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THE IMPACT OF CENTRAL BANK DIGITAL CURRENCIES ON MONETARY LAW: AN EUROPEAN PERSPECTIVE

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LIST OF FREQUENT ABBREVIATIONS

AML	*Anti-money laundering*
BIS	*Bank for International Settlements*
CBDC	*Central bank digital currencies*
CASP	*Crypto-asset service provider*
CFT	*Countering the finance of terrorism*
CJEU	*Court of justice of the European Union*
DLT	*Distributed ledger technology*
ECB	*European Central Bank*
EMD2	*Directive 2009/110/EC*
ESCB	*European system of central banks*
ICO	*Initial coin offerings*
IMF	*International monetary fund*
MiCA	*Markets in crypto-assets*
PoW	*Proof of work*
PoS	*Proof of stake*

INTRODUCTION

The evolution of the concept of money, a physiological consequence of the advancement of socio-economic contexts, accelerated significantly in recent decades. Over the past 50 years, several facts of historical significance from a monetary perspective have occurred. Even today, these have not been fully understood and investigated. One of these is the dematerialisation of money, which is the consequence of the disappearance of any material relationship with a physical unit of measurement. This dematerialisation led to the disappearance of any intrinsic value in money and emphasised its extrinsic value as identified in the nominalistic principle. The historical date that set this moment is 15 August 1971, when then US President Nixon declared the end of the convertibility of the dollar into gold, thus abandoning the fixed ratio of $35 per ounce of gold, conventionally established at Bretton Woods in 1944. Since that date, the world entered into a new historical phase, characterised by the liberalisation of the issuance of money. This liberalisation led to a radical change in the determination of the value of money and in the structure of monetary systems as an expression of a state's sovereignty from an economic perspective. Central banks' direct control over the quantity of money in circulation due to its anchorage to a physical and scarcely available unit of measurement was replaced by indirect control of the price of money, aimed at determining its quantity – and thus its value – through the indication of interest rates applied by central banks according to the monetary policy pursued. The stability and sovereignty of this system is based on two main elements: the trust placed in the central banks as issuers of the currency and their ability to channel monetary policy decisions to the real economy. The main channel through which these conditions are transmitted is represented by financial institutions, such as commercial banks, which provide credit to the economy at rates that reflect those set by central banks in the context of monetary policy. On the other hand, the emergence of information technologies in last decades has exacerbated this process. In the banking and financial industry, this phenomenon has been defined as "FinTech", and has led to a progressive transposition of the concept of money into the virtual sphere. This transposition, together with the liberalisation of the issuance of money, has led to a fragmentation of the concept of money, which in turn has fostered the rise of private forms of money operating outside

the traditional monetary and financial system. A key step in this process has been identified in the emergence of distributed ledger-based technologies, which have provided the technological conditions to enable the exchange of value between individuals without the need to rely on a central fiduciary intermediary. The potential disintermediation of value exchanges between individuals and proliferation of private unregulated virtual currencies denominated in their own unit of account challenge not only the intermediation role of financial institutions in the economy, but ultimately also the economic sovereignty of a state, represented by the control exercised over their own unit of account as applied in the relevant economic context. This is due – *inter alia* – to the potential weakening and disruption of monetary policy transmission mechanisms represented by financial institutions acting as intermediaries between central banks and the real economy. These concerns are particularly evident when considering specific types of digital assets based on distributed ledger technologies, referred to as "stablecoins", whose technological and economic features make them potentially suited to replace traditional fiat currencies, and which have currently reached a total market capitalisation of about USD 152 billion. The inherent complexity and variety of the economic and technological features which these new types of digital assets involve, combined with the relatively early stage of regulatory initiatives in this area, render the analysis of relevant risks by central banks and regulatory agencies increasingly challenging. Based on these premises, this paper aims to explore the phenomenon of digital assets, focusing on their legal and economic features, as well as on the challenges that their substantial diffusion could raise for central banks in the coming years. In particular, due to their variety and innovative capacity, the analysis will specifically address the phenomenon of crypto-assets, highlighting both the legal issues they entail and their systemic relevance in terms of financial stability. In chapter three, the analysis will then proceed with an in-depth examination of the different phenomena of central bank digital currencies and the correlation between the potential benefits arising from their introduction and the systemic concerns generated by the crypto-assets. In light of the relatively early stage of discussions regarding the introduction and design of a central bank digital currency, the paper will outline the main potential risks and benefits inherent to the key design choices currently being discussed in the European and international debate. Subsequently, the paper will focus on the possibility for a central bank digital currency issued by the Eurosystem (digital Euro) to assume the status of a legal tender in European countries that are part of the euro area in light of the interpretation of the concept of legal tender as provided by recent CJEU judgments. Finally, the monetary policy

mandate entrusted by the Treaties to the Eurosystem will be analysed to understand whether, and upon which conditions, a digital euro could be introduced under these powers. The first chapter analyses the evolution of the concept of money from its primordial forms to the present day, providing an overview of the different types of digital currencies populating the international economic environment, their characteristics and suggesting considerations on their current impact on the concept of money based on recent economic data. The second chapter focuses on the main legal issues related to crypto-assets. Due to the wide variety of crypto-assets and the uniqueness of their characteristics, the discussion takes into account their structural and functional peculiarities as outlined by the recently proposed European Regulation on markets in crypto-assets (MiCAR). The third chapter defines the phenomenon of central bank digital currencies, analysing their purpose and function in light of the modern economic and monetary environment, as well as the potential risks and benefits that their introduction might entail depending on the design choices currently being discussed in the European and international debate. The fourth chapter explores the possibility for a digital Euro to assume the status of legal tender by analysing the relevant European legislation and proposing an evolutionary interpretation of the legal tender concept in light of a recent CJEU judgment. It then proceeds to examine the monetary policy mandate entrusted to the Eurosystem as interpreted by the CJEU, arguing about the existence of legal grounds and policy reasons which would justify the introduction of a digital euro in the context of these powers.

CHAPTER I - THE GALAXY OF NEW CURRENCIES

Summary: 1. *The Evolution of Money: A Historical Background* – 2. *The Case for Central Bank Digital Currencies* – 3. *The Galaxy of New Currencies* – 3.1. *Electronic Money* – 3.2. *Virtual Currencies* – 3.3. *Crypto-assets* – 3.4. *Stablecoins*.

1. The Evolution of Money: A Historical Background

Money has always been a concept elusive to definitions. The reason for this can be attributed to the fact that the concept of money, as the historian Philip Grierson already reported in his famous work "The Origins of Money", "must be considered in the context of the society in which it exists"[1]. In fact, the concept of money has constantly evolved over time as the social and economic needs of a given community in a given historical period have changed. This contrasts with the granitic nature of the functions performed by money, the classification of which can already be found in Aristotle's Nicomachean Ethics, namely: unit of account, means of payment (or exchange), and store of value. Wanting to discern the nature of money *per se*, it can be said that it is essentially composed of an intrinsic element and an extrinsic element. The first, already characteristic of the primordial forms of money, and whose influence continued over time until the abandonment of the Gold Standard in the context of the 1931 Bretton Woods agreements, is the value of the medium on which the money is produced. Indeed, the value of the medium, by virtue of its physical properties, determined a generalised desire for possession in society. Because of its scarcity, gold has historically proven to be a suitable commodity along with other precious metals. This desire is at the basis of the concept of money as a store of value and medium of exchange, as the commodity is no longer conceived in a finalistic, but in an instrumental sense. Indeed, once gold had been assigned the instrumental function of medium of exchange, there was a completely autonomous development of this function, so that its value was soon based solely on the possibility of alienation for further goods and services. In other words, the assumption by gold (and by other precious metals) of the function of store of value and medium of exchange, depending on the eras and geographical contexts, arose from a different declination of the desire to possess such commodities, which no longer resulted in a direct, but rather an indirect relationship with the commodity itself[2]. On the other hand, the extrinsic value of money is represented by the collective desire to possess it. In this light, the indirect (*i.e.* medium of exchange) relationship between money and the individual is enriched and influenced by the relationship between money and the collectivity as a whole, which provides money with its function as a measure

[1] Philip Grierson, "The Origins of Money", lecture given at Cambridge University, 1976, p. 9

[2] Raffaele Beretta Piccoli, "Ontologia del denaro", Journal of Aesthetics, 40 | 2009, p. 85-104, available at: https://doi.org/10.4000/estetica.1893

of value (*i.e.* unit of account). In fact, the generalised desire for a certain good, regardless of whether it is expressed directly through the use of the good or indirectly through the exchange of the same for other goods or services, entails its erection as a measure of value with respect to all other goods. Although it is not the purpose of this thesis to analyse or hypothesise a hierarchy of value between the three different functions commonly attributed to money, it seems appropriate to mention the relevance of the unit of account function in Grierson's work. In particular, Grierson assumes an ontological prevalence of the function of unit of account over the other functions of money, identifying it as the common denominator of proto-monetary experiences. For instance, he mentions how grain and stockfish, although used as a form of money, do not constitute a store of value, regardless of whether it is conceived in terms of concentrating value over a long period of time, or in terms of maintaining value over a significant period. On the contrary, it is pointed out that diamonds have regularly been recognised as a store of value but have never been used as a medium of exchange. Moreover, referring to the function as a medium of exchange, Grierson states that unless the value of a commodity is relatable to a unit of account in the socio-economic reference system, transactions in which that commodity is used as a medium of exchange can still be defined as barter. The extrinsic value of money, therefore, initially manifested through a metric applicable in a given social context, and subsequently through the authority that coined it from time to time. This extrinsic value can be defined as a "nominal" value, *i.e.* hetero-attributed to money by an authority on the basis of social conventions and guaranteed in turn by the value of the support material. It is therefore possible to observe how there was an interdependent relationship between the intrinsic and extrinsic value of money, *i.e.* between the authority that coined the money and the value of the medium on which it was coined. An eminent example of the relationship between money and authority has also been recognised in a well-known passage from the synoptic gospels in which, when Jesus is asked whether it was lawful to pay a tribute to Caesar, he, after examining the metallic coin, replies with the famous statement "render unto Caesar the things that are Caesar's, and unto God the things that are God's"[3]. The phrase, in addition to determining the hetero-attributive limit of earthly power with respect to divine power, provides a useful suggestion to understand how the state-centred conception of money that we witness in modern monetary institutions was already ideologically embedded in Palestine at that time. However, the interdependent relationship between the nominalistic

[3] De Stasio, V., "Verso un concetto Europeo di Moneta Legale: valute virtuali, monete complementari e regole di adempimento", Il Fallimentarista, 2018, p. 3

and intrinsic value of money, historically tilted in favour of the latter, gradually balanced out in favour of the former. In fact, the replacement of metallic coins with paper securities as a form of money in the context of the commercial developments of the 14th century resulted in a prevalence of the fiduciary element of money over its intrinsic element. This rebalancing was caused by purely commercial needs. Indeed, there was a material limitation in the management of money supply due to the impossibility of controlling the availability of the precious metals on which it was minted. Moreover, transporting and holding large quantities of precious metals constituted a risk for economic operators. The consequences of this phenomenon in the following centuries were twofold: on the one hand, the fiduciary element arose as the pivotal element in monetary systems through the transformation of metallic coins first into credit certificates (*i.e.* documents representing the right to receive money in the form of metallic coins with intrinsic value) and later into securities, (*i.e.* documents that did not contemplate any further performance)[4]. From a historical perspective, the elimination of the further performance due in metallic money by virtue of the credit certificates held coincided with the end, in the second half of the 20th century, of gold as the standard reference value for the world monetary system and concluded the transformation of money into an essentially nominalistic concept. On the other hand, the side effects of this process materialised in the expansion and, at least initially, the fragmentation of the monetary base. With reference to the fragmentation of the monetary base, it occurred as its management was not immediately centralized and subject to public control. Initially, there were multiple private credit institutions issuing securities, which then circulated in the real economy as banknotes. An example of this can be found in the so-called "Free Banking" era which took place in many states worldwide during the second half of the 19th century. This peculiar monetary system arose in an institutional environment without legal tender and central banks, where the issuance of money was left at the disposal of individual private banks. This scenario was accompanied in the United States of America by a massive deregulation of the banking industry and allowed in many American states the creation of private credit certificates that took on the function of banknotes. These banknotes, issued by private banks, were put into circulation throughout the United States. One of the major criticisms of this system was that the exchange value of these private banknotes could fluctuate significantly depending on both the issuing institution and the geographical area where the note was exchanged. In other words, there was a *de facto* secondary market for banknotes in

[4] De Stasio, V., "Verso un concetto Europeo di Moneta Legale: valute virtuali, monete complementari e regole di adempimento", Il Fallimentarista, 2018, p. 5, which refers to Pellizzi, G.L., "Principi di Diritto Cartolare", Bologna, 1967

circulation. This secondary market, although efficient in economic terms, rendered the overall monetary system inefficient, as the finalisation of transactions was constantly subject to uncertainty due to the volatility of private banknotes' nominal value[5]. Overall, the nominalistic transformation of the concept of money as just mentioned constitutes an ontological prerequisite for two closely related concepts which form the basis of modern monetary systems: fiat money and fractional reserve banking. As eminently observed, during the 20th century, an epochal change characterised the evolution of the international monetary system: the shift from commodity money (commodity standard) to fiat money (fiat money standard). This transformation, which took place gradually between the Great War and the suspension of dollar convertibility in August 1971, is the key to the interpretation of the Bretton Woods agreements in 1944. The Bretton Woods monetary order represents a last, ephemeral attempt to maintain a link with commodity-backed money[6]. The term fiat money, contrary to the concept of commodity-backed money, represents today a type of money issued by a sovereign state or a monetary union, the value of which is not ultimately guaranteed by any commodity, but rather by the relationship between its supply and demand. Indeed, fiat money possesses neither intrinsic value nor direct use value. Its functional legitimacy is not due to the intrinsic value of the medium (*i.e.* banknotes or electronic entries) by means of which it is transferred, but solely because of the institutional legitimation it receives from the issuing authority as "legal tender". This legitimation, on the one hand, produces a legal obligation to accept this type of money for the settlement of obligations in the relative socio-economic context, thus making it a medium of exchange. On the other hand, it assigns to this type of money the role of a unit of account, making its value stable and universally shared. As regards to fractional reserve banking, it does not refer to the concept of money itself, but rather to the process through which commercial banks expand the monetary base by "creating" money. It has been argued that the birth of fractional reserve banking coincides with the birth of the world's first central bank, the Swedish Riksbank, in 1688. Although other primitive forms of fractional reserve banking were already in use, its wider diffusion followed the institutionalisation of this model by Sweden. Fractional reserve banking is based on the idea that the virtual expansion of money held by commercial banks as deposits through loans constitutes not only a more efficient use of available resources but can also benefit the economy as a whole by stimulating

[5] Gary B. Gorton and Jeffery Y. Zhang, "Taming Wildcat Stablecoins", SSRN, 2021, p. 20-25
[6] Filippo Cesarano, "Gli Accordi di Bretton Woods: la costruzione di un ordine monetario internazionale", Collana Storica della Banca d'Italia, 2000

spending[7]. For a better understanding of how fractional reserve banking intersects with the modern monetary system, a clarification regarding the distinction between commercial money and central bank money is deemed appropriate. Nowadays, the monetary base of most monetary systems consists of two main elements: central bank money and commercial bank money. The former constitutes a liability of the central bank and represents the form of money institutionally referred to as "legal tender" in that it serves not only as a medium of exchange and store of value, but most importantly as a unit of account. Moreover, it is a risk-free type of money, as a central bank is not inherently subject to credit risk. Examples of central bank money are banknotes, coins and commercial banks' reserves held at the central bank. By contrast, commercial bank money constitutes a liability of commercial banks as regulated and supervised institutions. As a liability of private credit institutions, this type of money is subject to the risk of default by the issuing institution. Although not explicitly endorsed as legal tender in most countries, this type of money constitutes the bulk of the monetary base of modern economic systems. The fungibility of commercial bank money (*e.g.* bank deposits) is ensured by its virtual convertibility on demand vis-à-vis other manifestations of a currency (*e.g.* central bank money and banknotes). The relationship between central bank money and commercial money constitutes the main transmission channel of monetary policy. The primary objective enshrined in central banks' mandates internationally is to regulate the price of money. Indeed, since these cannot directly regulate the quantity of money in circulation due to fractional reserve banking, the central banks' role in modern monetary systems is to regulate the cost of money (and thus indirectly its quantity) through the provision of two main interest rates: (i) the interest rate paid on commercial banks' deposits held at the central bank; and (ii) the interest rate at which commercial banks can borrow money from the central bank in contexts of short-term liquidity needs. These considerations highlight how the nominalistic principle is inherently embedded in the modern concepts of money and monetary systems. In this perspective, the fragmentation of monetary systems by private forms of money that elude the direct or indirect control of the countries in which they are diffused would exacerbate (as better detailed below) the nominalistic system that characterises modern economies, with significant consequences in terms of monetary sovereignty. Moreover, they indicate how the evolution of the concept of money over time was mainly led by commercial needs. For these reasons, in a context where the fiduciary element is central to determining the value of money regardless of the medium through which it is expressed, notwithstanding the natural necessity to maintain

[7] Source Binance: https://academy.binance.com/en/articles/what-is-fractional-reserve

the concept of money up to date with technological innovations, there seems to be scope to advocate for the preservation of this trust.

2. The Case for Central Bank Digital Currencies

The potential issuance of sovereign digital currencies is one of the main topics in the current economic and political debate. It stems from a technological revolution that began with the advent of information technology (IT) systems, and which is challenging not only the financial industry, but the overall role of the banking system, and ultimately the relationship between money and sovereignty. As already mentioned, over the centuries the link between sovereignty and money has taken on different forms and modalities, culminating in the concept of nominalism, which today takes the form of a fiduciary intermediation between individuals and financial institutions, both public and private. As far back as 1997, when the internet was still at its outset, it was proposed that "throughout history, economic development has depended on the creation of new monetary abstractions. Long ago currency supplanted barter in our society; more recently, paper checks and plastic cards have replaced currency in many contexts, [...] the culmination of this progression is electronic cash"[8]. The accuracy of this prediction may be confirmed today as we assist to a steady decline in the use of cash worldwide. In the last two decades, the expansion of digital commerce has been unprecedented, with the value of the digital payments segment projected to reach US $ 8.49 trillion within 2022[9]. Along with the growth of digital commerce, payment solutions and related market players have emerged and gained significant strategic importance. In the European context, the total number of non-cash payments reached a total value of € 162.1 trillion in 2019, representing an increase of 8.1 per cent compared with the previous year[10]. In this respect, significant regulatory interventions have occurred to include and reconcile recent technological developments in the payments sector within the European legal framework. However, it could be argued that the real driving force which led the international community of central banks to consider the issuance of sovereign digital currencies as a complement to cash stemmed from the emergence of distributed ledger-based technologies. Today it is estimated that more than 80 per cent of central banks worldwide are considering launching a central bank digital currency or have

[8] Joshua B. Konvisser, "Coins, Notes and Bits: the case for legal tender on the internet", Harvard Journal of Law & Technology, Volume 10, Number 2, 1997, p. 324-326

[9] Source STATIST: https://www.statista.com/outlook/dmo/fintech/digital-payments/worldwide

[10] European Central Bank, "Payment Statistics: 2019", available at https://www.ecb.europa.eu/press/pr/stats/paysec/html/ecb.pis2019~71119b94d1.en.html

already done so[11]. This widespread interest is due to the growing need for central banks, as holders of monetary policy control and promoters of the safety and efficiency of the payment systems, to respond to the increasing relevance of private digital currencies in the context of payment services, which is exacerbated by a steady decline in the use of cash[12]. Although already hypothesised since 1991[13], distributed ledger technology (DLT) has gained relevance in the financial industry since the publication in 2008 of the "white paper" of a new peer-to-peer electronic money system called "Bitcoin" by the well-known pseudonym Satoshi Nakamoto. The term distributed ledger technology was later defined as "a type of technology that supports the distributed recording of encrypted data"[14]. Moreover, DLT stands in a *genus to species* relationship with the technology underlying the functioning of Bitcoin (commonly referred to as "blockchain"), as it refers to a broader category of computer protocols with multiple application solutions. Regarding their application to digital monetary transactions, distributed ledger-based technologies have the potential to eliminate the need for a central authority to prevent transactions manipulation, as well as to manage any other related incidental aspect (*e.g.* dispute mediation, anti-money laundering requirements, etc.). In this way, entrepreneurial projects based on such technologies promise not only an alleged[15] democratisation of the financial industry through the decentralisation of control, but also an increase in the inclusiveness of the financial system itself through the overall lowering of transaction costs which assertively limit the minimum practical transaction size and cut off the possibility for small casual transactions[16]. However, it should be pointed out that this proposition is contradictory. Indeed, what has been called the "mirage of low operational costs"

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[11] PricewaterhouseCoopers, "Global CBDC Index and Stablecoin Overview", 2022 available at https://www.pwc.com/gx/en/new-ventures/cryptocurrency-assets/pwc-global-cbdc-index-stablecoin-overview-2022.pdf

[12] As regards the Euro area, while there are differences among Member States, overall, the use of cash is declining. For more information in this respect, please refer to https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp211105~08781cb638.en.html

[13] In 1991, Stuart Haber and W. Scott Stornetta wrote "How to Time-Stamp a Digital Document", where they propose practical procedures to certify when a digital document is created or modified. Later, in 1997 Adam Back proposed Hashcash, a proof-of-work system used to limit spam e-mails and Denial of Service attacks. In 2002, David Mazières and Dennis Shasha proposed Hashcash as a system for storing data on a network. Finally, in 2005 Nick Szabo proposed the first decentralised currency, which he called "bit gold". For more information in this respect, please refer to: https://academy.youngplatform.com/blockchain/dlt-blockchain-storia-differenze/

[14] Art. 3 (1) (1), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

[15] A blockchain can be either centralised or decentralised. However, it is important to point out that the term "decentralised" is not to be confused with "distributed". Whilst a blockchain is inherently distributed (*i. e.* many parties hold copies of the ledger), it is not inherently decentralised. Whether a blockchain is centralised or decentralised depends on the rights of participants on the ledger. Therefore, it is purely a question of design. For more information in this respect, please refer to: https://www.finra.org/sites/default/files/2017_BC_Byte.pdf

[16] Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System", 2008, p. 1, available at: https://bitcoin.org/bitcoin.pdf

associated with blockchain stems from the false impression of free transactions: in reality, taking into account seigniorage rents that cover the costs of "distributed consensus", each transaction on the blockchain would cost around $ 5-10[17]. Less expensive forms of distributed consensus have not yet been demonstrated, and in any case the cost of integrating them into the existing financial infrastructure would not be insignificant[18]. Overall, as stated in the Bitcoin white paper, "a purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution"[19]. This would of course entail not only an economic revolution, but also a political and institutional one. The Bitcoin project, by implying the proposition of a system of electronic transactions that do not require fiduciary intermediation, stands in stark contrast to the underlying structures of the modern financial and monetary system as analysed above. Thus, the reasons for such an interest on the part of central banks in issuing a sovereign digital currency are not only economic, but also political. Indeed, a possible widespread diffusion in the economy of digital currencies whose functioning is linked to technologies based on distributed registers could entail several side effects. The most relevant would be that of the loss by states of control over the monetary base, and thus of monetary sovereignty. For example, the Bitcoin project, while potentially classifiable as fiat money insofar as its value is ultimately guaranteed exclusively by the trust placed by its holders in the deflationary structure[20] of the computer protocol that supports its operation, stands completely outside the traditional financial system, as: (i) the production of new Bitcoin units is not under the control of any entity, public or private; (ii) its overall operation is not conditioned by the intervention

[17] Bitcoin's monetary system operates with full decentralisation. As further discussed below, the distributed consensus mechanism enabling this decentralisation virtually empowers all participants of the network to validate transactions by solving mathematical problems with high computational complexity. This ensures the security of the consensus mechanism. However, it also involves a very slow flow of transactions which renders Bitcoin hardly scalable and extremely energy-consuming. Indeed, in 2021Cambridge researchers created an online tool which estimated Bitcoin's energy consumption at 121.36 terawatt-hours (TWh) a year. The online tool has ranked Bitcoin's electricity consumption above Argentina (121 TWh), the Netherlands (108.8 TWh) and the United Arab Emirates (113.20 TWh). In the regulatory context, this feature led to European legislators to consider banning the consensus mechanism used by Bitcoin (so-called Proof-of-Work) through the recently introduced MiCA Regulation proposal due to its significant carbon footprint. For more information in this respect, please refer to: https://www.nytimes.com/interactive/2021/09/03/climate/bitcoin-carbon-footprint-electricity.html

[18] Ferdinando M. Ametrano, "Le premesse incerte della tecnologia distributed ledger per i mercati finanziari", available at: https://www.borsaitaliana.it/borsaitaliana/academy/bitcoin-blockchain-chimera-dlt.htm

[19] Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System", 2008, p. 1, available at: https://bitcoin.org/bitcoin.pdf

[20] Bitcoin's supply is inherently subject to a cap. Indeed, according to the Bitcoin protocol, the maximum number of Bitcoins that can be issued is 21 million. New bitcoins are added to the Bitcoin supply approximately every 10 minutes, which is the average amount of time required to create a new block of the Bitcoin blockchain. Due to the protocol's design, the number of bitcoins issued per block is reduced by 50 per cent after every 210,000 blocks (*i.e.* about once every four years). For more information in this respect, please refer to: https://bitcoin.org/en/faq#general

of any financial intermediary. However, the most recent considerations regarding the overall structure of the computer protocol underlying the Bitcoin project seem to conclude for its definition as a commodity, rather than a currency. In fact, several technological features such as high transaction costs, the lack of institutional recognition as "legal tender" currency by most states[21], as well as the significant intrinsic volatility of its value, have led to this technology being considered as unsuitable for the settlement of financial transactions[22]. With regard to the volatility of its value, suffice it to say that the value of a Bitcoin has currently fallen by roughly 70 per cent in just ten months, compared to the peak value of EUR 67,000 reached in November 2021[23]. These considerations highlight how the real digital alternative to sovereign currencies may not come from projects like Bitcoin or similar, commonly referred to as "cryptocurrencies", but rather from so-called "stablecoins". A stablecoin, as further discussed below, constitutes a particular type of crypto-assets and can be defined as "a specific category of crypto-assets that aim to maintain a stable value relative to a specified asset, or a pool or basket of assets and provide perceived stability when compared to the high volatility of unbacked crypto-assets"[24]. However, as recently stated, stablecoins "inhabit the same realm as Bitcoin and other cryptocurrencies, in that they are electronic, can be exchanged peer-to-peer and are not issued by central banks"[25]. Indeed, although they share operational characteristics with cryptocurrencies from a technological perspective (the technologies underlying stablecoins ensure the interoperability of such assets across different types of DLT), they attempt to overcome their main weaknesses by differing in the method through which their value is determined. In fact, stablecoins' value is usually pegged to an underlying traditional fiat currency such as the US Dollar or the Euro. This makes them more suitable for widespread use in the context of digital payments, as it significantly diminishes the volatility of their value. It is worth noting that, as of March 2022, the market cap of the top 10 stablecoins reached a combined value of over USD 160 billion[26]. However, stablecoins still only account for about 6 per cent of the estimated USD 2 trillion total market capitalisation of crypto-

[21] At present, Bitcoin has been recognised as legal tender in only two states, namely El Salvador and the Central African Republic. On the other hand, Bitcoin and cryptocurrencies in general have been declared illegal in several countries around the world, such as Russia and China.
[22] Ferdinando M. Ametrano, "The uncertain premises of distributed ledger technology for financial markets", available at: https://www.borsaitaliana.it/borsaitaliana/academy/bitcoin-blockchain-chimera-dlt.htm
[23] Source Coin Market Cap: https://coinmarketcap.com/it/currencies/bitcoin/
[24] Financial Stability Board, 2020, available at: https://www.fsb.org/work-of-the-fsb/financial-innovation-and-structural-change/crypto-assets-and-global-stablecoins/
[25] Douglas Arner, Raphael Auer and Jon Frost, "Stablecoins: risks, potential and regulation", Bank for International Settlements Working Paper No. 905, 2020, p. 3
[26] Source Statista: https://www.statista.com/statistics/1255835/stablecoin-market-capitalization/

assets[27]. Moreover, because of their stability, stablecoins' scope in the crypto-assets ecosystem have multiplied. As recently pointed out, "in addition to acting as a relatively safe "parking space" for crypto volatility, stablecoins serve as a bridge between fiat currencies and crypto assets"[28]. Overall, stablecoins' rapid growth, increasing global use cases and potential financial risk contagion channels make it urgent to implement effective regulatory, supervisory and oversight frameworks before significant further interconnectedness with the traditional financial system occurs. Attention to stablecoins has also increased due to recent events occurred in the crypto-assets ecosystem. In March 2022, an algorithmic stablecoin denominated "Terra USD" imploded by losing 97 per cent of its value in just a month. The panic which ensued the debacle erased hundreds of billions of dollars from the entire crypto-assets market. Indeed, Terra USD was one of the main stablecoins in the crypto-assets ecosystem and had reached a capitalisation of approximately USD 60 billion[29]. As a result, stablecoins are currently in the spotlight of policy makers. For instance, in April 2022, the HM Treasury of the United Kingdom announced plans to regulate stablecoin by amending the 2017 Payment Service Regulations, Financial Services Act and the 2011 Electronic Money Regulations Act, so that it could become part of the retail payments system. On July 20, 2022, the Financial Markets and Services Act was finally introduced to the UK parliament. Its official approval is expected within the following weeks. Besides from repealing several European Union provisions in the financial sector which remark the UK's renewed regulatory independence, the Act provides a comprehensive regulatory framework for crypto-assets and stablecoins. The UK's regulatory initiative echoes the recent efforts of the European Union in approaching the crypto-assets ecosystem. Indeed, the European Union is currently leading international efforts to set up a new, harmonised regulatory framework for stablecoins through the Markets in Crypto-assets Regulation (MiCA)[30]. MiCA Regulation proposal constitutes a bespoke framework for the issuance and provision of services related to stablecoins and other crypto-assets and is part of a broader digital finance package which aims to develop a European approach to crypto-assets that fosters technological development while ensuring financial stability and consumer protection. Furthermore. Under this Regulation, stablecoin issuers and

[27] Mitsutoshi Adachi, Alexandra Born, Isabella Gschossmann and Anton van der Kraaij, "The expanding functions and uses of stablecoins", published as part of the ECB Financial Stability Review, 2021

[28] Mitsutoshi Adachi, Alexandra Born, Isabella Gschossmann and Anton van der Kraaij, 'The expanding functions and uses of stablecoins', published as part of the ECB Financial Stability Review, 2021

[29] For more information in this respect, please refer to: https://www.cnbc.com/2022/05/31/uk-plans-new-safeguards-for-stablecoins-after-terra-collapse.html

[30] Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937, available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0593

crypto asset service providers would be subject to the same set of minimum requirements, irrespective of their applicable licensing regime. With reference to the timing of adoption, a provisional agreement on the text of the regulation was reached on 30 June 2022 between the Council of the European Union's presidency and the European Parliament, which should consequently enter into force in 2023. With reference to the United States, a legislative proposal is currently being discussed, which should provide comprehensive regulation of crypto-assets and recognise stablecoins as part of the traditional financial system by subjecting them to banking-like regulation. Approval of the text is however scheduled for 2023, as policymaking in the U.S. will grind to a halt in November due to midterms elections[31]. In this respect, it could be argued that the regulation of stablecoins, while necessary for the prevention and containment of the systemic risk that their massive adoption could entail, would also make them part of the traditional financial system, legitimising and presumably further intensifying their use. Because of its characteristics, it has been argued that the growing presence of such a digital asset within the traditional financial system could enable it to "achieve a global footprint and become widely used for European retail payments. Such development would foster innovation but could also threaten European financial, economic and, ultimately, political sovereignty"[32]. In this scenario, it is worth mentioning that Circle, one of the largest US technology companies operating in the field of peer-to-peer payments and issuer of one of the most successful stablecoins, namely USDC[33], on 30 June 2022 issued the first stablecoin whose value is linked to the Euro (EUROC)[34], effectively creating a private European digital currency and further expanding the stablecoins market in Europe. The mass adoption of a euro-denominated stablecoin as EUROC could affect the European Central Bank's ability to offer sovereign money to all citizens and manage it in the public interest. Indeed, such an expansion of stablecoins as stable private digital assets could affect the availability of safe assets in the financial environment, which in turn could influence the level and volatility of real interest rates[35]. Overall, as recently stated by the ECB, "in such circumstances, issuance of a digital

[31] For more information in this respect, please refer to: https://www.reuters.com/markets/us/stablecoins-face-bank-like-us-regulation-under-draft-house-bill-source-2022-07-20/

[32] European Central Bank, "Report on a Digital Euro", 2020, p. 11-12

[33] USDC is a stablecoin issued by Circle in September 2018, the value of which is tied to the US dollar. The stablecoin currently has a market capitalisation of USD55 billion and is an integral part of the crypto-asset ecosystem. For more information in this respect, please refer to: https://coinmarketcap.com/it/currencies/usd-coin/

[34] Euro Coin (EUROC) is a stablecoin issued by Circle under the same model as the dollar digital currency USD Coin (USDC). According to Circle, Euro Coin is 100 per cent backed by euros held in euro-denominated banking accounts and is always redeemable 1:1 for euros. For more information in this respect, please refer to: https://www.circle.com/en/euro-coin

[35] World Economic Forum, "The Macroeconomic Impact of Cryptocurrency and Stablecoins", White Paper, 2022, p. 36

euro could support European sovereignty and stability, in particular in the monetary and financial dimensions"[36].

3. The Galaxy of New Currencies

The galaxy of digital assets that inhabit the modern economy is characterised by highly heterogeneous elements, whose differences are evident from both an ideological and structural point of view. The common element of the various projects available is represented by the technological innovation that has characterised the financial industry in recent decades. This phenomenon is commonly referred to as "Financial Technology" (FinTech). The use of technology constitutes a necessary element in making financial innovation possible. The nature of the relationship between technological innovation and financial intermediation is being explored - from different perspectives - in numerous international public and private forums, with regard to the impact that technological transformation is having on the global financial system. The technology-driven changes taking place in financial services markets have a far deeper and broader political scope than a mere reshaping of specialised economic structures (*e.g.* markets and financial intermediaries), as we know them today[37]. With the aim of delimiting the scope of the analysis, this chapter will examine the main FinTech innovations which took place in the context of digital assets*,* as well as the related regulatory initiatives undertaken at the European level due to their status and influence in the global regulatory arena[38]. Nonetheless, it is worth pointing out that at the birth of the FinTech phenomenon in the 21st century, the term was initially used to define technologies implemented in the back-end of information systems (*i.e.* the administration systems not visible to the user) of financial

[36] European Central Bank, "Report on a Digital Euro", 2020, p. 12
[37] Commissione Nazionale Società e Borsa (CONSOB), "*Fintech*", available at: https://www.consob.it/web/area-pubblica/sezione-fintech
[38] The European Union's significant regulatory influence in the global arena has been denominated as the "Brussels Effect". In particular, it has been argued that "notwithstanding its many obvious challenges, the EU remains an influential superpower that shapes the world in its image. The Brussels Effect refers to the EU's unilateral power to regulate global markets. Without the need to resort to international institutions or seek other nations' cooperation, the EU has the unique ability among nations today to promulgate regulations that shape the global business environment, elevating standards worldwide and leading to a notable Europeanisation of many important aspects of global commerce. Different from many other forms of global influence, the Brussels Effect entails that the EU does not need to impose its standards coercively on anyone-market forces alone are often sufficient to convert the EU standard into the global standard as multinational companies voluntarily extend the EU rule to govern their global operations. In this way, the EU wields significant, unique, and highly penetrating power to unilaterally transform global markets, including through its ability to set the standards in diverse areas such as competition regulation, data protection, online hate speech, consumer health and safety, or environmental protection'. Source: Bradford, Anu, "The Brussels Effect: How the European Union Rules the World", Oxford Academic, 2019

and banking institutions. Over time, however, FinTech has increasingly shifted towards a consumer-oriented conception, in a quest for a comprehensive digitalisation of financial services.

3.1. Electronic Money

From a substantive point of view, the concept of e-money as a digital representation of value intersects the entire ecosystem of digital assets. From a technical standpoint, in e-money this value is stored electronically either through a physical technological device (hardware-based product), or through a software protocol that can be used on different physical devices (software-based product). The device operates as a prepaid bearer instrument and transactions carried out through it do not necessarily involve the opening of a bank account. As the complexity and diversity of the different types of digital assets increased, it became necessary to delineate a specific framework of this phenomenon. From a European perspective, Directive 2009/110/EC[39] (EMD2) established a legal basis for e-money issuance in the European Union. Article 2 (1) of EMD2 defines an "electronic money institution" as "a legal person that has been granted authorisation to issue e-money". Article 2 (2) then proceeds in defining "electronic money" as "electronically, including magnetically, stored monetary value as represented by a claim on the issuer which is issued on receipt of funds for the purpose of making payment transactions [...], and which is accepted by a natural or legal person other than the electronic money issuer". Under the European Directive, e-money may be issued by credit institutions, as well as by other financial and non-financial institutions. The definition of e-money provided by the Directive makes clear its difference from banknotes. It is considered "stored monetary value" and is not given the status of legal tender, which conversely is assigned to euro banknotes by article 128 (1) of the Treaty on the Functioning of the European Union (TFEU) and to euro coins by article 11 of Regulation EC/974/98. On the other hand, to provide a systematic classification for this type of representation of value, a further distinction should be made. Electronic money as stored monetary value can be considered "commercial money", as electronic money transactions are conducted in money created by

[39] Directive 2009/110/EC of the European Parliament and Council of 16 September 2009 on the taking up, pursuit and prudential supervision of the business of electronic money institutions, amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC

commercial banks, and only ultimately settled in central bank money in the form of reserves held by commercial banks with the central bank. As a result, while being part of the monetary system, electronic money as defined by EMD2 differs from central bank money. Indeed, likewise commercial bank money, electronic money represents a liability of the electronic money issuer as a supervised institution, and not of the central bank. The difference between central bank money[40] and commercial money resembles the difference between public and private money, as only the former is attributed the status of legal tender. Moreover, art. 11 of EMD2 instructs European Union member states to "ensure that electronic money issuers issue electronic money at par value on the receipt of funds", and mandates that "upon request by the electronic money holder, electronic money issuers redeem at any moment and at par value, the monetary value of the electronic money held". These provisions mirror the European Central Bank's objective to maintain the uniformity and thus the sovereignty of the euro currency. In an environment where most euros are created and issued by commercial banks and where most retail payments are operated by private providers, this is achieved through the convertibility at par into public money of all monetary instruments with the same nominal value in all circumstances. Overall, this process prevents the fragmentation of the monetary system, where different manifestations of a currency become imperfect substitutes, thus creating a fundamental uncertainty about the value of money[41]. As a result, electronic money issuers, likewise commercial banks, are subject to regulation and oversight under the Directive to ensure that the value of their liabilities is preserved.

3.2. Virtual Currencies

The term virtual currency was initially coined in 2012 by the European Central Bank to define "a type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community"[42]. The universe of currencies that can be considered virtual has expanded considerably since 2012 to include various representations of value that do not adhere to the ECB's definition.

[40] In this paper, the terms "central bank money" and "public money" will be used interchangeably due to their common features as risk-free assets.
[41] Markus Brunnermeier, Jean-Pierre Landau, "The Digital Euro: policy implications and perspectives" Policy Department for Economic, Scientific and Quality of Life Policies, Directorate General for Internal Policies, European Parliament, 2022, p. 16,
[42] European Central Bank, "Virtual Currency Schemes", 2012, p. 5

However, starting from this definition, it is possible to understand how virtual currencies share common features with other types of digital assets such as electronic money and crypto-assets. Together with electronic money, virtual currencies can be considered as a specific type of digital asset, basically used to carry out digital transactions. However, a distinction must be made between virtual currencies and electronic money. As mentioned above, according to the EMD2, e-money is a monetary value represented by a claim on the issuer that is: (i) stored electronically; (ii) issued upon receipt of funds of no less than the value of the monetary value issued; and (iii) accepted as a means of payment by undertakings other than the issuer. Although some of these criteria are also met by virtual currencies, there is an important difference. In e-money systems, the link between e-money and the traditional money format is preserved and has a legal basis, since the funds issued in the form of e-money are expressed in the same unit of account as the funds received in exchange by the users (*e.g.* US dollars, euros, etc.). In virtual currency systems, the unit of account is changed into a virtual one (*e.g.* Bitcoin, Ether). Consequently, virtual currencies establish a specific exchange rate with respect to the traditional currency. This is naturally subject to fluctuation, as the value of the virtual currency is based on the often volatile relationship between its supply and demand. Moreover, the conversion in a virtual unit of account blurs the link to the traditional currency, which could be problematic when recovering funds, assuming this is allowed. Finally, the fact that a virtual currency is denominated differently (*i.e.* not in euros, US dollars, etc.) and that the funds often do not have to be repaid at face value means that complete control of the virtual currency is left to the issuer, which is usually a non-financial company. A further difference lies in the fact that e-money systems are regulated and institutions issuing means of payment in the form of e-money are subject to prudential supervision requirements. From an international point of view, despite regulatory initiatives undertaken by the European Union through the MiCA Regulation proposal, the same does not yet apply to virtual currency systems. Consequently, the risks faced by e-money and virtual currencies as different manifestations of value are different. E-money is mainly subject to the operational risk associated with potential disruptions of the system in which the e-money is stored. Virtual currencies are not only subject to credit, liquidity and operational risk without any kind of underlying legal framework but are also subject to legal uncertainty and the risk of fraud, due to the lack of regulation and public oversight[43]. Furthermore, these are subject to limited

[43] European Central Bank, "Virtual Currency Schemes", 2012, p. 16-17

spendibility due to the current lack of acceptance from merchants. Indeed, as per any other payments service infrastructure, virtual currencies would require a diffused network of merchants accepting there as a means of exchange and a substantial number of users in order to be operational and effective. With respect to cryptocurrencies and crypto-assets in general, all virtual currencies and crypto-assets are digital assets. However, not all digital currencies are cryptographically secured. Indeed, cryptocurrencies always use cryptography to secure their networks, while virtual currencies may or may not use cryptography to secure their networks[44]. Furthermore, according to their operational structure, virtual currencies can be classified as follows: (i) closed virtual currencies; and (ii) open virtual currencies. As for closed virtual currencies, they operate in a controlled and private ecosystem. Such virtual currencies cannot be converted into other virtual currencies or traditional fiat currencies. Examples of closed virtual currencies are the currencies of gaming systems. Although such currencies can be used in their respective environments, they cannot be converted into traditional currencies. On the other hand, open virtual currencies (also known as convertible virtual currencies), can be converted into other forms of money. They operate in open ecosystems and can be converted into another virtual currency or into traditional currencies, either within the platform or outside of it. Examples of open virtual currencies are stablecoins and cryptocurrencies. Bitcoin and Ethereum, the two largest cryptocurrencies by market capitalisation, can be converted into other cryptocurrencies or some fiat currencies.

3.3. Crypto-assets

As a preliminary remark, it should be noted that, in line with the approach proposed by the Financial Stability Board as well as by other international policy committees, in this paper cryptocurrencies will be referred to as "crypto-assets" to emphasise the fact that cryptocurrencies are effectively not currencies. This is because cryptocurrencies do not completely satisfy the three main roles associated with a currency from an economic perspective, as: (i) their high price volatility limits their use as a reliable store of value. As further discussed below, cryptocurrencies either constitute liabilities of unregulated private entities, or do not constitute liabilities of any entity at all. As a result, the fluctuations in their market capitalisation have been significant and unforeseeable due to their

[44] Source Investopedia: https://www.investopedia.com/terms/v/virtual-currency.asp

uncorrelation with traditional asset classes, (ii) their current limited acceptance network significantly restricts as a means of exchange. Their already mentioned lack of legal tender status in most countries internationally entails that cryptocurrencies are accepted only when to parties agree to use it a means of payment; (iii) to date, there is little evidence that cryptocurrencies are widely used as a unit of account. Indeed, rather than being used to measure the value of goods and services directly, cryptocurrencies' value is based on the exchange rate set against other fiat currencies[45]. Cryptocurrencies constitute a particular type of crypto-assets, with respect to which they stand in a *genus to species* relationship. Although they are both digital assets operating on the basis of cryptographic technologies, their design entails differences that make them uniquely suited for certain use cases. For this reason, it is considered appropriate to first analyse crypto-assets as a general category, as well as the different types of DLT which enable their operation, and then proceed to assess the different kinds of crypto-assets. Crypto-assets have been defined as "a digital representation of value or rights which may be transferred and stored electronically, using distributed ledger technology or similar technology"[46]. In the financial industry, crypto-assets constitute one of the main applications of DLT. They constitute digital representations of value or rights that have the potential to bring significant benefits to both market participants and consumers. For instance, by simplifying capital-raising processes and increasing competition, crypto-asset issuances can enable a cheaper, less burdensome and more inclusive way of financing small and medium-sized enterprises (SMEs). Indeed, according to the MiCA Regulation proposal, capital raising operations in the form of offerings of crypto-assets to the public would constitute a faster and less burdensome way of raising capital with respect to a quotation on a stock exchange via an initial public offering (IPO) or a bond issue. On the other hand, offerings of crypto-assets, depending on the issuer's financial standing and market conditions, might also constitute a cheaper funding mechanism compared to corporate loans as offered by credit institutions. When used as a means of payment, their inherent characteristic of limiting the number of intermediaries involved may offer opportunities in terms of cheaper, faster, and more

[45] Dong He, Karl Habermeier, Ross Leckow, Vikram Haksar, Yasmin Almeida, Mikari Kashima, Nadim Kyriakos-Saad, Hiroko Oura, Tahsin Saadi Sedik, Natalia Stetsenko, and Concepcion Verdugo-Yepes, "Virtual Currencies and Beyond: Initial Considerations", IMF Staff Discussion Note, International Monetary Fund, 2016, p. 17

[46] Art. 3 (1) (2), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

efficient payments, particularly on a cross-border basis[47]. From a technical perspective, this asset class proposes as an evolution of e-money. Indeed, although both e-money and crypto-assets are stored electronically, electronic money differs from most crypto-assets in that it constitutes a liability of the electronic money issuer and a representation of an underlying monetary value. This is not always true for crypto-assets. Indeed, many crypto-assets exploit the potential of DLT to eliminate the presence of intermediaries for both custody and validation of transactions. In this way, they stand as an alternative to the traditional financial system, enabling a new form of digital value holding and peer-to-peer exchange through the use of cryptographic techniques. The main technological difficulty in peer-to-peer digital exchange is the so-called "double spending problem". The relative ease of replication of any form of digital money makes fraudulent spending a real possibility. Indeed, digital information can be replicated more easily than physical banknotes. For digital money, solving the problem of double spending requires keeping a record of all transactions. Before cryptocurrencies, the only solution was to entrust the verification of all transactions to an intermediary as a fiduciary agent. The problem of double spending is overcome by crypto-assets through a coordinated and decentralised updating of information via a distributed ledger. The distributed ledger records the history of all transactions taking place in the ecosystem, and a copy of it is kept by each user. This structure allows each user to check directly in their own copy of the distributed ledger whether the transfer of value has taken place, as well as the possible presence of double-spending attempts, thus making the peer-to-peer digital transfer of value possible[48]. Moreover, while all types of crypto-assets rely on a distributed ledger, they differ in terms of how the ledger is updated. Two main categories can be distinguished, with substantial differences in their operational configuration. The first category is called "permissioned" DLT. The operation of crypto-assets based on this type of DLT is similar to conventional payment mechanisms in that, to avoid abuse, the distributed ledger can only be updated by subjects expressly designated through the software protocol underlying the crypto-asset project. Such parties are often referred to as trusted nodes. Trusted nodes are designated by a central authority (*e.g.* the company that developed the crypto-asset) and are subject to supervision. Thus, although permissioned DLT-based crypto-assets differ from traditional

[47] Recital (2), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

[48] Bank For International Settlements, "V. Cryptocurrencies: looking beyond the hype", BIS Annual Economic Report, 2018, p. 95-96

and electronic money in terms of how transaction information is stored (decentralised versus centralised), they share with it a dependence on central institutions as the ultimate source of trust. Detaching itself much more radically from the prevailing institutional set-up, a second category of crypto-assets is structured in a fully decentralised[49] manner using "permissionless" DLT. In such a scenario, the distributed ledger recording transactions can only be modified by the consent of network participants. While anyone can participate in updating the ledger, no participant is in a position to modify it unilaterally. The main example of a crypto-asset in a permissionless DLT is outlined in Bitcoin's white paper, which proposes a currency based on a specific type of distributed ledger technology, called "blockchain". A blockchain can be defined as a distributed ledger that is updated in groups of transactions called "blocks". The blocks are subsequently concatenated sequentially with cryptographic techniques to form the blockchain. This type of DLT has been adopted by countless other cryptocurrencies. Crypto-assets based on permissionless DLT distinguish two groups of participants in the network: the "validators", who act as accounting agents (*i.e.* they validate transactions that take place within the network), and the "users", (*i.e.* the individuals who transact in crypto-assets). The principle behind this technology is simple: instead of an intermediary (*e.g.* a bank) centrally recording transactions by virtue of a fiduciary relationship, the distributed ledger is updated by a validator and the update is subsequently stored by all other participants in the network. It should be noted that the difference between validators and users is not predetermined as in the case of crypto-assets based on permissioned DLT, but rather each party is theoretically free to operate as a validator. However, the investment required to perform the role of validator in a permissionless DLT has increased considerably as the profitability of this activity has grown proportionally with crypto-assets' popularity among investors[50]. Overall, the main

[49] It should be pointed out, however, that decentralisation is an organisational choice, not a technical necessity. Indeed, crypto-assets based on DLT can work well in more centralised infrastructures. From a monetary perspective, the pivotal point of crypto-assets based on permissionless DLT is not the technical infrastructure, but rather the underlying economic architecture which determines the crypto-assets' regime of issuance and the foundations of their value.

[50] Taking Bitcoin into consideration, as the value of this crypto-asset increased over time, transaction validation has become an attractive business for investors and large corporations. Indeed, as further discussed below, the validation of transactions in Bitcoin involves a double remuneration, as the validator receives both a commission from those involved in the transaction and a fraction of newly issued Bitcoin. One of the consequences of this structure is that in order to compete for the validation of transactions in the Bitcoin network in terms of computational power, the investment required is currently prohibitive for most individuals. The same reasoning, albeit in different terms, applies to other crypto-assets such as Ethereum. Although this process is a natural consequence of the development of crypto-assets whose validation system is based on a proof of work, it undermines the link between crypto-assets and the democratisation of the financial system often envisaged by crypto-assets issuers and supporters. Indeed, it is evident how this process inevitably leads to a concentration of the validator's role according to the resources available to acquire computational power.

feature of these crypto-assets is the presence of a set of rules (*i.e.* the so-called protocol) that aim to create and align the incentives of all network participants in order to create a reliable payment technology without a central fiduciary agent. Furthermore, the protocol usually determines the overall supply of the asset to counter its value dilution. For instance, Bitcoin's protocol provides that no more than 21 million bitcoin units can exist. However, not all crypto-assets based on permissionless DLT exhibit a deflationary structure[51]. In the case of Bitcoin, this deflationary set-up has contributed to attract purely speculative investments. This phenomenon enhanced Bitcoin's function as a store of value, legitimising its classification as a commodity rather than a currency. Furthermore, the protocol is designed to ensure that all participants operate in a self-sustaining equilibrium. For this purpose, the main aspects usually regulated by the protocol in a crypto-asset based on permissionless DLT are the following. Firstly, the pivotal element in the operation of permissionless DLTs is the transaction validation system, as it ensures that the ecosystem can effectively operate in a decentralised manner. The two main validation systems are denominated "Proof of Work" (PoW) and "Proof of Stake" (PoS). These rules entail a cost for updating the distributed register. As for the PoW, it consists in a mathematical proof that a certain amount of computational work has been performed, which in turn requires the use of expensive hardware systems and electricity. Since the proof of work process can be compared to the extraction of rare numbers through complex calculations, it is often referred to as "mining", and the individuals who validate the transactions as "miners". With regard to PoS, it constitutes a consensus mechanism whereby the validation of a transaction does not require the solution of a mathematical proof of high computational complexity, but rather users willing to participate as validators in the network are required to explicitly stake a certain amount of capital in exchange for the chance to validate blocks. The staked amount of capital acts as "collateral that can be destroyed if the validator behaves dishonestly or lazily"[52]. The actual validator of the transaction is then randomly selected among those who have provided their capital at disposal to this extent. Secondly, all validators and users of a permissionless DLT network can verify all distributed ledger updates, which should induce validators to only include in the blockchain valid and lawful transactions. If a ledger update includes an invalid transaction (*e.g.* a double-spending

[51] For instance, Ethereum, the other main DLT-based permissionless crypto-asset along with Bitcoin, currently has a supply of 119 million ETH (the system's native currency). Although it would be incorrect to claim that Ethereum's supply is unlimited, the diversity between the two ecosystems is evident.
[52] Source Ethereum official page: https://ethereum.org/en/developers/docs/consensus-mechanisms/pos/

attempt), it is rejected by the network and the validator's rewards are canceled. The verification of all new distributed ledger updates by the network of validators and users is therefore essential to incentivise validators to only add valid transactions[53]. In exchange for the computational power (PoW) or the amount of staked capital made available (PoS), validators receive fees from users involved in the transactions they validate and, if specified by the protocol, newly issued crypto-assets[54]. After discussing the essential elements of the operational structure of crypto-assets based on permissionless DLT, it is deemed appropriate to further analyse the different declinations of crypto-assets from a functional perspective in light of the recent regulatory proposal put forward by the European Union through the MiCA Regulation. Article 3 of MiCA regulation, after defining the general category, distinguishes between three different types of crypto-assets, which the European legislator has established to subject to specific regulation, namely: a) "asset-referenced tokens"; b) "electronic money tokens"; c) "utility tokens". Regarding asset-referenced tokens, these are referred to as a "type of crypto-asset that purports to maintain a stable value by referring the value of several fiat currencies that are legal tender, one or several commodities or one or several crypto-assets, or a combination of such assets"[55] . Such asset-referenced tokens aim to maintain a stable value by referring to different legal tender currencies, one or more commodities, one or more cryptocurrencies or a basket of such assets. By stabilising their value, these asset-backed tokens often aim to be used by their holders as a means of payment to purchase goods and services and as a store of value. With reference to electronic money tokens (or e-money tokens), they are defined by the proposed MiCA Regulation as "a type of crypto-asset the main purpose of which is to be used as a means of exchange and that purports to maintain a stable value by referring to the value of a fiat currency that is legal tender"[56]. The function of such crypto-assets is very similar to that of electronic money as defined in Article 2 (2) of EMD2. Like e-money, such crypto-assets are electronic surrogates for coins and banknotes and are used to make payments. Despite their similarities, e-money and crypto-assets referring to a single fiat currency

[53] Bank For International Settlements, "V. Cryptocurrencies: looking beyond the hype", BIS Annual Economic Report, 2018, p. 96-98

[54] This is currently the case with regard to Bitcoin. However, as previously mentioned, the supply of Bitcoin is mathematically limited to an amount of 21,000,000. Consequently, rewards granted in the form of newly issued bitcoins will decrease to zero after 21,000,000 bitcoins have been mined. Mining after this point will be incentivised by transaction fees paid to miners only.

[55] Art. 3 (1) (3), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

[56] Art. 3 (1) (4), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

differ in some important respects. Holders of e-money, as defined in Article 2(2) of EMD2, always have a claim against the e-money institution and have the contractual right to redeem their e-money at any time against a legal tender fiat currency at the nominal value of that currency. Conversely, some of the crypto-assets which refer their value to a legal tender fiat currency do not provide their holders with such a claim against the issuers of such assets and may not fall within the scope of EMD2. Moreover, other crypto-assets which refer their value to a traditional fiat currency do not provide a credit at par with the reference currency or limit the redemption period. As mentioned in the MiCA proposal, "the fact that the holders of such crypto-assets do not have a claim against the issuers of such assets, or that such a claim is not at par with the currency to which such crypto-assets refer, could undermine the confidence of the users of such crypto-asset"[57] . Utility tokens are instead defined as "a type of crypto-asset which is intended to provide digital access to a good or service, available on DLT, and is only accepted by the issuer of that token"[58]. This sub-category consists of a type of crypto-asset whose purpose is to provide digital access to a good or service, available on the DLT, and which is only accepted by the token issuer. Such utility tokens have non-financial purposes related to the operation of a digital platform and digital services. The structure of this regulatory framework highlights how the European legislators' choice was to detail a specific regulatory status for the three types of crypto-assets mentioned above due to their structural and functional peculiarities, while including all other types of digital assets based on DLT technology in the general definition of crypto-asset. This includes crypto-assets which do not have the characteristics of a utility token and whose value is not referred to the value of any fiat currency that is legal tender, commodity, crypto-asset or a combination of such assets. By way of example, it includes some of the crypto-assets with the largest market capitalisation, such as Bitcoin and Ethereum. Also commonly referred to as "fiat cryptocurrencies" or "unbacked cryptocurrencies", the value of such assets is not tied to any reference asset. Indeed, their value as an investment or medium of exchange is essentially determined by the trust placed in the protocol that determines their operation (*i.e.*, as recently stated, that "controls to supply and the agreement over the validity of transfers in crypto-assets are not enforced by

[57] Recital (10), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[58] Art. 3 (1) (5), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

an accountable party but are induced by the use of cryptographic tools")[59]. Moreover, the absence of an underlying fundamental value in unbacked cryptocurrencies makes them subject to a specific risk profile, as it exacerbates their volatility, which is already inherent in crypto-assets. Finally, it seems worth clarifying that the proposed MiCA Regulation excludes from its scope all types of crypto-assets qualifying as "transferable securities" and thus as "financial instruments" within the meaning of Article 4 (1) (15) of Directive 2014/65/EU on markets in financial instruments (MiFID II). Under the proposed MiCA regulation, such crypto-assets will remain governed by the existing European Union provisions on financial instruments[60], regardless of the type of technology used for their issuance or transfer and considering the principle of technological neutrality that inspires the European legislative action. This principle is also emphasised by the MiCA proposal, which states that the "Union legislation on financial services should not favour one particular technology"[61]. At the same time, framing these types of crypto-assets within the existent European provisions on financial instruments highlighted the significant structural differences that the use of DLT entails compared to traditional financial instruments. As stated by the European legislators. these differences "may preclude or limit the use of DLT in the issuance, trading and settlement of crypto-assets which qualify as financial instruments"[62]. Indeed, the lack of a robust market infrastructure for the trading and settlement of crypto-assets qualifying as financial instruments meant that there was no secondary market which could guarantee the liquidity of the system. Overall, the possibility of primary market expansion for categories of crypto-assets qualifying as financial instruments within the meaning of MiFID II was therefore severely limited. The same considerations are also applicable with regard to the phenomenon of so-called "tokenised assets". Indeed, the "tokenization" of traditional financial instruments involves their transformation into crypto-assets to enable their issue, storage, and transfer on a distributed ledger. The regulatory gaps due to the regulatory, technological, and operational specificities of these different types of crypto-assets, as well as the different risks associated

[59] European Central Bank, "Crypto-Assets: implications for financial stability, monetary policy and payments and market infrastructures", Occasional Paper Series No. 223, 2019, p. 7
[60] Recital (2), Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot scheme for market infrastructures based on distributed ledger technology, and amending Regulations (EU) No. 600/2014 and (EU) No. 909/2014 and Directive 2014/65/EU
[61] Recital (6), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[62] Recital (3), Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology, and amending Regulations (EU) No. 600/2014 and (EU) No. 909/2014 and Directive 2014/65/EU

with them, led to the issuance by the European Union of the Pilot Regime for market infrastructures based on distributed ledger technology (DLT Pilot Regime)[63]. The DLT Pilot Regime, together with the MiCA Regulation proposal, is part of a comprehensive package of measures introduced by the European Commission in 2020 to further enable and support the potential of digital finance in terms of innovation and competition, while mitigating associated potential risks. The objective of the DLT Pilot Regime is to foster the development of crypto-assets that qualify as financial instruments and DLT, while preserving a high level of financial stability, market integrity, transparency and investor protection. From an operational standpoint, the DLT Pilot Regime creates a "regulatory sandbox" where DLT market infrastructures are temporarily exempted from specific regulatory requirements which could hinder their development, and where the European Securities and Markets Authorities (ESMA), together with the other competent authorities, can obtain experience on the opportunities and specific risks associated with crypto-assets that qualify as financial instruments and with their underlying technology.

3.4. Stablecoins

Within the crypto-assets ecosystem, stablecoins are not only the ones that could potentially compete as digital substitutes for traditional currencies, but also the ones that present the greatest challenges from a regulatory perspective due to their structure and potential mass adoption. Referring to the classification made by the MiCA Regulation proposal, stablecoins can be included either in the category of asset-backed tokens or in that of e-money tokens according to the economic function they perform. It has been argued that stablecoins whose value is backed by a single currency that is given the status of legal tender may be structurally close to the definition of e-money under the EMD2. Indeed, the aim of many stablecoins is to act as a means of payment and potentially as a store of value. However, on one hand, their classification under the EMD2 might not adequately mitigate the most significant risks to consumer protection inherent to stablecoins' operational structure (*e.g.* those raised by wallet providers). On the other hand, EMD2 does not set specific provisions for an entity that would be of systemic relevance in the financial

[63] Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology, and amending Regulations (EU) No. 600/2014 and (EU) No. 909/2014 and Directive 2014/65/EU, which was published in the Official Journal of the European Union on June 2, 2022

industry, which is what so-called "global stablecoins" could potentially become[64]. As already mentioned, due to their inherent features, stablecoins could facilitate cross-border payments and increase financial inclusion. However, if widely used, they could impact the smooth operation of the payment system and financial stability, as well as monetary policy transmission and ultimately monetary sovereignty. Global stablecoins differ from stablecoins due to their geographic scope. Indeed, global stablecoins initiatives built on an existing large or cross-border customer base may have the potential to achieve systemic relevance internationally by increasing transnational capital flows and eventually the volatility of foreign exchange rates and official foreign reserves[65]. These characteristics have led the European Union to outline a specific regime for these types of stablecoins. In fact, the MiCA Regulation proposal provides an *ad hoc* regime for "significant stablecoins", referring the decision on its applicability to a case-by-case assessment by the European Banking Authority (EBA). In particular, Article 39 of the proposed Regulation sets out the criteria that the EBA may apply when determining whether an asset-referenced token is to be deemed as significant from a regulatory perspective. Article 50 refers to Article 39 with respect to the determination of electronic money tokens as significant. The criteria are the following: (i) the size of the customer base of the promoters of the tokens; (ii) the value of the tokens or their market capitalization; (iii) the number and value of transactions; (iv) the size of the reserve of assets; (v) the significance of the issuers' cross-border activities; and (vi) the interconnectedness with the financial system. Moreover, art. 39 also empowers the European Commission to adopt delegated acts to specify further circumstances under which an issuer of asset-referenced tokens or e-money tokens may be deemed as significant. Furthermore, Article 41 details the *ad hoc* regime by providing a list of the additional obligations applicable to issuers of significant asset-referenced or e-money tokens, such as additional own funds requirements, liquidity management policy and interoperability. To better understand the peculiarities of stablecoins, as well as their role as a bridge between traditional finance and the crypto-assets ecosystem, it is deemed appropriate to highlight their different types and designs, which encompass the whole spectrum from completely centralised to fully decentralised solutions. Having the primary objective of maintaining a stable value through reference to other types of assets,

[64] Impact Assessment, Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

[65] European Central Bank, European System of Central Banks (ESCB) response to the European Commission's public consultation on EU framework for markets in crypto-assets, p. 7. Available at: https://www.ecb.europa.eu/paym/intro/publications/pdf/ecb.miptopical200424.en.pdf

stablecoins constitute an excellent vantage point for observing the trade-off between centralisation and decentralisation inherent in the crypto-asset category because of their proximity to traditional payment systems and banking services. On the one hand, it is possible to find solutions whose design involves a corporate entity as an intermediary that acts as an issuer of crypto-assets via DLT and manages the assets constituting the reserves of the corresponding digital currencies in circulation. It is precisely the composition and management of the reserve assets which ensures that the stablecoin can trade at par with the reference asset or basket of assets. In order to perform well in stressed market conditions, where the volatility in the value of the reserve assets held by the intermediary may increase significantly, it should be ensured that the reserve assets backing the stablecoins in circulation is composed by high quality, liquid assets[66]. At the opposite side of the spectrum there are the so-called "algorithmic stablecoins", which "aim at maintaining a stable value, via software protocols which provide for the increase or decrease of the supply of such crypto-assets in response to changes in demand"[67]. However, as mentioned by European legislators, algorithmic stablecoins "should not be considered as asset referenced tokens, provided that they do not aim at stabilising their value by referencing one or several other assets"[68]. European legislators' choice to exclude algorithmic stablecoins from the asset-referenced tokens category constitutes a firm stance regarding the method of value determination and maintenance used by these types of crypto-assets. As a result, alrigorithmic stablecoins will be assimilated to unbacked crypto-assets from a regulatory perspective. Algorithmic stablecoins resemble fully decentralised models, which rely exclusively on automated software protocols to issue crypto-assets and implement the economic operations required to maintain the price of the crypto-asset close to par. Considering their economic structure, three categories of stablecoins can be identified: (i) fiat-backed stablecoins; (ii) crypto-backed stablecoins; (iii) algorithmic stablecoins. As regards the first category, a fiat-backed stablecoin is generally issued in exchange for a fiat currency which is legal tender. The funds are then used to invest in reserve assets denominated in the same currency. Through this process, the fiat currency is subsequently exchanged on DLT as a digitally native currency. The aim of fiat-backed

[66] Christian Catalini, Alonso de Gortari, Nihar Shah, "Some Simple Economics of Stablecoins", SSRN, 2021, p. 3

[67] Recital (26), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

[68] Recital (26), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

stablecoins' issuers is to maintain the crypto-asset's value tied 1:1 with the reference fiat currency by holding reserve assets at least equal to the total amount of outstanding stablecoins. Reserve assets constitute the guarantee of the issuer's obligation to redeem a stablecoin at its face value. Usually, as the value of the reserve assets in which they invest the funds received by investors can fluctuate due to market volatility, stablecoins issuers hold reserve assets in excess of the total amount of stablecoins outstanding. This provides a capital buffer for further stability. The main drivers affecting a fiat-backed stablecoin issuer's ability to maintain its value tied 1:1 to a fiat currency are: (i) the composition of its reserve assets; and (ii) the size of its excess capital buffer. As recently, stated "the riskier and less liquid a stablecoin's reserve assets are, the larger the buffer needs to be to maintain a stable peg"[69]. Reserve assets of a fiat-backed stablecoin are typically constituted by cash, cash equivalents, and government bonds, but can also include securities and commodities (*e.g.* precious metals). In light of the above, it is possible to appreciate the difference between fiat-backed stablecoins and fiat cryptocurrencies (*e.g.* Bitcoin), which lack any intrinsic value due to the absence of any reference asset and do not represent a financial claim on, or a liability of, any identifiable entity. Indeed, fiat-backed stablecoins constitute fully centralised organisations, where the pivotal element is represented by the corporate intermediary which owns and manages the reserve assets. Furthermore, these types of stablecoins constitute a liability of the relevant corporate intermediary and stablecoins owners are always provided with a claim on the intermediary to redeem their stablecoins in exchange for fiat currency[70]. Regarding crypto-backed stablecoins, their structure resembles fiat-backed stablecoins, as both aim to maintain their value tied 1:1 to a pool of reserve assets of at least equal value to the total amount of outstanding stablecoins. However, they differ from fiat-backed stablecoins due to three main reasons: (i) crypto-backed stablecoins' reserve assets are constituted by other crypto-assets; (ii) in order to prevent their value from dropping below their face value, crypto-backed stablecoins are overcollateralised, as the amounts minted are only a fraction of the value of the digital assets constituting the reserve assets due to the significantly higher volatility of their value; (iii) unlike fiat-backed stablecoins and similarly to algorithmic stablecoins, crypto-backed

[69] Coinbase Institute, "Stablecoins: Coinbase White Paper", 2022, p. 11
[70] Coinbase Institute, "Stablecoins: Coinbase White Paper", 2022, p. 13

stablecoins have no custodial arrangement[71]. Indeed, they rely on smart contracts[72] to perform the economic operations aimed at maintaining their value stable. The relevance of smart contracts within the crypto-assets ecosystem has been acknowledged by the European Union due to their revolutionary operational specificities and their diffused application in DLT protocols. The DLT Pilot Regime addressed these operational continuity and security concerns focusing on the need for transparency, reliability, and safety requirements in both in smart contracts and DLT protocols overall. For instance, article 6 of the DLT Pilot Regime – which specifies operational requirements for multilateral trading facilities and securities settlement systems based on DLT – requires these operators to have in place IT and cyber arrangements which "shall ensure the continued transparency, availability, reliability, and security of smart contracts used on DLT. These arrangements shall also ensure the integrity, security and confidentiality of any data stored, and the availability and accessibility of such data"[73]. In line with the aim of establishing a "regulatory sandbox" rather than detailing a precise regulation of this phenomenon, the DLT Pilot Regime does not set strict requirements, but rather only establishes the principles to which multilateral trading facilities and securities settlement systems empowered by DLT will have to adhere. Finally, in relation to algorithmic stablecoins, these are similar to crypto-backed stablecoins but with one key difference, namely that crypto-backed stablecoins' reserve assets do exist regardless of the above-mentioned smart contract arrangement which enables them to perform the economic operations required to maintain their value stable. Algorithmic stablecoins do not generally have any reserve asset backing their value. Instead, they use a second digital asset within the same smart contract arrangement to maintain their value tied to a reference fiat currency. The value of the second digital asset is linked to the algorithmic stablecoin's

[71] In a custodial arrangement, the stablecoin's reserve assets are held and managed by the stablecoin's issuer, who maintains a primary responsibility as regards to the functioning of the stablecoin arrangement. However, sometimes stablecoins' issuers may rely on third parties to perform these operations. On the other hand, non-custodial stablecoin arrangements operate by automating the economic relationships between participants in the stablecoin arrangement through DLT protocols. By doing so, non-custodial arrangements try to operate without the need for an intermediary on which stablecoins' holders may place their trust. Source: https://assets.ctfassets.net/c5bd0wqjc7v0/79db1PxjBTv1JbL574fFvA/61e9950c436df5556c878d94bfcee855/CBI-StablecoinWhitepaper-July2022.pdf

[72] While neither smart, nor contracts, smart contracts constitute self-executing software protocols that mirror the terms of an agreement between two or more parties, which is written through lines of code. These allow for the execution of irreversible transactions between anonymous parties without requiring an external enforcement mechanism. Moreover, their structure enhances transactions' traceability and transparency. Source: https://www.bis.org/publ/work1015.pdf

[73] Article 6 (4), Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot scheme for market infrastructures based on distributed ledger technology, and amending Regulations (EU) No. 600/2014 and (EU) No. 909/2014 and Directive 2014/65/EU

value because their supply and demand is controlled by the same smart contract arrangements. In other words, the value of the digital asset backing the algorithmic stablecoin depends on the stability of the stablecoin itself. This process has been defined as "endogenous backing"[74]. As mentioned above, its weakness has been recently demonstrated by the events that occurred in May 2022, which led to the collapse of the algorithmic stablecoin Terra USD, which was endogenously backed by LUNA tokens. Indeed, algorithmic stablecoins resemble a self-fulfilling prophecy if confidence wanes in the stablecoin arrangement as a whole[75].

[74] Coinbase Institute, “Stablecoins: Coinbase White Paper”, 2022, p. 15
[75] Coinbase Institute, “Stablecoins: Coinbase White Paper”, 2022, p. 11-16

CHAPTER II – LEGAL ISSUES RAISED BY THE NEW CURRENCIES

Summary: 1. *Operational Features and Legal Issues: An Overview* – 2. *A Regulatory Analysis: the MiCA Regulation Proposal and 5AMLD* – 2.1. *Crypto-assets Service Providers* – 2.2. *Asset-referenced Tokens* – 2.3. *Electronic Money Tokens* – 2.4. *Crypto-assets Other than Asset-referenced Tokens and Electronic Money Tokens* – 2.5. *Financial Stability* – 2.6. *Anti-money Laundering and Countering the Finance of Terrorism*.

1. Operational Features and Legal Issues: An Overview

With the aim of delimiting the scope of the analysis, this chapter will highlight the legal issues related to crypto-assets that stem from their innovative nature both from a legal and economic perspective. Indeed, differently from electronic money, whose comprehensive regulation resulted in a significant level of transaction security and integration within the traditional financial system, legal issues related to crypto-assets are yet to be fully assessed by regulators internationally due to the technological specificities that these involve. Notwithstanding their thorough regulation, electronic money issuers remain subject to the inherent risks of financial intermediaries such as credit, liquidity, and operational risk. However, it is worth noting that due to their degree of regulation and supervision, electronic money has been assimilated to the concept of "scriptural money", which is a broad term often used to refer to the digital representation of public money or private money issued by regulated and supervised entities (*e.g.* commercial banks). Due to its features as a regulated and reliable form of money, as well as its proliferation within the traditional financial system, it has been argued that excluding scriptural money from the notion of legal tender seems an unrealistic perspective[76]. In this light, it is evident how, despite its nature as money issued by private institutions, the risk profile of electronic money is entirely different from that of crypto-assets. Moreover, the analysis will cover the legal issues related to crypto-assets which do not qualify as financial instruments as defined in Article 4 (1) (15) of MiFID, since – as already mentioned – these remain subject to the existing Union legislation on financial instruments due to their similarities with traditional financial instruments. Furthermore, legal issues related to crypto-assets as a general category will be differentiated from those related to specific types of crypto-assets as defined by MiCA Regulation proposal due to their unique structural and functional features as defined above. Three main legal issues can be identified in relation to crypto-assets: (i) consumer protection; (ii) anti-money laundering (AML) and combating the finance of terrorism (CFT); (iii) financial stability. As regards to consumer and investor protection, these mainly stem from the technological advances which differentiate crypto-assets from traditional financial instruments. These technological features do not only affect the way crypto-assets are transferred, but also the way these are stored. As already mentioned, most crypto-assets are exchanged through public blockchains (*i.e.* software protocols based on permissionless DLT). A transfer of crypto-

[76] De Stasio, V., "Verso un concetto Europeo di Moneta Legale: valute virtuali, monete complementari e regole di adempimento", Il Fallimentarista, 2018, p. 9

assets within a public blockchain would generally involve a person (A) holding a "private" and "public" key in a digital wallet. Private keys are used to control the ownership of the respective crypto-assets and are kept secret for authentication and encryption of the data related to transactions. On the other hand, public keys constitute the equivalent of digital addresses and are not kept secret as they are essential for the identification of the parties involved in a transaction. Moreover, since a private is what grants ownership of the crypto-assets at a given digital address (*i.e.* the public key), losing it entails losing the right to dispose of the assets, hence the need to maintain private keys safe. As regards to the transfer mechanism, a person (A) would generate a transaction which includes (A)'s digital address and (B)'s digital address using (A)'s private key (which is only used to initiate the transaction and not disclosed). The transaction would subsequently be broadcasted to the entire public blockchain network, which – according to the relevant consensus mechanism – would verify from the use of (A)'s private key that (A) has the authority to transfer the crypto-assets related to its public key (*i.e.* its digital address). With respect to digital crypto-assets wallets, these are used to store both public and private keys and allow users to interact with DLTs by empowering them to send and receive crypto-assets and monitor their balances. However, different forms of crypto-assets wallets do exist. For instance, some wallets support multiple crypto-assets whilst others are specific to a particular type of DLT protocol. Moreover, crypto-assets wallets can also be software or hardware-based, as well as "hot" or "cold"[77]. In this respect, it should be noted that most crypto-asset wallets popular among the public are software-based and connected to the internet, which renders them vulnerable to fraud and digital thefts in the form of internet hacks. It is now clear that the use of distributed ledger technology entails a different modality of access to funds compared to the technologies traditionally used to store and exchange funds. For this reason, many individuals often opt to access their crypto-assets holdings through third parties such as crypto-assets wallet providers or crypto-assets exchanges[78]. However, as recently argued,

[77] A software wallet constitutes a software application that may be installed locally (*i.e.* meaning that it is only accessible from a specific hardware device), or run in a cloud (*i.e.* meaning that it is accessible from any computing device or location). On the other hand, a hardware wallet constitutes a physical device (*e.g.* a USB key). Moreover, hot wallets are connected to the internet and are seen as less secure due to their exposure to hacks, whilst cold wallets are not connected to the internet and must be connected to the internet before they can be used to send and receive crypto-assets. Software wallets are usually hot wallets, whilst cold wallets are usually hardware wallets. For more information in this respect, please refer to: https://www.eba.europa.eu/sites/default/documents/files/documents/10180/2545547/67493daa-85a8-4429-aa91-e9a5ed880684/EBA%20Report%20on%20crypto%20assets.pdf?retry=1

[78] In this scenario, the original holder of crypto-assets delegates the crypto-assets wallet providers or the crypto-assets exchange for the purpose of detaining and preserving both its public and private key. As a result, the overall experience of holding and transferring crypto-assets might seem less burdensome and complicated from the user's perspective. However, by doing so, since the private key related to the crypto-asset wallet constitutes the only

"ironically – and much in contrast to the original promise of Bitcoin and other cryptocurrencies – many users who turned to cryptocurrencies out of distrust in banks and governments have thus wound up relying on unregulated intermediaries. Some of these […] have proved to be fraudulent or have themselves fallen victim to hacking attacks"[79]. Furthermore, as crypto-assets exchanges, wallet providers and issuers still constitute unregulated entities which do not benefit of the regulatory safety nets provided with respect to traditional financial intermediaries (*e.g.* deposit insurance schemes provided for banks), it is not clear which would be the treatment of the clients' funds in an insolvency scenario. This particular legal issue recently gained traction in the regulatory arena as Coinbase – one of the largest crypto-assets exchange globally[80] – stated in its earnings report for the first quarter of 2022 that "because custodially held crypto assets may be considered to be the property of a bankruptcy estate, in the event of a bankruptcy, the crypto assets we hold in custody on behalf of our customers could be subject to bankruptcy proceedings and such customers could be treated as our general unsecured creditors"[81]. However, this is a symptom of a major regulatory issue, namely that there is currently no legal certainty regarding the legal relationship between clients and crypto-assets exchanges, and issuers even when the related projects constitute centralised organisations due to the presence of a corporate intermediary[82]. From a conceptual standpoint, depending on their design, crypto-assets differ from conventional forms of money such as deposits in bank accounts. Whilst both these forms of money are immaterial and manifest in digital form, the similarities fade if the legal nature of deposits in bank accounts and the role of their digital representation are considered. The concept of "money in the account" does not represent the balance of an individual's holdings in a bank's digital ledger, but rather the legal right to enforce a payment of a debt owed by the bank to the account holder. The record displayed on a bank's digital ledger is only secondary evidence of the legal relationship between the individual and the bank, namely the debt relationship (*i.e.* the right of the individual against the bank) that a bank account entails. This does not occur with respect to crypto-assets. In fact, in the context of crypto-assets, evidence of a right and the right itself are combined in one thing, namely the

proof of ownership required to dispose of the funds related to that wallet, holders of crypto-assets are effectively delegating the ownership of the funds contained in their wallets.

[79] Bank For International Settlements, "V. Cryptocurrencies: looking beyond the hype", BIS Annual Economic Report, 2018, p. 105

[80] As of March 31, 2022, Coinbase held US $ 256 billion in custodial fiat currencies and crypto-assets on behalf of customers. Source: please refer to note no. 80

[81] Coinbase, first-quarter earnings report filing to the Securities and Exchange Commission (SEC) of the United States of America, 2022, p. 83

[82] For instance, this is the case of fiat-backed stablecoins, where the relevant corporate intermediary is responsible for holding and managing the reserve assets.

item of digital data constituted by an individual's public and private key. This ontological difference between crypto-assets and other digital representations of money constitutes one of the reasons why crypto-assets might not fit in conventional private law categories depending on their design[83]. From a legal perspective, whilst balances held in bank accounts constitute an established and regulated legal relationship that benefits from safeguards and prudential requirements provided by the regulatory framework applicable to credit institutions, crypto-assets holdings do not enjoy the same benefits due to the unregulated nature of crypto-assets issuers and exchanges. The unregulated nature of crypto-assets issuers also involves a lack of standardisation with respect to the contractual terms and conditions applied to customers by crypto-assets issuers. This lack of standardisation is evident in the context of the redeemability of the funds by customers as envisaged by some crypto-assets issuers, such as stablecoins' issuers, and constitutes another distinguishing factor between crypto-assets holdings and bank deposits. As already mentioned, the mechanism through which stablecoins' issuers stabilise the value of their liabilities and enhance trust among investors generally involves providing clients with a right to redeem the stablecoins purchased: (i) in cash denominated in the fiat currency to which the stablecoin's value is referenced; (ii) in kind, through assets denominated in the fiat currency to which the stablecoin value is referenced[84]. Furthermore, the provision of redemption rights, together with the adoption of a centralised structure that involves a corporate entity acting as an intermediary is what differentiates asset-referenced tokens and electronic-money tokens from the general category of crypto-assets[85] as defined by the MiCA Regulation proposal. According to the terms and conditions applied, the relationship between most popular and capitalised stablecoins issuers and the respective crypto-assets holders might qualify as a debt relationship, thus resembling the legal relationship underlying bank deposits. As a result, it has been argued that stablecoins' holders may essentially qualify as creditors[86]. The only exception among major stablecoins is constituted by Tether (USDT)[87]. Indeed, based on Tether's terms of service, it has been argued that its underlying contractual relationship with

[83] Bank for International Settlements (BIS), "Summary of the webinar on legal aspects of digital currencies", held virtually on 26 January 2021, available at: https://www.bis.org/events/210126_digital_currencies.htm

[84] As already mentioned, the redemption of funds is allowed by the reserve assets stablecoins' issuers hold and manage in the interest of investors.

[85] In light of the classification provided by the MICA Regulation proposal as discussed above, this general category includes major crypto-assets in terms of market capitalisation such as Bitcoin and Ethereum, as well as so-called algorithmic stablecoins due to their decentralised structure and peculiar process through which these aim at stabilising their value.

[86] Gary B. Gorton, Jeffery Y. Zhang, "Taming Wildcat Stablecoins", SSRN, 2021, p. 10-15

[87] USDT is a stablecoin issued by Tether Limited Inc. in 2014, whose value is tied to the US dollar. The stablecoin currently has a market capitalisation of about US dollars 65 billion.

crypto-assets holders might qualify as an equity relationship rather than a debt relationship[88]. Considering the above, it is clear how Tether is not obligated to exchange one stablecoin for one dollar, which would result in a debt contract. As the stablecoin holder seeks redemption, based on current market conditions in terms of liquidity, availability, and pricing (valuation) of the pool of assets constituting its reserve assets, Tether can either: (i) sell some portion of its underlying reserve assets and give the proceeds to the stablecoin holder; (ii) redeem the stablecoins by in-kind redemptions[89]; (iii) delay the redemption of the stablecoins[90]. The differences among terms and conditions applied by stablecoins issuers as detailed above regarding redemption rights highlight the overall lack of legal certainty affecting the relationship between crypto-assets issuers and holders. The differences between bank deposits and crypto-asset holdings are even more pronounced in the case of crypto-assets that do not fall under the category of asset-referenced tokens or electronic money tokens[91] as outlined by the proposed MiCA Regulation. Indeed, their decentralised structure does not involve the presence of a corporate intermediary providing redemption rights for the tokens. Consequently, holders of crypto-assets falling into this category who wish to redeem the value of their crypto-assets in a fiat currency may only rely on a crypto-assets exchange to sell their crypto-assets holdings based on the current market value and liquidity for that particular type of asset, thereby being exposed to significant risks of speculation as already occurred. Consumer protection concerns have also been raised by so-called Initial Coin Offerings (ICOs). ICOs have been defined as "an operation through which companies, entrepreneurs, developers or other promoters raise capital for their projects in exchange for crypto-assets […] that they create"[92], and constitute one of the ways through which crypto-assets are distributed to users

[88] Gary B. Gorton, Jeffery Y. Zhang, "Taming Wildcat Stablecoins", SSRN, 2021, p. 11. Indeed, according to art. 3 of Tether's terms of service, "Tether reserves the right to delay the redemption or withdrawal of Tether Tokens if such delay is necessitated by the illiquidity or unavailability or loss of any Reserves held by Tether to back the Tether Tokens, and Tether reserves the right to redeem Tether Tokens by in-kind redemptions of securities and other assets held in the Reserves". For more information in this respect, please refer to Tether's terms of service, available at: https://tether.to/legal/

[89] Notably, Tether's use of the term "reserves" in the context of its terms of service means "traditional currency and cash equivalents and, from time to time, may include other assets and receivables from loans made by Tether to third parties, which *may include affiliated entities*".

[90] However, delays in the redemption process affect almost any stablecoins' issuer due to the need for the verification of account data. For more information in this respect, please refer to note 87, p. 14-15

[91] In this respect, it seems appropriate to point out that, with respect to the category of utility tokens as outlined by the proposed MiCA Regulation, these do not generally provide redemption rights. Furthermore, these are not even traded on exchanges as they are only intended to provide digital access to a good or service available on the respective DLT network and are only accepted by the issuer of that token. Therefore, the possibility to redeem utility tokens for fiat currency is considerably limited by design.

[92] European Securities and Exchange Commission (ESMA), "Advice on Initial Coin Offerings and Crypto-Assets", 2019, p. 4

and investors[93]. In other words, ICOs constitute an auctioning of an initial set of crypto-assets to the public, with the proceeds granting participation rights in a business venture. The legal issues related to ICOs range from the opacity as regards the types of rights which are being granted to investors[94], to the risk of fraud and scams[95]. These risks are exacerbated by the fact that the information released to investors in the context of an ICO is often minimal and unaudited. From a substantial standpoint, ICOs represent the equivalent of IPOs but for crypto-assets rather than traditional financial instruments. As a result, it has been argued that ICOs should be subject to a regulatory regime similar to that of IPOs, especially with regard to information disclosures, transparency and liability potentially arising from inaccuracies or misleading information contained in marketing communications.

2. A Regulatory Analysis: the MiCA Regulation Proposal and 5AMLD

Legal issues related to digital thefts, clients' funds safekeeping and redemption, as well as marketing communications as discussed above have been met by efforts in the European regulatory context through the already mentioned MiCA Regulation proposal. In light of the distinction provided with regard to the different types of crypto-assets, the proposed Regulation mirrors a different regulatory regime with respect to: (i) asset-referenced tokens; (ii) electronic money tokens; and (iii) crypto-assets which do not lie in either one of the above categories. Furthermore, the proposal also details specific operational requirements for crypto-assets exchanges and wallet providers.

2.1. Crypto-assets service providers

[93] Generally, crypto-assets might be distributed to investors and users through different channels: (i) initial coin offerings, which constitute crypto-assets offerings to the general public in a specific jurisdiction or in more jurisdictions; (ii) private placements, which, according to the relevant regulatory provisions, constitute placements of crypto-assets to qualified or experienced investors; (iii) as a reward for the maintenance of the DLT or the validation of transactions. For instance, the latter is the case with the Bitcoin network as detailed above.

[94] In the absence of a clear regulatory framework, initial coin offerings also entail legal issues with respect to the rights which are being granted to investors in exchange for their investment, which in turn negatively affects the overall legal certainty of this phenomenon. Indeed, the technological and design features of crypto-assets, combined with their unregulated nature, blur the traditional technical distinctions between equity and debt instruments. This is also evident in the case of utility tokens, which do not involve a direct economic interest, but rather provide digital access to a good or service available on DLT.

[95] For instance, in a report released in 2018 by the advisory firm Satis Group, it has been argued that nearly 80 per cent of initial coin offerings launched in 2017 were scams. The report was based on several criteria such as the promoters' intention of fulfilling project development duties. For more information in this respect, please refer to: https://cointelegraph.com/news/new-study-says-80-percent-of-icos-conducted-in-2017-were-scams

Title V of the Regulation proposal sets out the provisions on authorization and operating conditions of crypto-assets service providers. In particular, the proposal includes crypto-assets wallet providers and crypto-assets exchanges in the category of "crypto-assets service providers" (CASPs), which are defined as "any person whose occupation or business is the provision of one or more crypto-assets services to third parties on a professional basis"[96]. According to article 53 of the proposed Regulation, "crypto-asset services shall only be provided by legal persons that have a registered office in a Member State of the Union and that have been authorised as crypto-asset service providers by the competent authority of the Member State where they have their registered office. Moreover, with the aim of centralizing and strengthening the supervision of crypto-assets activities, article 57 includes a mandate for ESMA to establish a register of all crypto-assets service providers, which will also include information on the crypto-assets white papers as notified by competent national authorities. From an operational perspective, article 61 (7) of the proposal addresses potential technological inefficiencies which might render CASPs subject to the risk of hacks by instructing them to "have internal control mechanisms and effective procedure for risk assessment, including effective control and safeguard arrangements for managing ICT systems in accordance with Regulation (EU) 2021/xx of the European Parliament and of the Council[97]. They shall monitor and, on a regular basis, evaluate the adequacy and effectiveness of internal control mechanisms and procedures for risk assessment and take appropriate measures to address any deficiencies. Crypto-assets service providers shall have systems and procedures to safeguard the security, integrity, and confidentiality of information in accordance with Regulation (EU) 2021/xx of the European Parliament and of the Council"[98]. From an operational standpoint, article 63 of

[96] Article 3 (8), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937. Article 3 (9) further details the meaning of "crypto-asset service" under the proposed Regulation by providing a list of activities which includes: (i) the custody and administration of crypto-assets on behalf of third parties; (ii) the operation of a trading platform for crypto-assets; (iii) the exchange of crypto-assets for fiat currency that is legal tender; (iv) the exchange of crypto-assets for other crypto-assets; (v) the execution of orders for crypto-assets on behalf of third parties; (vi) placing of crypto-assets; (vii) the reception and transmission of orders for crypto-assets on behalf of this parties; (viii) providing advice on crypto-assets. Furthermore, Article 3 (10) specifies that the "custody and administration of crypto-assets on behalf of third parties" as mentioned in article 3 (9) means the "safekeeping or controlling, on behalf of third parties, crypto-assets or the means of access to such crypto-assets, where applicable in the form of private cryptographic keys".

[97] Proposal for a Regulation of the European Parliament and the Council on digital operational resilience for the financial sector and amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014 and (EU) No 909/2014. This regulation proposal, also referred to as "DORA", is part of the European Union's Digital Finance Package as discussed above and aims at consolidating and upgrading Information and Communications Technology (ICT) risk requirements throughout the financial sector. A provisional agreement has been reached by European legislators on the text of the proposal on May 10, 2022.

[98] Please refer to note no. 97

the MiCA Regulation proposal addresses the safekeeping of client's crypto-assets and funds by mandating CASPs that hold crypto-assets belonging to clients or the means of access to such crypto-assets to "make adequate arrangements to safeguard the ownership rights of clients, especially in the event of the crypto-asset service provider's insolvency, and to prevent the use of a client's crypto-assets on own account except with the client's express consent". Specifically addressing and emphasizing the necessity for segregation of clients' funds, Article 63 (3) provides that "crypto-assets service providers shall, promptly place any clients' funds, with a central bank or a credit institution. Crypto-assets service providers shall take all necessary steps to ensure that the clients' funds held with a central bank, or a credit institution are held in an account or accounts separately identifiable from any accounts used to hold funds belonging to the crypto-asset service provider". These provisions aim at mitigating legal issues related to consumer protection through safeguarding the proper management of clients' crypto-assets by CASPs (even in an insolvency scenario) whilst promoting the overall enhancement of CASPs' information and communication technology (ICT) systems to increase their operational resilience. With respect to the authorisation regime and marketing communications for crypto-assets issuers, the MiCA proposal imposes a direct obligation on issuers of crypto-assets to publish an information document (so-called white paper) with mandatory disclosure requirements[99]. This regulatory choice, apart from aligning the phenomenon of ICOs to that of IPOs from a regulatory perspective while acknowledging their differences, is also aimed at countering the widespread issue of crypto-assets from off-shore jurisdictions which poses significant consumer protection and financial stability concerns[100].

2.2. Asset-referenced Tokens

In relation to asset-referenced tokens, Title II, Chapter I of the proposed Regulation details the procedure for authorization of such tokens' issuers and the approval of their crypto-assets white paper by the relevant national authorities. With the aim of countering the

[99] However, in order to avoid the creation of administrative burdens not proportionate to the risks created by the services provided, small and medium-sized enterprises (SMEs) will be exempted from the publication of the information document where the total consideration of the offering of crypto-assets is less then € 1,000,000 over a period of twelve months. On the other hand, and for the same purpose, issuers of stablecoins will not be subject to authorisation by a national competent authority if the outstanding amount of stablecoins is below € 5,000,000.
[100] How recently pointed out, the number of ICO fundraising projects based in off-shore jurisdictions such as the Cayman Islands rose from a reported 3 per cent to 40 per cent in 2017, whilst dropped sizeably from 32 per cent to 10 per cent in other more regulated such as the United States. For more information in this respect, please refer to note no. 95.

expansion within the Union of stablecoins[101] issued by companies located outside the European Union (and thus outside the Union's regulatory perimeter), Article 15 provides that issuers of asset-referenced tokens shall be incorporated in the form of a legal entity established in the European Union to be authorised to operate in the single market. The article continues by indicating that no-asset referenced tokens may be offered in the EU or admitted to trading on a trading platform for crypto-assets if the issuer is not authorised in the Union and does not publish a crypto-asset white paper approved by the competent authority. The white paper shall contain the information provided in article 17, which include, *inter alia*: a detailed description of the issuer's governance arrangements, including a description regarding responsibilities of third party entities eventually involved; a detailed description of (i) the composition of the asset pool constituting the asset-referenced token's reserve assets; (iii) the arrangements ensuring the custody and segregation of reserve assets; (iii) the investment policy for the reserve assets, where these are invested by the issuer; (iv) the nature and enforceability of rights provided to asset-referenced tokens holders, including any redemption right or claim holders may have on reserve assets or against the issuer, as well as their treatment in insolvency proceedings; (v) the mechanism to ensure the liquidity of the asset-referenced tokens, where the issuer does not provide holders with a direct claim on the reserve assets[102]. Partly mirroring the exemptions provided under Regulation (EU) 2017/1129[103] (Prospectus Regulation), article 15 also includes exceptions from the authorisation regime for low-impact asset-referenced tokens and for asset-referenced tokens which are marketed, distributed, and exclusively held by qualified investors. However, such issuers will have to produce a white paper and submit it for approval by the competent authority of the Member State where they have a registered office. Furthermore, Title III, Chapter II sets out conduct requirements which encompass the overall operational structure of asset-referenced token issuers. For instance, article 23 mandates behavioral requirements such as to act honestly, fairly, and professionally, whilst articles 24 and 25 detail rules and requirements for the publication of the crypto-asset white paper and related marketing communications. As regards to clients' redemption rights, the proposal acknowledged the different design choices that

[101] For more information in this respect, please see above note no. 34
[102] Article 17 (1), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[103] Regulation (EU) 2017/1129 of The European Parliament and of the Council of 14 June 2017 on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, and repealing Directive 2003/71/EC

asset-referenced tokens can involve and adopted a rather flexible regulatory approach. In fact, some asset-referenced tokens may offer all their holders redemption rights or claims on the reserve assets or on the issuer, whilst other asset-referenced tokens may not grant such rights to all their holders and may for instance limit the right of redemption to specific holders. By consequence, as already mentioned, article 17 requires issuers of asset-referenced tokens to include in the white paper "detailed information on the nature and enforceability of rights, including any direct redemption right or any claims, that holders of asset-referenced tokens and any legal or natural person […] may have on the reserve assets or against the issuer, including how such rights may be treated in insolvency procedures"[104]. Furthermore, article 35 provides that, where holders of asset-referenced tokens are granted redemption rights or claims on the reserve assets, the issuer shall establish a policy setting out: "(a) the conditions, including thresholds, periods and timeframes, for holders of asset-referenced tokens to exercise those rights; (b) the mechanisms and procedures to ensure the redemption of the asset- referenced tokens, including in stressed market circumstances, in case of an orderly wind-down of the issuer of asset-referenced tokens […] or in case of a cessation of activities by such issuer; (c) the valuation, or the principles of valuation, of the asset-referenced tokens and of the reserve assets when those rights are exercised by the holder of asset- referenced tokens; (d) the settlement conditions when those rights are exercised; (e) the fees applied by the issuers of asset-referenced tokens when the holders exercise those rights"[105]. On the other hand, should the asset-referenced tokens issuer not provide redemption rights or claims on the reserve assets to all the holders of asset-referenced tokens, article 35 (3) provides that these shall establish specific policies and procedures which define: (i) the natural or legal persons that are provided with such rights; (ii) the conditions for exercising those rights; and (iii) the obligations imposed on those persons. Furthermore, where asset-referenced tokens issuers do not grant redemption rights or claims on the reserve assets at all, article 35 (4) ensures holders are still offered minimum rights by instructing asset-referenced tokens issuers to: (i) put in place mechanisms to ensure the liquidity of the asset-referenced tokens by establishing and maintaining written agreements with authorised crypto-asset service

[104] Article 17 (1) (e), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

[105] Article 35 (2) (a) – (e), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937. In this regard, in order to prevent issuers from imposing unreasonable fees on holders, article 35 (2) further specifies that the fees referred to in point (e) shall be proportionate and commensurate with the actual costs incurred by the issuers of asset-referenced tokens.

providers and by ensuring that a sufficient number of crypto-asset service providers are required to post firm quotes at competitive prices on a regular and predictable basis; and, most importantly (ii) provide holders of asset-referenced tokens the right to redeem the crypto-assets from the issuer of crypto-assets directly where the market value of asset-referenced tokens varies significantly from the value of the reference assets or the reserve assets. Furthermore, where asset-referenced tokens issuers do not grant a direct claim or redemption rights to all holders, the related crypto-asset white paper shall "contain a clear and unambiguous statement that all the holders of crypto-assets do not have a claim on the reserve assets or cannot redeem those reserve assets as with the issuer at any time"[106]. With the aim of ensuring client's redemption rights are respected even in distressed conditions, article 42 (1) instructs asset-referenced tokens issuers to "have in place a plan that is appropriate to support an orderly wind-down of their activities under applicable national law, including continuity or recovery of any critical activities performed by those issuers or by any third-party entities". Article 42 (3) further indicates that the wind-down plan shall "include contractual arrangements, procedures and systems to ensure that the proceeds from the sale of the remaining reserve assets are paid to the holders of the asset-referenced tokens". Finally, considering the European Union's purpose to delineate asset-referenced tokens as a means of exchange rather than as a store of value, article 36 prohibits asset-referenced tokens issuers and crypto-assets service providers to provide for "interest or any other benefit related to the length of time during which a holder of asset- referenced tokens holds asset-referenced assets"[107].

2.3. Electronic Money Tokens

Regarding electronic money tokens, Title III, Chapter 6 of the MiCA Regulation proposal establishes a set of regulatory provisions which differ partially to those regarding asset-referenced tokens and other types of crypto-assets. In particular, article 43 mandates that no e-money token shall be offered to the public in the EU or admitted to trading on a crypto-assets trading platform unless the issuer is authorised as a credit institution or as an

[106] Article 17 (1), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[107] Article 36, Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

electronic money institution within the meaning of Article 2 (1) of EMD2[108]. Interestingly, acknowledging their similarities from a functional perspective, article 43 also establishes that e-money tokens shall be deemed as electronic money for the purpose of EMD2[109]. Consequently, the proposal instructs issuers of electronic tokens issuers to comply with the relevant operational requirement of EMD2, unless specified otherwise by the proposal[110]. For instance, article 45 – mirroring the provisions of article 36 with respect to electronic money tokens – derogates to the provisions of article 12 of EMD2 by establishing that "no issuer of e-money tokens or crypto-asset service providers shall grant interest, or any other benefit related to the length of time during which a holder of e-money tokens holder such e-money tokens"[111]. In addition to obtaining an authorisation as a credit institution or as an electronic money institution and complying with requirements applying to electronic money institution, similarly to asset-referenced tokens, electronic tokens issuers shall authorisation publish a white paper and notify it to the competent authority in the member state where their registered office is located[112]. The white paper shall contain the information provided in article 46. However, article also 43 includes exceptions for low-impact electronic money tokens and for electronic money tokens which are marketed, distributed, and exclusively held by qualified investors[113]. On the other hand, differently from asset-referenced tokens, the proposal instructs electronic money tokens issuers to provide holders of such crypto-assets with redemption rights. Indeed, article 44 establishes that all holders of electronic money tokens shall "be provided with a claim on the issuer of such e-money tokens", and that "any e-money token that does not provide all holders with a claim shall be prohibited"[114]. Article 44 continues by establishing that "upon request by the holder of e-money tokens, the respective issuer shall redeem at any moment and at par value the value of the e-money tokens held to the holders of e-money tokens, either in cash

[108] Article 43 (1) (a), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[109] Article 43 (1) (c), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[110] Article 43 (1) (b), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[111] Article 45, Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[112] Article 43 (1) (c), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[113] Article 43 (2), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[114] Article 44 (2), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

or by credit transfer"[115]. Furthermore, the proposal provides that redemption of e-money tokens by holders may only be subject to fees if this is stated in the crypto-asset white paper, and that such fees shall be proportionate to the costs incurred by the issuer of e-money tokens[116]. Finally, to prevent cross-currency risks, article 49 provides that the funds received in exchange for e-money tokens shall be invested by the electronic money tokens issuer in assets denominated in the same currency as the one that the e-money token is referencing.

2.4. Crypto-assets other than Asset-referenced tokens and Electronic Money Tokens

In relation to crypto-assets other than asset-referenced tokens and electronic money tokens, these are regulated by Title II of the MiCA Regulation proposal. As discussed above, crypto-assets other than asset-referenced tokens and electronic money tokens often involve a decentralised structure not only in the transfer of the tokens, but also in the management and custody of the funds which are exchanged for such tokens. Acknowledging these differences, the proposal does not provide an authorisation regime for the issuers of these crypto-assets. However, article 4 provides that the issuer of this type of crypto-assets shall be a legal entity and publish and notify a crypto-asset white paper to the competent authority of the Member State where it has a registered office. Due to the lack of an authorisation regime, the information requirements for this type of crypto-assets are strengthened with the aim of providing holders with sufficient information both on the issuer and the instruments which are being issued. Indeed, article 5 establishes that the crypto-asset white paper shall contain – *inter alia*: (i) a detailed description of the issuer and a presentation of the main participants involved in the project's design and development; (ii) a detailed description of the issuer's project, the type of crypto-assets that will be offered to the public or for which admission to trading is sought and the reasons for such offering of admission, as well as the planned use of the fiat currency or other crypto-assets collected through the offer to the public; (iii) a detailed description of the rights and obligations attached to the instruments issued and the conditions for the exercise of those rights; (iv) information regarding the underlying technology and standards applied by the

[115] Article 44 (4), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[116] Article 44 (6), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

issuer with respect to the holding, storing and transfer of the crypto-assets; (v) a detailed analysis of the risks related to the issuer, the crypto-assets, and the overall implementation of the project[117]. Presumably with the aim of emphasising the risk profile of such crypto-assets, the proposal further establishes that: (i) the crypto-asset white paper must contain the following statement: "The issuer of the crypto-assets is solely responsible for the content of this crypto-asset white paper. This crypto-asset white paper has not been reviewed or approved by any competent authority in any Member State of the European Union"[118]; (ii) the crypto-asset white paper shall not provide any forecast or assumption on the future value of the crypto-assets unless the issuer of the crypto-assets can guarantee such future value[119]; (iii) the crypto-asset white paper shall contain a statement that: "(a) the crypto-assets may lose their value in part of in full; (b) the crypto-assets may not always be transferable; (c) the crypto-assets may not be liquid; (d) where the offer to the public concerns utility tokens, that such utility tokens may not be exchangeable against the good or service promised in the crypto-asset white paper, especially in case of failure or discontinuation of the project"[120]. On the other hand, the proposal interestingly provides exemptions from the drafting and publication of the white paper not only in the case of low-impact crypto-assets and for crypto-assets that are marketed, distributed, and exclusively held by qualified investors, but also in the following cases: (i) where the crypto-assets are offered to fewer than 150 natural or legal persons per Member State if such persons are acting on their own account; (ii) where the crypto-assets are offered for free. In this respect, the proposal further specifies that crypto-assets might not be considered to be offered for free where the purchasers provide personal data or other monetary or non-monetary benefits in exchange for crypto-assets, even via a third party; (iii) where the crypto-assets are unique and not fungible with other crypto-assets. This provision is significant as it exempts any issuer of Non-Fungible Tokens (NFTs) from publishing any information material in the context of their sale[121]; (iv) where crypto-assets are

[117] Article 5 (1), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[118] Article 5 (3), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[119] Article 5 (4), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[120] Article 5 (5), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[121] Non-fungible tokens constitute cryptographic assets on a DLT with unique identification codes and metadata that distinguish them from each other. Unlike other types of crypto-assets, they cannot be traded or exchanged at equivalency. Sales of NFTs reached about US $ 25 billion in 2021, compared to just $94.9 million the year before.

automatically created through mining as a reward for the maintenance of the DLT or the validation of transactions. This would be the case of crypto-asset such as Bitcoin and Ethereum as discussed above[122]. Finally, for the purpose of enhancing transparency with respect to the types of assets which are offered by crypto-assets issuers, article 7 of the Regulation proposal provides that the notification of the crypto-asset white paper shall detail how the crypto-asset as described in the white paper is not to be deemed as: (i) a financial instrument as defined in Article 4 (1), point (15), of Directive 2014/65/EU; (ii) electronic money as defined in Article 2, point 2, of Directive 2009/110/EC; (iii) a deposit as defined in Article 2 (1), point (3), of Directive 2014/49/EU; (iv) a structured deposit as defined in Article 4 (1), point (43), of Directive 2014/65/EU[123].

2.5. Financial Stability

Regarding financial stability, as discussed above, the evolution of crypto-assets from a niche market into a worldwide phenomenon occurring as a result of their progressive adoption in the traditional financial system might involve several legal issues. As the objective of financial stability is enshrined in most central banks' mandates, financial stability concerns are currently in regulators' spotlight. These range from the potential disintermediation of the financial industry as envisaged by crypto-assets based on permissionless DLT and DeFi projects, to the prudential treatment of crypto-assets exposures of traditional financial entities. To date, the turmoil surrounding crypto-asset markets did not affect the traditional financial system due to their peripheric impact. However, it remains to be seen whether a widespread use of crypto-assets and related self-executing financial products ensuing their institutional adoption will give rise to vulnerabilities. Indeed, due to their novel risk profiles, these technologies require enhanced capabilities of regulators and supervisory agencies, since the regulatory definitions do not always align with the new technological realities, which are used for multiple economic activities and are consequently regulated by different oversight bodies. Overall, it has been argued that these features call for a redrawing of regulatory boundaries to make them fit

For more information in this respect, please refer to: https://www.reuters.com/markets/europe/nft-sales-hit-25-billion-2021-growth-shows-signs-slowing-2022-01-10/

[122] Article 4 (2), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

[123] Article 7 (3), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

for a "new reality where the lines demarcating the responsibilities of different regulators within and across jurisdictions have become increasingly blurred"[124]. Indeed, the inherently global nature of the risks related to crypto-assets requires globally coordinated regulation in order to avoid the build-up of systemic risk. In this respect, micro-prudential regulation and supervision by respective countries should be complemented with efficient international macroprudential regulatory frameworks. However, the phenomenon of macroprudential regulation and supervision is still relatively new, and its design and effectiveness have been a major focus in the academic debate following the financial crisis of 2007-2009. To understand the overall role and scope for the regulation of crypto-assets, it seems appropriate to detail the nature and consequences of the systemic risk their potential widespread use could entail by mirroring considerations made after the financial crisis of 2007-2009. Indeed, it could be argued that the current technological revolution triggered in the financial sector by distributed ledger-based technologies shares some similarities with the conditions that anticipated that crisis. The current debate on the institutional design of macroprudential regulation of the financial system builds on the main failures of the liberal economic policies that have shaped the structure of modern capitalism since the end of the Great War and which led to the 2007-2009 financial crisis. Understanding these phenomena requires not only an economic, but also a political and sociological analysis. The vertiginous growth in terms of volume of financial markets in recent decades is unprecedented and finds its origin in the economic reconstruction plans launched after the Great War by the major Western economies. It is in this context that banking institutions have taken on the social function of crossroads for the satisfaction of both the interests of the community and the implementation of the economic policies of the states. The intertwining of the economic growth that politicians need to obtain their consensus, the aspirations of individuals to satisfy their growing interests, and the continuous profit-seeking of banks gives the financial system a cyclical structure. On the other hand, all major financial crises have always been preceded by periods of strong economic growth, where the contamination between political stability, social satisfaction and the significant profits generated by the financial markets made a critical analysis of the components that constituted the resulting euphoria hardly feasible. In addition to economic growth, innovation has also characterised the periods preceding an economic crisis. The

[124] Bank For International Settlements, "V. Cryptocurrencies: looking beyond the hype", BIS Annual Economic Report, 2018, p. 108

early years of the 21st century were characterised by the development of complex financial products such as derivatives, as well as risk distribution and transfer processes such as securitisations. One of the assumptions underlying confidence in the structure of the financial system was that as the ability to distribute and transfer the risks inherent in each financial transaction increased, so would the stability of the system as a whole. History has taught us that these properties have rather dangerously increased the interdependence of financial institutions, and consequently the contagiousness of the crisis. Moreover, these innovations have dramatically increased the information asymmetries between economic agents and those who were supposed to regulate them. In fact, the growing wealth of financial institutions has enabled them to develop particularly advanced skills and business models, in relation to which the regulatory authorities - not endowed with the same operational capacity - have found themselves in the position of having to chase change rather than regulate it. Considering the above, it is evident how the element of financial innovation which has triggered the current revolution of the financial industry, combined with the advanced skills and business models of financial institutions, might support the build-up of systemic risk around the crypto-assets ecosystem. Indeed, the developments in terms of both products and services which crypto-assets involve are even more significant than those which characterised the 2007-2009 financial crisis. As a result, the mandate for regulators to develop regulatory solutions with an international scope and that take into account the specificities of these technologies will be crucial in pursuing the goal of financial stability in the years to come. As recently envisaged by the European Systemic Risk Board (ESRB), "the entry of new institutions and the use of new financial products, some of which have quickly gained popularity (*e.g.* crypto assets, stablecoins, etc.) has the potential to pose risks to financial stability". While macro-prudential frameworks with respect to crypto-assets are still currently under discussion, the MiCA proposal put forward by the European Union considers the risks posed by crypto-assets issuers and service providers from a microprudential standpoint. In particular, the proposal details a specific regime with respect to asset-referenced tokens, while providing that issuers of electronic-money tokens will be subject to Directive 2009/110/EC to what extents the custody, management and eventual investment of the fiat currency collected via the offer to the public. On the other hand, the proposal does not provide a particular regime regarding the use of the funds collected by issuers of crypto-assets other than asset-referenced tokens or electronic money tokens. Rather, it only provides that the "planned use of the fiat currency or other crypto-assets collected via the offer to the public" shall be mentioned in the white

paper published and notified by the issuer to the competent authority of the Member State where it has its registered office[125]. In order to address the risks to financial stability posed by asset-referenced tokens, article 31 of the proposal mandates issuers to observe capital requirements proportionate to the issuance size of the asset-referenced tokens, namely in an amount equal to the greater of: (i) € 350.000; (ii) 2% of the average amount of the reserve assets as calculated daily over the preceding six months[126]. However, the proposal further enables competent authorities of the issuer's Member State to increase or decrease the amount of own fund requirements based on – *inter alia* – the evaluation of the risk-assessment mechanism of the issuer, the quality and volatility of the assets in the reserve backing the asset-referenced tokens and the aggregate value and number of asset-referenced tokens in circulation[127]. Moreover, article 31 also establishes that: (i) the own funds shall consist in Common Equity Tier 1 items and instruments as referred to in articles 26 to 30 of Regulation (EU) No. 575/2013[128]; (ii) the threshold exemptions referred to in articles 46 and 48 of Regulation (EU) No. 575/2013 shall not apply with respect to asset-referenced tokens issuers[129]. Moreover, for the purpose of stabilising the value of their asset-referenced tokens, article 32 instructs issuers of asset-referenced tokens to constitute and maintain a reserve of assets backing those crypto-assets at all times, as well as to ensure the prudent management of such reserve assets by making sure that the creation and destruction of asset-referenced tokens are always matched by a corresponding increase or decrease in the reserve assets[130]. For this purpose, issuers of asset-referenced tokens are also required to establish policies that describe: (i) the composition of the reserve assets; (ii) the allocation of such assets; (iii) the comprehensive assessment of the risks raised by the reserve assets; (iv) the procedure for the creation and destruction of the asset-referenced tokens; (v) the procedure to purchase and redeem the asset-referenced tokens against the reserve assets; and (vi) where the reserve assets are invested, the investment policy pursued

[125] Article 5 (1) (b), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[126] Article 31 (1), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[127] Article 31 (3), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[128] Regulation (EU) No. 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012
[129] Article 31 (2), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[130] Article 32 (1) and (3), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

by the issuer[131]. To make sure that the financial condition of asset-referenced tokens can be properly assessed by regulators, supervisors, and the public at large, the proposal also requires an independent audit to be conducted as regards to the composition of the reserve assets at least every six months[132]. Furthermore, to prevent the risk of loss and to preserve the value of asset-referenced tokens, article 33 provides that issuers of such tokens shall have an adequate custody policy ensuring that: (i) the reserve assets are entirely segregated from the issuer's own assets in all circumstances; (ii) that the reserve assets are not either encumbered or pledged as a collateral; and (iii) that the issuer of asset-referenced tokens can have prompt access to those reserve assets in order to meet any redemption requests from the respective holders[133]. According to article 33 of the proposal, the reserve assets shall be kept in custody by either a crypto-assets service provider where the reserve assets are constituted by crypto-assets, and by a credit institution within the meaning of Regulation (EU) No. 575/2013[134] for all other types of reserve assets[135]. With the aim of protecting the holders of asset-referenced tokens against a decrease in value of the assets backing the value of the tokens, article 34 of the MiCA Regulation proposal provides that, where reserve assets are invested by the asset-referenced tokens issuer, these shall be invested in "highly liquid financial instruments with minimal market and credit risk", as "the investments shall be capable of being liquidated rapidly with minimal adverse price effect"[136]. Importantly, as the asset-referenced tokens might be used as a means of payment, article 34 concludes by establishing that all profits or losses arising from the investment of the reserve assets should be borne by the issuer. Mirroring the provisions of article 34 with respect to electronic money tokens, article 49 of the proposal established that funds collected via the public offering by electronic money tokens issuers shall be invested in secure and low-risk assets according to article 7 (2) of EMD2. Regarding asset-referenced tokens which are deemed significant for the purpose of the proposed Regulation, article 41 provides specific additional obligations which apply to the respective issuers. In particular:

[131] Article 32 (4), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[132] Article 32 (5), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[133] Article 33 (1), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[134] Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012
[135] Article 33 (2), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[136] Article 34 (1), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

(i) it provides more stringent capital requirements, as the percentage of own funds with respect to the average amounts of the reserve assets is lifted from 2 per cent to 3 per cent[137]; (ii) it requires issuers to implement a remuneration policy which promotes sound and effective risk management[138]; (iii) for the purpose of ensuring interoperability, it requires issuers to make sure that the respective asset-referenced tokens can be held in custody by different crypto-assets service providers as authorised according to the Regulation proposal and which do not belong to the same group[139]; (iv) it mandates issuers to implement liquidity management policies and procedures aimed at ensuring that the reserve assets have a "resilient liquidity profile" that might enable the issuer to continue operating even in distressed scenarios[140]. On the other hand, in relation to significant electronic money tokens, article 52 provides for additional derogations from the regime indicated in EMD2 for electronic money issuers by subjecting significant electronic money tokens to the provisions set for significant asset-referenced tokens[141]. Finally, in light of their critical role in the functioning of the overall crypto-assets ecosystem as discussed above, the proposal also established prudential requirements for crypto-assets service providers, which shall take the form of: (i) own funds, representing Common Equity Tier 1 items and instruments as referred to in articles 26 to 30 of Regulation (EU) No. 575/2013; or (ii) an insurance policy which covers the territories of the European Union where crypto-assets services are provided, or a commensurate guarantee[142].

2.6. Anti-money Laundering and Countering the Finance of Terrorism

With respect to risks related to anti-money laundering and countering the finance of terrorism risks, it should be pointed out that, to date, crypto-assets have proven to be an ideal instrument for the purpose of avoiding the checks and controls which traditional financial instruments are subject. This is mainly due to both their design, which often

[137] Article 41 (4), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[138] Article 41 (1), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[139] Article 41 (2), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[140] Article 41 (3), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[141] Article 52, Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937
[142] Article 60 (2), Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

involves anonymity features, and their unregulated nature. According to a report published in January by Chainalysis, a blockchain analysis firm, cybercriminals laundered US $ 8.6 billion in crypto-assets throughout 2021 only, up 30 per cent from 2020. Overall, the report estimated that cybercriminals have laundered more than US $ 33 billion worth of crypto-assets since 2017[143]. Due to the anonymity features that crypto-assets imply, it is hard to quantify the extent to which these are currently being used not only to engage in illegal transactions, but also to avoid capital controls and taxes. Other phenomena recently occurred highlighted potential interlinkages between crypto-assets and illegal transactions. For instance, it has been argued that the strong reaction in terms of market capitalisation of Bitcoin to the shutdown of Silk Road, a major online marketplace for illegal drugs, might suggest that "a non-negligible fraction of the demand for cryptocurrencies derives from illicit activity"[144]. The high degree of decentralisation that some crypto-assets entail renders them particularly vulnerable to anonymity risks. From a technical perspective, Bitcoin addresses (*i.e.* the so-called public key as detailed above) do not contain any other information related to the customer, and the overall informatic system does not provide any central server. The DLT protocol underlying the Bitcoin network does not either: (i) require or provide identification and verification of participants; or (ii) generate historical records of transactions in such a way that these are linked with real-world entities or individuals. Moreover, the legal structures related to these crypto-assets do not involve corporate intermediaries which can be made subject to regulation and supervision by competent authorities, as there is no central entity that even law enforcement can target for potential investigation or asset seize purposes. Furthermore, the global reach that the internet as a native habitat provides to crypto-assets increases AML and CFT risks even more, as it empowers crypto-assets with cross-border features by enabling the transfer of funds anywhere from any device with just an internet connection. In addition to that, crypto-assets often rely on complex multi-jurisdictional infrastructures which entail the presence of several entities to execute transactions. This fragmentation of services means that: (i) responsibilities related to AML and CFT compliance, supervision and enforcement might be unclear; and (ii) even where access points for regulation, supervision and enforcement might be identified in the overall infrastructure, the customer and transactions record might

[143] For more information in this respect, please refer to: https://www.reuters.com/technology/crypto-money-laundering-rises-30-2021-chainalysis-2022-01-26/

[144] Bank For International Settlements, "V. Cryptocurrencies: looking beyond the hype", BIS Annual Economic Report, 2018, p. 105

be held by different entities located in different jurisdictions. As discussed above, this in turn could create scope for regulatory arbitrage. since the effective supervision and enforcement of crypto-assets issuers and entities offering crypto-assets services would be left to international cooperation, and centralised components of decentralised crypto-asset infrastructure might be located in jurisdictions with weak AML and CFT controls. On the other hand, centralised crypto-assets infrastructures might even be complicit in money laundering and finance terrorism and could deliberately set up their activities in jurisdictions with weak AML and CFT regimes or proven weak international cooperation[145]. The choice operated by the European Union through the MiCA Regulation proposal, namely to obligate all crypto-assets issuers to at least establish a corporate entity in the Union, is significant in this respect. On the other hand, the current crypto-assets ecosystem provides regulators and supervisors worldwide with the possibility to assess AML and CFT through the main economic gateways of the ecosystem, namely crypto-assets exchanges and stablecoins. With respect to crypto-assets exchanges, these are crucial in the functioning of the system as these provide a secondary market for these instruments by procuring liquidity. In relation to stablecoins, as detailed above, these are often structured in a centralised manner and entail the presence of a corporate intermediary which owns and manages the pool of assets constituting the stablecoin's reserve assets which enables it to maintain its value stable over time. In addition to that, how recently stated, stablecoins "have become a critical part of the crypto-asset ecosystem due to their frequent use in the trading of crypto-assets and as liquidity providers in DeFi"[146]. The phenomenon of Decentralised Finance (DeFi) constitutes one of the developments of distributed ledger technologies. The aim of DeFi projects is to provide an alternative to the traditional financial and banking industry by enabling its decentralisation through smart contracts which could automate financial transactions based on data and complex predefined software solutions. In this light, the inherent centralised structure of crypto-assets service providers and stablecoins, combined with their critical role in the functioning of the overall crypto-assets ecosystem, could be exploited to assess AML and CFT issues also with respect to decentralised crypto-assets. In the European Union, AML and CFT issues as regards to crypto-assets were brought in the regulatory scope by the EU's fifth Anti-Money

[145] Financial Action Task Force (FATF), "Virtual currencies: Key definitions and Potential AML/CFT risks", FATF Report, 2014, p. 9-10

[146] European Central Bank (ECB), "Stablecoins' role in crypto and beyond: functions, risks and policy", Macroprudential Bulletin, 2022, available at: https://www.ecb.europa.eu/pub/financial-stability/macroprudential-bulletin/html/ecb.mpbu202207_2~836f682ed7.en.html

Laundering Directive (5AMLD)[147], which provided several amendments to the EU's fourth Anti-Money Laundering Directive (4AMLD)[148]. 5AMLD widened the EU's regulatory perimeter for AML and CFT controls by expressly bringing providers of exchange services between virtual currencies and fiat currencies (*i.e.* platforms used to exchange money for cryptocurrency) as well as custodian wallet providers into scope. Both providers were brought within the "obliged entity" definition under 4AMLD and new definitions for both virtual currencies and custodian wallet providers were established. The Directive also requires Member States to subject such providers to registration. Until its enactment, by falling outside the regulatory perimeter, virtual currency exchange providers and custodian wallet providers faced no EU law obligations to identify suspicious activity. The EU's extension of the regulatory perimeter is designed to prevent criminal groups from exploiting the anonymity of virtual currency-based transactions and to improve national regulators' monitoring of the users of virtual currencies while at the same time not hampering technical progress or development.

[147] Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU

[148] Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC

CHAPTER III - AN EUROPEAN CENTRAL BANK DIGITAL CURRENCY: DESIGN CHOICES AND LEGAL CONSIDERATIONS

Summary: 1. *Function, Scope and Classification of a CBDC* – 1.1. *Money Today: a Central Bank Perspective* – 1.2. *Potential Role of a CBDC* – 1.3. *A Digital Euro* – 2. *Core Properties and Design Choices* – 2.1. *Account-based* – 2.2. *Token-based* – 3. *Key Design Choices* – 3.1. *Remuneration* – 3.2. *Limits or Caps* – 3.3. *Online, offline or both?* – 4. *Operational and Reputational Risks for the Eurosystem*.

1. Function, Scope and Classification of a CBDC

Besides the overview of private digital assets and related legal risks as just outlined, it is now deemed appropriate to analyse the phenomenon of Central Bank Digital Currencies (CBDCs). In this paper, the European project of issuing a sovereign digital currency (also called "digital euro") will be considered in light of the current international academic debate. In particular, the analysis will first highlight the possible benefits that the issuance of a CBDC might offer with respect to financial stability and monetary policy. Subsequently, the analysis will focus on the different design choices currently under discussion, as well as the on the relative risks that such choices entail from a legal and economic perspective.

1.1. Money Today: a Central Bank Perspective

The progressive transformation of money as a digital asset we are currently witnessing entails several consequences for central banks. Firstly, money is becoming more diverse. The birth of digital money allowed the creation and diffusion of forms of private money tailored to almost any usage or shape, which can be managed through different types of technologies. In the modern financial environment, it could be argued that two main types of digital money exist: scriptural money and tokens. In relation to scriptural money, it is a broad term used to define a fraction of the monetary base represented by "deposit balances held on an account at a credit institution or a central bank, or electronic money"[149][150]. In order to understand the systematic importance of the concept of scriptural money, it is worth mentioning its application in the European regulatory context. In the revised Payments Services Directive (PSD2)[151], the European legislator refrained from providing

[149] Since no legal definition of the concept of scriptural money has been provided by the European legislator, its relationship to electronic money in the European regulatory framework is currently unclear. However, in line with the definition provided by the European Central Bank, electronic money could be classified as a type of scriptural money with the characteristics defined in Directive (EU) 2009/110/EC. This approach might be further supported by the opinion provided by the European Central Bank on 5 December 2008 in the context of the introduction of Directive 2009/110/EC (E-money Directive). Indeed, at page 6 of the opinion it is stated that "it is only by ensuring that the holder of e-money can reconvert the value of e-money into banknotes or scriptural money that confidence in e-money as an effective and reliable substitute for coins and banknotes will be preserved". A strict interpretation of this sentence might as well suggest the classification of e-money as a sub-species of scriptural money, which would *de facto* assume a role analogous to that of legal tender in the digital sphere.

[150] European Central Bank, "Crypto-Assets: implications for financial stability, monetary policy and payments and market infrastructures", Occasional Paper Series No. 223, 2019, p. 8

[151] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No. 1093/2010, and repealing Directive 2007/64/EC

an unambiguous definition of the concept of money. The subject of the directive is the transfer of "funds". With respect to this term, Article 4 (25) of the directive provides a list that includes: "banknotes and coins, scriptural money or electronic money as defined in point (2) of Article 2 of Directive 2009/110/EC". Considering the above, it could be argued that scriptural money represents the fraction of digital money which is either public or subject to regulation and supervision by public institutions. This perspective might be supported by the European Central Bank, which – in distinguishing scriptural money from crypto-assets – indicated two different types of scriptural money: (i) scriptural money in the form of commercial bank money, which consists in "commercial bank liabilities that take the form of deposits held at a commercial bank"; and (ii) scriptural money in the form of central bank money, which consists in a "liability of the central bank in the form of either (i) existing bank deposits held at a central bank for wholesale settlement purposes or (ii) digital base money (DBM) for the general public and central bank digital currency"[152]. On the other hand, tokens constitute a digital representation of value empowered by decentralised ledger technologies that can be exchanged directly, on a peer-to-peer basis without validation by a third party. The concept of token encompasses the whole spectrum of crypto-assets as detailed above, since all crypto-assets represent electronic files which embody a specific value. Moreover, since digital tokens are highly customisable, these can be programmed according to specific economic needs. As discussed above, most digital tokens are fungible, divisible, and transferable. As digital tokens have no material existence, their operation requires a designated system to authenticate transactions. In the current academic debate, digital tokens are often associated with DLT, as this constitutes the underlying technology for great part of the digital tokens in circulation. This is due to its programmability, transparency, immutability, and security, which might pave the way to new solutions for the management of complex systems and histories, such as supply chains, medical records, or land registers, where the need for precise recording of events and permanent coordination of participants is crucial to the functioning of the system. However, the role of digital tokens as means of payment is more open to questions as discussed above, as the decentralised structure DLTs involve is an organizational choice rather than a technical necessity. Indeed, digital tokens can also function in more centralised infrastructures. For instance, as opposed to digital tokens which are used as

[152] European Central Bank, "Crypto-Assets: implications for financial stability, monetary policy and payments and market infrastructures", Occasional Paper Series No. 223, 2019, p. 8

means of payment in decentralised infrastructures such as crypto-assets, digital tokens are also employed in open banking applications, where these simply mirror existing bank deposits. Secondly money is becoming more segmented. The increasing adoption of private digital currencies as means of payment stemmed from the global expansion of digital platforms designed as closed systems which provide users with several functionalities (*e.g.* e-commerce, entertainment, social media). The underlying economic considerations related to these platforms aim to develop synergies and complementarities among these functionalities. It has been argued that digital platforms have "economic incentives to erect technical barriers to the interoperability of their system, limit their connections with other parts of the economy and operate as closed systems"[153]. In this context, the creation of their own digital money is only a way to further lock-in customers and enlarge their footprint. Examples of these kind of closed digital platforms can be found in China, where FinTech companies such as Tencent and AntFinancial are leading innovation in the retail payments sector by creating multi-functional digital environments. However, the interoperability of these private ecosystems, as well as the easy transferability of funds among them has not matched their success in terms of usage and market capitalization. For instance, WeChat Pay and Alipay (*i.e.* the digital platforms related to Tencent and AliFinancial respectively), despite accounting for 90 per cent of mobile payments in China, do not let customers transfer funds among the two providers. Transferring the money requires cashing out the funds to a bank account and then cashing in to the other platform and entails transaction costs due to the presence of withdrawal fees[154]. Thirdly, money is becoming more competitive. The digitalisation of money also led to the flourishing of private money experiments due to the relatively low expertise required. The competition which ensues is improving and innovating the retail payments sector by accelerating cross-border payments and reducing transaction costs. On the other hand, it also entails financial stability and consumer protection concerns as detailed above[155]. The use of central bank money (*i.e.* public money) as the ultimate means of settlement of transactions in the economy enables central banks to act on the economy (*e.g.* pursue monetary policy, preserve financial

[153] Markus Brunnermeier, Jean-Pierre Landau, "The Digital Euro: policy implications and perspectives" Policy Department for Economic, Scientific and Quality of Life Policies, Directorate General for Internal Policies, European Parliament, 2022, p. 17

[154] Christian Catalini, Alonso de Gortari, Nihar Shah, "Some Simple Economics of Stablecoins", SSRN, 2021, p. 16

[155] Markus Brunnermeier, Jean-Pierre Landau, "The Digital Euro: policy implications and perspectives" Policy Department for Economic, Scientific and Quality of Life Policies, Directorate General for Internal Policies, European Parliament, 2022, p. 16-22

stability, etc.) by setting the interest rates attached to their own liabilities. Changes in the central bank's policy rate are then transmitted across the whole monetary system to the real economy through financial and credit markets. This process enables central banks to ensure the uniformity of a currency and control the respective unit of account, both of which constitute necessary elements for the implementation of monetary policy and ultimately for the preservation of monetary sovereignty. The increasing diversity of money we witness today might undermine this process if alternative private digital currencies were to replace central bank money in their role. Indeed, monetary sovereignty has been defined as "the ability of central banks to control the unit of account in their whole jurisdiction"[156]. As further discussed below, in the EU this monetary sovereignty is enshrined both in Article 128 (1) of the TFEU and Article 16 of Protocol No. 4 on the Statute of the ESCB and of the ECB, which delineate the Eurosystem's exclusive competence to issue euro banknotes as official unit of account in the euro area. This control is deemed lost when citizens start using a foreign or private currency in their daily activities (*e.g.* to quote prices, wages, etc.). As a result, domestic monetary policy becomes powerless, since the domestic monetary and financial conditions are determined by a foreign or private authority that issues the unit of account. This phenomenon would resemble the so-called "dollarisation" of many countries' domestic financial and monetary conditions due to the dominant role of the Dollar in the global financial system. However, the risks for the overall financial system would be even more significant should the (partial) substitution of national currencies occur not due to the influence of another country's currency, but rather due to the influence of private currencies operated and controlled by private and often unknown individuals.

1.2. Potential Role of a CBDC

CBDCs differ from the ecosystem of private digital assets because of one key factor. E-money and commercial bank money, constitute liabilities of supervised private entities. While these entities might default and become unable to meet their customers' claims (*e.g.* to convert their holdings into central bank money), their operation is safeguarded by legally binding regulatory frameworks which oblige issuers to preserve the value of their liabilities. For instance, in addition to their supervisory function, central banks generally have the

[156] Markus Brunnermeier, Jean-Pierre Landau, "The Digital Euro: policy implications and perspectives" Policy Department for Economic, Scientific and Quality of Life Policies, Directorate General for Internal Policies, European Parliament, 2022, p. 16

power to intervene in situations of financial stress in order to prevent the insolvency of credit institutions. This function is commonly referred to as "lender of last resort"[157]. Finally, within the Euro area, commercial banks deposits are also safeguarded by deposit insurance schemes. As regards to crypto-assets, as already mentioned above, these may not constitute a liability of any entity at all. When they do, these are not yet subject to a reliable legal framework aimed at protecting the value of their liabilities. On the other hand, a CBDC would constitute a risk-free form of central bank money (*i.e.* public money), as it would be issued by a central bank and would remain its liability at all times. As a liability of the central bank, it could: (i) maintain its value unchanged over time, thus ensuring that the citizens' purchasing power[158] does not fluctuate beyond a predefined threshold[159]; (ii) avoid the fragmentation of the monetary system by preserving the uniformity of the currency in the digital environment. Indeed, by issuing a CBDC under its control and as its own liability, a central bank could avoid a situation where different manifestations of a currency in the digital environment become imperfect substitutes, thus undermining the central bank's role as payments systems supervisor and monetary policy setter; (iii) empower the central bank with new tools to support the economy and foster financial inclusion. For instance, a central bank digital currency might enable central banks to stimulate aggregate demand through direct transfers of money to citizens (*i.e.* so-called helicopter money). This feature could possibly be combined with a "programmable" monetary policy, which would entail transfers of money with an "expiry" date or conditional on being spent on certain goods or services[160]. On the other hand, a digital euro might foster financial inclusion for the "unbanked"[161] and for most economically vulnerable groups in society, whose condition might soon be exacerbated due decline in the use of cash in the euro area; (iv) strengthen the international role of a currency and enhance the efficiency of the cross-currency payment system. The decision to issue a

[157] For more information in this respect, please refer to the EU's Agreement on Emergency Liquidity Assistance (ELA), available at: https://www.ecb.europa.eu/mopo/ela/html/index.en.html

[158] The purchasing power represents the amount of goods and services that citizens can purchase with a predefined amount of money over time.

[159] Preserving the stability of goods and services' prices is one of the primary objectives of most central banks. As regards to the European Central Bank, this objective is enshrined in article 127 (1) of the Treaty on the Functioning of the European Union.

[160] Bank for International Settlements (BIS), "Central Bank Digital Currencies: foundational principles and core features", 2021, p. 8

[161] Unbanked is an informal term used to indicate adults who do not use banks or banking institutions in any capacity. It is estimated that about 13.5 million households in the euro area are unbanked as of 2022. For more information in this respect, please refer to: https://www.ecb.europa.eu/pub/economic-bulletin/articles/2022/html/ecb.ebart202205_02~74b1fc0841.en.html

central bank digital currency might not only be influenced by endogenous factors, but also by exogenous ones. One of these is represented by a scenario in which some major central banks opt to issue a CBDC, while other not. In this case, the former might enhance the status of the related currencies at the expense of the latter. Moreover, a CBDC might contribute to correct inefficiencies currently existing in cross-currency payment infrastructures, notably those related to transfers of remittances[162] through improved interoperability among payment systems operating in different currencies; (v) preserve financial stability. As discussed above, CBDCs might support financial stability by providing a risk-free asset in the digital environment which would both preserve the current role central banks play in the overall economy and ensure the uniformity of a currency.

1.3. A Digital Euro

In the European context, the introduction of a CBDC mainly stems from the need to respond to changes that have characterised the retail payments industry in recent years[163]. It is argued that the benefits potentially ensuing the issuance of a CBDC mirror the ESCB's mandate as enshrined in Article 127 of the TFEU. Indeed, in addition to maintaining price stability for goods and services, Art. 127 confers on the European System of Central Banks (ESCB) the further objectives of: (i) promoting the smooth operation of payment systems[164]; (ii) supporting the general economic policies in the European Union[165]; (iii) defining and implementing the monetary policy of the Union[166]; (iv) conducting foreign exchange operations[167]; (v) holding and managing the official foreign reserves of the member states [168]; (vi) contributing to the smooth conduct of policies pursued by the competent authorities relating to the prudential supervision of credit institutions and the stability of the financial system[169]. The possible role of a digital euro considering the

[162] In 2020, the overall remittances market was estimated by the World Bank at US $ 714 billion. For more information in this respect, please refer to: https://www.knomad.org/publication/ migration-and-development-brief-32-covid-19-crisis-through-migration-lens
[163] The Eurosystem has been providing central bank money in the form of banknotes to citizens for two decades. While cash – despite its decline – is still the dominant means of payments in the euro area, new technologies and the increasing demand for immediacy from consumers are changing the way European citizens pay. This is evident in the expanding role of electronic payments as mentioned above.
[164] Article 127 (2) of the Treaty on the Functioning of the European Union
[165] Article 127 (1) of the Treaty on the Functioning of the European Union
[166] Article 127 (2) of the Treaty on the Functioning of the European Union
[167] Article 127 (2) of the Treaty on the Functioning of the European Union
[168] Article 127 (2) of the Treaty on the Functioning of the European Union
[169] Article 127 (5) of the Treaty on the Functioning of the European Union

objectives of the Eurosystem is currently being discussed in the context of the investigation phase launched in July 2021 by the European Central Bank (ECB). This phase aims at identifying the optimal design of a digital euro and ensure it meets the needs of citizens in the Euro area. Regarding the relationship between a digital euro and banknotes, the European Union has already stated that a digital euro "would be complementing cash, not replacing it, as well as that "cash will continue to be available in the euro area. A digital euro would function alongside cash as a response to consumers' evolving demand to pay digitally, in a fast and secure way"[170]. This implies that a digital euro would constitute a so-called "retail" central bank digital currency, as opposed to a "wholesale" central bank digital currency. Moreover, a Digital Euro would not constitute a parallel currency, but rather another way to supply euro currency. Therefore, its convertibility at par with other forms of the euro, such as banknotes, central bank reserves and commercial bank deposits, would be ensured in all circumstances. Furthermore, with the aim of avoiding undue financial risks to the Eurosystem, it has been argued that the supply of central bank money issued in the form of a digital euro should always be subject to the Eurosystem control[171], and that this initiative should not aim at crowding out private digital retail payments[172].

2. Core Properties and Design Choices

With this in mind, it is deemed appropriate to detail the main properties and design choices of a digital euro which are being discussed at a European level. Overall, several design choices and principles are currently being discussed by European Union's institutions with respect to the potential issue of a digital euro. These resemble the core properties and design choices described in 2018 by the Committee on Payments and Market Infrastructures of the Bank for International Settlement (BIS) as one of the first reports on CBDCs by an international financial institution[173]. After defining CBDCs as "a digital form of central bank money that is different from balances in traditional reserve or settlement amounts"[174], the report indicates four core properties of money affecting the discussion on central bank digital currencies' design: (i)

[170] European Central Bank, "FAQs on the digital euro", available at: https://www.ecb.europa.eu/paym/digital_euro/faqs/html/ecb.faq_digital_euro.en.html
[171] As it is the case now with euro banknotes and coins according to Article 128 (1) of the TFEU and article 16 of Protocol No. 4 on the Statute of the ESCB and the ECB.
[172] European Central Bank, "Report on a Digital Euro", 2020, p. 25-30
[173] Committee on Payments and Market Infrastructures, "Central Bank Digital Currencies", Bank for International Settlements (BIS), 2018
[174] Committee on Payments and Market Infrastructures, "Central Bank Digital Currencies", Bank for International Settlements (BIS), 2018, p. 4

issuer (central bank or other entity; (ii) form (digital or physical); (iii) accessibility (wide or restricted); (iv) technology (token-based or account-based). Regarding the latter, whilst commercial bank money and central bank money in the form of balances and reserve accounts constitute account-based money, cash and most digital currencies represent token-based money. The main difference between token-based and account-based money lies in the verification needed when it is used as a means of exchange. Indeed, whilst in account-based money systems, the verification of transactions is based on the ability to identify the account holder to avoid identity theft, the verification of transactions in token-based money systems relies on the ability of the payee to verify the validity of the object of the payment in order to avoid counterfeiting in the case of cash and double-spending issues in the case of digital tokens. Based on these four properties, the report indicates three possible types of CBDCs: (i) a token-based CBDC which is widely available to the public and mainly targeted for retail transactions, but also suitable for broader use; (ii) a token-based CBDC with access restricted to selected entities and whose main purposes are wholesale payments and settlement transactions; (iii) an account-based CBDC where the central bank would directly provide general purpose accounts to all individuals in the relevant economic area[175]. As already mentioned, this last type of CBDC would constitute the solution with the highest magnitude. Indeed, its introduction would entail several concerns both from an economic and legal perspective, due to the lack of availability of the technology empowering such system, the potential disintermediation of the banking system it might involve, and the fact that most monetary and central bank laws do not envisage the presence of accounts held by the public directly at the central bank. Furthermore, the types of CBDC indicated in points (i) and (iii) would resemble a so-called "retail" or "general purpose" CBDC, whilst the one indicated in point (ii) would constitute a "wholesale" CBDC. Transposing these considerations in the European context, a wholesale digital euro would constitute a CBDC made available only to participants in the large-value payment system managed by the European Central Bank[176] with the aim of improving its efficiency and provide faster transaction settlement. However, how recently pointed out, a wholesale CBDC already exists, since "banks have accounts with central banks and these accounts are digital.

[175] Committee on Payments and Market Infrastructures, "Central Bank Digital Currencies", Bank for International Settlements (BIS), 2018, p. 4

[176] This transactions settlement system is named TARGET2. The Eurosystem created TARGET2 to be used by participating intermediaries for the gross settlement in central bank money of large-value transactions, such as monetary policy operations, interbank payments, operations on behalf of customers and ancillary system transactions (customer payments systems, securities settlement systems, central counterparties, and money markets). Source: Banca d'Italia, available at: https://www.bancaditalia.it/compiti/sistema-pagamenti/target2/index.html?com.dotmarketing.htmlpage.language=1&dotcache=refresh

The term "wholesale CBDC" is often used in a potentially misleading manner to refer to the idea of changing the way banks access digital central bank money from the current "conventional" technology to a blockchain/distributed ledger technology"[177]. A retail CBDC would instead entail significant novelties from a legal perspective, as – according to the technology used – it might involve a scenario where direct access to the digital euro as a form of central bank money is extended to end users (*i.e.* citizens), rather than only to entities that already have access to central bank money. Considering the above and based on the data currently available, the European Union indicated that a digital euro would mainly serve retail payments or general purposes, rather than wholesale transactions settlement purpose. As a result, this analysis will only highlight the design choices and legal considerations related to the issuance of a retail digital euro.

2.1. Account-based

Should the technology used for the issuance of a retail digital euro be account-based, the European Union should decide whether to: (i) allow citizens to open account directly with the Eurosystem; or (ii) provide intermediate access by end users to central bank accounts through supervised intermediaries. In the first model, it has been argued that the Eurosystem "would have the full control over the digital euro life cycle as it would issue and redeem any unit of digital euro and would process transactions directly via its own infrastructure", as well as that "this model would be technologically challenging for the Eurosystem owing to the number of connections and independent accounts to be provided and for which the present central bank IT infrastructure is not designed. Moreover, direct access would imply a significant operational burden for the central bank, which could be required to ensure adherence to payment services regulations and requirements as a scheme operator"[178]. It is evident that such a solution would constitute a significant challenge for the ECB, as it would expose it to several operational and reputational risks. Moreover, the issuance to the general public of a CBDC through the opening of cash accounts directly at the European Central Bank should be assessed from a legal perspective. This issue has also been highlighted by the International Monetary Fund (IMF), which pointed out that this

[177] Ulrich Bindseil, Fabio Panetta, Ignacio Terol, "Central Bank Digital Currency: functional scope, pricing and controls, Occasional Paper Series No. 286, European Central Bank, 2021, p. 5
[178] European Central Bank, "Report on a Digital Euro", 2020, p. 38

might lack a sufficient legal basis according to many central bank laws[179]. The IMF pointed out that central bank law provisions empowering central banks to open cash current accounts in their books are often restricted, as: (i) some central bank laws limit the power of the central bank to open cash current accounts to a restricted group of institutions, which are typically public institutions and financial institutions, with some central bank laws further limiting the access to banks rather than financial institutions; (ii) other central banks laws do not limit the opening of cash current accounts to a designated group of institutions, with some not imposing any restrictions and others explicitly allowing offering cash current accounts to natural persons; (iii) another group of central banks laws provide restrictions in this respect, but allow these restrictions to be lifted by a decision of the central bank's board of directors or the minister of finance. In this scenario, article 17 of the Protocol No. 4 on the statute of the ESCB and of the European Central Bank explicitly states that "in order to conduct their operations, the ECB and the national central banks may open accounts for credit institutions, public entities and other market participants and accept assets, including book entry securities, as collateral"[180]. In this light, should the European Union opt for the issuance of an account-based digital euro allowing for the direct opening of cash current accounts to the general public, this might lack a sufficient legal basis and might thus require a legislative revision of the ESCB statute. As regards to the second model, which implies the presence of supervised intermediaries, it has been argued that "the Eurosystem could continue interacting directly only with supervised intermediaries, which would act as settlements agents instructing transactions on behalf of their customers. Digital euro accounts would still belong to the end users and the Eurosystem would retain full control over the life cycle and processing of transactions in real time via its infrastructure. However, the number of connections to the system would in principle be limited to the number of participating intermediaries"[181]. This second solution would reduce the operational and reputational risks the ESCB would assume in the first scenario, as its operating infrastructure would not require significant changes. Also, it would bypass

[179] Wouter Bossu, Masaru Itatani, Catalina Margulis, Arthur Rossi, Hans Weenink and Akihiro Yoshinaga, "Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Considerations", IMF Working Paper, International Monetary Fund, 2020, p. 22. Analysing the central bank law provisions of 146 countries, the IMF concluded that: (i) 85 per cent of these restrict the access to open cash current accounts to the State, banks and employees of the central bank; (ii) 9 per cent of these are uncertain whether such access is restricted or open to the general public; and (iii) in 6 per cent of the countries considered in the study, central bank laws directly or indirectly allow the central bank to open cash current accounts with the public.

[180] Article 17, Protocol No. 4 on the statute of the European System of Central Banks and of the European Central Bank

[181] European Central Bank, "Report on a Digital Euro", 2020, p. 39

the legal issues that the opening of cash current accounts at the ESCB would entail as discussed above. However, from a legal perspective, a scenario where accessibility of a digital euro is intermediated by supervised institutions might jeopardise one of the main purposes issuing a CBDC, namely that of providing the general public with a universally accessible, risk-free asset. This would depend upon whether the intermediation of supervised entities only affects the distribution of the digital euro, it being a liability of the ESCB, or whether it would also involve the issuance of digital euro, it being a liability of supervised intermediaries. By definition, a CBDC constitutes a digital payment instrument, denominated in the national unit of account, that is a direct liability of the central bank. A CBDC whose issuance (and not only distribution) is managed by supervised intermediaries would not by definition be a CBDC. Rather, some commentators have referred to "synthetic CBDCs" to describe this phenomenon[182]. A synthetic CBDC would imply supervised private financial institutions issuing liabilities matched by funds held at the central bank, a phenomenon which would resemble narrow-bank money. Should a regulatory framework be established with the aim of guaranteeing that these intermediaries' liabilities will always be matched by finds at the central bank, this type of money could share some characteristics with a CBDC. However, in addition to not being a CBDC by definition as discussed above, these liabilities would lack key features of central bank money (*i.e.* public money), as: (i) private financial institutions operating in the payment service sector benefit from strong network effects which can lead to concentration and monopolistic situations, as well as to fragmentation; (ii) central banks pursue a mandate in the interest of citizens, rather than profit, which might affect the openness and inclusiveness of the system; (iii) whilst central banks might expand their balance sheets and create additional liabilities at short notice based on the underlying demand, private intermediaries' issuance of further liabilities would not be as flexible, since their liabilities would always have to be matched by funds held at the central bank in this scenario. As a result, a CBDC representing a direct liability on the central bank would also be more liquid than a synthetic CBDC, which in turn would strengthen the overall resilience of the system; (iv) concerns regarding the existence and composition of the funds held at the central bank by intermediaries might give rise to doubts

[182] Bank for International Settlements (BIS), "Central Bank Digital Currencies: foundational principles and core features", 2021, p. 4, referring to Adrian, T. and T. Mancini Griffoli, "The rise of digital money", IMF FinTech Notes, no 19/001, 2021

about the value of their respective liabilities, resulting in these potentially circulating at a discount to their par (*i.e.* nominal) value[183].

2.2. Token-based

Should the European Union opt for the issuance of a digital euro with token-based features and retail payments purposes, it would constitute a "bearer" instrument and would be equivalent to cash but in a digital form. In this respect, it should be highlighted that, despite some sources use the term "token-based" synonymously with distributed ledger technology-based, a bearer digital euro would not have to use DLT. The issuance of a token-based digital euro would involve different legal issues with respect to an account-based digital euro, since – as discussed above – the payer and the payee would be responsible for the verification of the transfer of value, in a mechanism similar to that of cash payments. However, the issuance of a token-based digital euro might affect further potential functionalities of a digital euro as further discussed below, such as limits on holdings and restrictions on the target group of users, which could only be enforced at the payment device level. For instance, in the case of restrictions on the target group of users, the token-based structure should be complemented by systems aimed at validating users' identities installed on all payments devices. The issuance of a token-based digital euro could also allow for some decentralization of the overall infrastructure, as the payments would not be verified by a centralised entity or by supervised intermediaries, but rather by users. On the other hand, it has been argued that "digital euro holdings and transactions could only be managed in a decentralised way if it were possible to ensure that they were processed in line with central bank requirements at all times"[184]. As a result, with the aim of enabling external parties (*i.e.* users) to transfer central bank money outside a central ledger in compliance with appropriate standards, operational and legal requirements (*e.g.* validation and cryptography methods) would need be set by the Eurosystem. Overall, this decentralised infrastructure would reduce the operational burden of the Eurosystem. Nevertheless, it would also pose several challenges from a technological perspective, as it would entail the development of a decentralised system with appropriate security and processing standards. Regarding the distribution system, it has been argued that a direct

[183] Bank for International Settlements (BIS), "Central Bank Digital Currencies: foundational principles and core features", 2021, p. 4
[184] European Central Bank, "Report on a Digital Euro", 2020, p. 40

end-user access to a bearer digital euro would "allow end users to transfer holdings of the bearer digital euro among them with no need to mandate a third party to play any role in the transaction"[185]. From a substantial standpoint, transactions occurring in this form of digital euro would resemble those in cash. However, due to the digital nature of a digital euro as opposed to cash, technological solutions would also be required to meet security standards. Two alternative technological solutions have been proposed in this respect: (i) DLT protocols; and (ii) local storage. The former would enable public institutions to exploit the benefits of DLTs for public purposes, while the latter would resemble a rather traditional solution, as it would entail the use of already existent devices such as prepaid cards. Importantly, the local storage might also allow offline functionalities, which will be further discussed below. Due to the operational effort that these transfer mechanisms would entail, in both cases involvement of supervised intermediaries would likely be required (*e.g.* for the provision of physical devices). Moreover, due to the bearer nature of these instruments, it should be highlighted that the loss or damage to the device where the CBDC is stored of a local or the loss of the cryptographic keys to the DLT account might result in the loss of CBDC. Because of its similarity to cash in terms of anonymity, this solution would entail legal issues from and AML and CFT perspective. For instance, absent European legislation on this subject, some Member States have adopted legal frameworks aimed at countering AML and CFT issues by posing hard limits on the use of cash for high-value transactions[186]. The same should presumably occur at a European level should the issuance of a digital euro occur in the above-mentioned form. A further hybrid design option would combine the decentralised features of a bearer digital euro with a centralised infrastructure where supervised intermediaries would act as settlement agents on behalf of customers for retail payments. In this scenario, despite maintaining an account relationship with such intermediaries, end users would maintain a direct claim on the Eurosystem, and all transfers would be ultimately settled in the Eurosystem structure[187].

[185] European Central Bank, "Report on a Digital Euro", 2020, p. 40

[186] While 15 EU countries (plus Norway and the UK) have opted not to limit the amount of cash payments (Luxembourg, Austria, Cyprus, Denmark, Estonia, Finland, Hungary, Ireland, Latvia, Lithuania, Germany, the Netherlands, Slovenia, Sweden), while others have chosen to limit this possibility both in terms of the amount of the cash payment and the way in which it is made (Belgium, Bulgaria, Czech Republic, Greece, Spain, France, Croatia, Italy, Malta, Poland, Portugal, Romania and Slovakia). In Italy, as part of the fight against money laundering and tax fraud, cash payments are limited to € 1.000 since 1 January 2022. For any payment above this limit, it is therefore necessary to use a bank card, a cheque or to make a bank transfer. For more information in this respect, please refer to: https://cecluxembourg.lu/cash-payments-limits-in-each-eu-country/?lang=en

[187] European Central Bank, "Report on a Digital Euro", 2020, p. 41

3. Key Design Choices

After analysing the four core properties of a CBDC as indicated by the BIS in its 2018 report, as well as their potential combinations and intertwinings as envisaged in the European context, it is now deemed appropriate to highlight the further key design choices indicated in the report which are currently under discussion in the European academic debate, and which might influence the legal and economic configuration of a CBDC. These are: (i) availability; (ii) anonymity; (iii) transfer mechanism; (iv) interest-bearing; (v) limits or caps. With regard to availability, as current access to digital central bank money is often restricted to central bank operating hours (*i.e.* not 24 hours per day and generally 5 days per week), CBDCs might enhance the operational efficiency of central bank money by making it available permanently. In relation to anonymity, a token-based CBDC as described above might be designed to provide different degrees of anonymity, making it similar to crypto-assets[188]. However, any decision related to anonymity should provide adequate solutions with respect to AML, CFT, and privacy requirements. With respect to privacy, it has already been clarified that the issuance of a digital euro would involve the European Central Bank having the capacity to innovate the payments system while preserving security aspects. Indeed, through the issuance of a digital euro, the ECB may acquire sensitive information on users. However, it should be noted that these concerns are even more pronounced should privately issued payment instruments (such as stablecoins) become part of the citizens' daily life through mass adoption. The same reasoning would apply in relation to cyber risks. While the building and managing of an information system infrastructure would inherently entail cyber risks, the involvement of the ECB in terms of investments and expertise would mitigate those risks. Overall, it should be acknowledged that, while the issuance of a digital euro could stimulate the emergence of new payment services and create several business opportunities for intermediaries eventually involved as intermediaries as detailed above, these could generate new and unprecedented sources of risk[189]. With respect to the transfer mechanism, it would depend on whether a digital euro would take the form of an account-based CBDC or a token-based CBDC. In the first scenario, the transfer of digital euro would likely be centralised and would occur through the

[188] Focusing on the interlinkages existing between these design choices, an account-based digital euro would result in anonymity of transactions being severely limited, as all transactions would be traced with the central ledger held either by the central bank or by supervised intermediaries based on the technical solutions adopted. On the other hand, a token-based digital euro might in principle enable anonymous transactions. However, robust technological and regulatory standards should be set in this scenario for a token-based digital euro to be compliant with AML and CFT provisions.

[189] European Central Bank, "Report on a Digital Euro", 2020, p. 7

intermediation the central bank or supervised intermediaries. On the other hand, the transfer of a token-based digital euro would occur on a peer-to-peer basis like cash transfers.

3.1. Remuneration

Regarding the possibility to remunerate a digital euro, this function might significantly enhance the ECB'S influence from a monetary perspective by empowering it to set an interest rate on digital euro holdings, and thus to influence citizens' spending behavior without (or in addition to) the cooperation of financial and credit institutions. In other words, it would create another, more direct and powerful, channel for the transmission of monetary policy. Indeed, as with other forms of central bank money, it has been argued that "the interest rate on CBDC might be set equal to an existing policy rate or be set at a different level to either encourage or discourage demand for CBDC"[190]. Moreover, interest rates applied on CBDCs could also be differentiated. For instance, in case of an account-based CBDC where accounts are linked to individual natural or legal persons, the CBDC rate might be set as varying depending on several characteristics, such as counterparty or amount held in the account. Remunerating a CBDC would accentuate the differences with cash. Indeed, besides being a native digital asset, an interest-bearing (positive or negative) CBDC could emphasise its function as a store of value or investment means rather than as a medium of exchange. This might also entail undesirable consequences from a legal and economic perspective. How recently argued "the introduction of a digital euro could affect the transmission of monetary policy and have a negative impact on financial stability, for example by challenging banks' [credit] intermediation capacity and affecting risk-free interest rates. Depending on its characteristics as a form of investment, it might induce depositors to transform their commercial bank deposits into central bank liabilities"[191]. A large-scale shift of funds from commercial bank deposits to central bank liabilities might increase commercial banks' funding costs[192]. This increase would be mirrored in the interest rates offered by commercial banks on loans and would potentially reduce the volume of bank credit to the economy, which would result hampered. Overall, due to the

[190] Committee on Payments and Market Infrastructures, "Central Bank Digital Currencies", Bank for International Settlements (BIS), 2018, p. 6
[191] European Central Bank, "Report on a Digital Euro", 2020, p. 16
[192] The increase in funding costs might occur both due to an increased interest rate paid on deposits to (at least) match the interest rate applied to CBDC holdings, or due to commercial banks being obliged to switch to other sources of funding in the international capital markets, which would inherently involve higher costs.

key role of the banking sector in financial intermediation, this process might have a negative impact on financial stability, as: (i) should commercial banks' traditional business model be undermined by the issuance of a CBDC, these might be tempted to engage in riskier activities in an attempt to increase profitability and counter the reduction in profitability ensuing from the higher funding costs these would incur as a result of a mass shift of funds from deposits to CBDC. In this respect, it should be pointed out that a large-scale substitution from deposits to CBDC holdings would be more likely in a negative interest rate environment. Indeed, whilst the negative interest rate environment experienced internationally which has characterised the last decade did not lead to a substitution of commercial bank deposits for cash due to the implied storage costs, the situation might change with a positive interest-bearing or even zero interest-bearing CBDC due to the absence of such storage costs; (ii) should banks' role in credit intermediation and routing of payments instruction reduce significantly, these would be able to collect fewer information on clients. This could undermine their risk assessment capacity and have negative effects on financial stability; (iii) the presence of a new inherently risk-free asset in the financial environment might induce investors to substitute safe assets with digital euro holdings (irrespective of their remuneration), particularly in distressed times. This in turn could affect interest rates applied to risk-free assets, and the overall effect might propagate towards other asset classes with different risk profiles; (iv) in distressed situations, where confidence in the resilience of the overall banking sector might be jeopardised, the presence of a CBDC might even accelerate shifts from commercial bank deposits to CBDC holdings. This could undermine financial stability by enhancing the likelihood and magnitude of bank runs, since the operational costs of substituting commercial bank deposits with digital euro holdings would presumably be lower than for withdrawing cash[193]. These considerations highlight how the design of a digital euro needs to be carefully addressed to preserve the objectives enshrined in the Eurosystem's mandate, such as the control of monetary policy and the pursuit of financial stability.

3.2. Limits or Caps

Negative effects on the banking sector, financial stability and the transmission of monetary policy might be countered through the imposition of direct or indirect limits on digital euro

[193] European Central Bank, "Report on a Digital Euro", 2020, p. 17-18

holdings. An example of indirect limits would be that of applying a variable or tiered remuneration system[194] to digital euro holdings with the aim of disincentivising the holding of large quantities of CBDC. Direct methods might involve limiting quantity of digital euro that users can hold or transact. This would strengthen the overall function as a medium of exchange of the digital euro rather than means of investment. On the other hand, the attractiveness of the digital euro should be preserved as well. Indeed, should the average holding of CBDC be too low due to disincentivising mechanisms as detailed above, a digital euro might be less competitive than alternative payments instruments (*e.g.* stablecoins)[195]. In other words, the overall design of a digital euro should provide it with enough incentives to promote its use as a means of exchange, but not as a means of investment.

3.3. Online, Offline or both?

Another broad distinction further proposed in the European context among CBDC's choices is between online and offline digital euro. These would both be compatible with each other and could be operate simultaneously. An online digital euro would resemble the current design of payment systems internationally, as payments would be confirmed online either through a central register (as it is the case with commercial banks and private intermediaries operating in the retail payments sector) or a by a network of users empowered by DLT. On the other hand, an offline functionality would render a digital euro more similar to banknotes, as it would preserve anonymity by avoiding the sharing of transaction details with parties other than those directly involved in the transaction. Its functioning may be based on pre-funded funds held in a hardware device (*e.g.* smart cards, mobile devices, etc.) already popular in the current retail payments ecosystem through which citizens could operate their day-to-day payments. However, since offline transactions would be untraceable, an offline functionality of the digital Euro would entail legal issues from an anti-money laundering and countering of financing of terrorism perspective. Furthermore, a digital Euro that could only be used offline would compromise its suitability for the new monetary policy instruments that an online digital Euro could

[194] Such remuneration system might be structured in a way that the interest rate applied to holdings of digital euro below a predefined threshold are remunerated positively, thus incentivizing such holdings, whilst holdings above the threshold might be subject to zero or negative remuneration. For more information in this respect, please refer to: https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2351~c8c18bbd60.en.pdf

[195] European Central Bank, "Report on a Digital Euro", 2020, p. 18

provide to the ECB, thus partially undermining the case for a digital Euro considering the ESCB's objectives as detailed above[196]. For these reasons, it has been argued that an offline digital Euro could only work as a complement to an online digital euro[197].

4. Operational and Reputational Risks for the Eurosystem

Depending on its design, the issuance of a digital Euro might also radically change the role and standing of the ESCB. As recently argued, this would entail several risks both from an operational and reputational perspective. Regarding operational risks, these would mainly stem from the likely increase of the Eurosystem's balance sheet, which would consequently affect its profitability and risk exposure. A significant fraction of a central bank's profitability is generated through the issuance of non-remunerated liabilities (*i.e.* banknotes) and the purchase of positively remunerated assets. The difference between the positive remuneration of central bank assets and the interest rate applied to its liabilities constitutes the so-called seignorage income. The issuance of an interest-bearing digital Euro would influence the Eurosystem's profitability by reducing the seignorage income earned due to the potential shift from zero-remunerated liabilities to positively-remunerated liabilities. As end users of the digital Euro would presumably expect it to be free of charge like banknotes, the income resulting from seignorage might not only be reduced but even wiped out or transformed in a cost. Indeed, as pointed out by the ECB, "it is unclear whether the Eurosystem would be willing or able to impose fees on third party provides involved, for example, in the provision of front-end services. At this stage, it cannot be ruled out that the Eurosystem might even have to subsidise the services offered by these [private] providers in order to ensure that the holders of digital Euro do not have to bear any costs, by analogy […] with the distribution of banknotes"[198]. Oppositely, other central banks such as the Bank of England (BOE) have considered the possibility of charging small transaction fees to intermediaries as a way for the central bank to recover costs incurred in building and managing the core CBDC infrastructure[199]. Regarding operational risks, while a moderate adoption of digital Euro holdings to the extent that it would substitute banknotes would not involve significant issues for the Eurosystem. On the other

[196] New monetary tools, such as conditional transfers and programmable money, would presumably require online functionalities for their implementation and supervision.
[197] European Central Bank, "Report on a Digital Euro", 2020, p. 32
[198] European Central Bank, "Report on a Digital Euro", 2020, p. 19
[199] For more information in this respect, please refer to: Bank of England, "Central Bank Digital Currency: opportunities, challenges and design", 2020

hand, widespread adoption of digital Euro holdings by European citizens or even by non-euro area residents would entail a non-negligible increase of the Eurosystem's balance sheet, which might consequently have to increase its intermediation role in the economy and increase its risk exposure. This is due to several reasons: (i) the increase in the Eurosystem's balance sheet ensuing from the increase in terms of liabilities issued would require the Eurosystem to acquire more assets such as securities and loans to match the issuance of digital euro. In this respect, it has been argued that the Eurosystem "might be forced to invest in more illiquid assets, ultimately taking on more credit and market risk"[200]; (ii) the Eurosystem, through the ECB, might have to increase its long-term lending operations to commercial banks as a result of the deposit outflows experienced by these in order to offset the negative consequences ensuing from the reduction of their intermediation role as detailed above; (iii) should the design of the digital Euro empower the Eurosystem with the management of the related payments system, it might be exposed to liabilities as any private operator of a retail payments system. In this scenario, the potential liability of the Eurosystem would be considerably expanded, as it could be claimed with respect to a wide range of events, such as malfunctionings of the underlying IT infrastructure and unauthorized payment transactions. However, these liabilities could not be completely excluded even in a scenario where the operation of the payment infrastructure is delegated by the Eurosystem to private supervised intermediaries. However, as already mentioned, the issuance of a digital Euro would not aim at crowding out the European payments service infrastructures and providers landscape. Consequently, it has been argued that the role of the Eurosystem in the issuance of a digital Euro "should not go beyond what is needed to ensure the effectiveness of a digital Euro (for example, controlling the monetary base; guaranteeing certainty of settlement and security of the infrastructure and ensuring that providers of related services are adequately overseen and supervised) as well as its efficiency and usability"[201]. This structure would be in line with the European retail payments strategy by adhering to the principle of proportionality which encompasses the whole spectrum of powers exercised by the European Union and by promoting competition in the retail payments sector. Moreover, this structure would avoid the introduction of a parallel payments system, which would involve significant costs and might delay the issuance of a digital euro. It might also strengthen the resilience of existing pan-European payment solutions such as those related to the Single Euro Payments Area (SEPA), while stimulating their innovation from a

[200] European Central Bank, "Report on a Digital Euro", 2020, p. 19
[201] European Central Bank, "Report on a Digital Euro", 2020, p. 20

technological perspective. Due to its significant impact both from an economic and political perspective, it has been argued that the introduction of a digital Euro might also involve reputational risks for the Eurosystem. Reputational risks could materialise both in endogenous and exogenous events. With respect to the former, a loss of reputation could result from: (i) a delayed implementation of the project beyond a publicly announced implementation date; (ii) the potential instability of the IT infrastructure underlying the digital Euro (which includes cyber-attacks); (iii) an uneven accessibility of a digital Euro across the euro area countries; (iv) uncertainty regarding the legal basis for the issuance of a digital euro, which will be further discussed below. From an endogenous perspective, reputational risks would involve the cross-border use of a digital euro. As discussed above, depending on its design and remuneration, the introduction of a digital Euro might increase the holding of euro currency by non-euro area citizens and entities. As recently observed in relation to CBDCs design choices, "the global appeal of currencies depends on fundamental economic forces which digitalization is unlikely to alter. However, the characteristics that are specific to digital means of payment, including safety, low transactions costs and bundling effects, could promote the international adoption of a currency. These features may combine to create positive feedback loops in the use of a currency as a means of payment and store of value and thus have effects on its global appeal. Moreover, the specific design features of a CBDC would be important for its global outreach and, ultimately, the international role of the currency in which it is denominated"[202]. In this light, beside potentially undermining the effectiveness of the Eurosystem's monetary policy due to the implications on capital flows and the exchange rate of the euro, a significant strengthening of the international role of the euro[203] might lead to cross-border spillovers of domestic monetary policy, thereby creating a new transmission channel. The reputational risk involved would likely become a political risk, as this process might lead to what has been defined as "euroisation" of countries with weak currencies and vulnerable economic fundamentals. Indeed, it has been argued that such currency substitution might foment resentment abroad and political tensions[204].

[202] European Central Bank, "The International Role of the Euro", 2021, p. 8
[203] Such a strengthening is based on a hypothetical scenario where holdings of digital euro have positive or zero remuneration and neither quantitative, nor subjective limitations.
[204] European Central Bank, "Report on a Digital Euro", 2020, p. 21-22

CHAPTER IV – A DIGITAL LEGAL TENDER: THE NEW CHALLENGE

Summary: 1. *Legal Tender as a Precondition to Monetary Policy* – 2. *The Eurosystem's Exclusive Competence to Issue a Digital Euro* – 3. *A Digital Euro as Legal Tender* – 4. *Introducing a Digital Euro under the Monetary Mandate of the ESCB* – 4.1. *Competence* – 4.2. *Proportionality* – 4.2.1. *Appropriateness* – 4.2.2. *Not going beyond* – 4.3. *Specific Issues Regarding a Retail Digital Euro*.

1. Legal Tender as a Precondition to Monetary Policy

The above analysis on the realm of private digital currencies which characterises the modern economic and financial environment and the role a CBDC could assume in this respect leaves us with three main takeaways: (i) despite their initial stage of developing and adoption, crypto-assets and especially stablecoins are currently in regulators' spotlight due to their potential negative effects on financial stability, monetary policy transmission, and ultimately monetary sovereignty; (ii) the development and introduction of a CBDC might counter these negative effects by strengthening the uniformity of a currency in the digital environment, but should itself be subject to careful scrutiny and consideration due to the potential effects involved, such as that on commercial banks' business model; (iii) the main policy reasons within central banks' regulatory perimeter which could potentially justify the introduction of a CBDC in this scenario are the following: improvement, maintenance or restoring of monetary policy transmission channels, preservation of financial stability, fostering of financial inclusion, as well as promotion and enhancement of smooth payments. In order to achieve these objectives, it is argued that a CBDC should be provided with legal tender status. This chapter will analyse the suitability of a digital Euro as a "digital legal tender" by looking for legal foundations among the European provisions governing the legal tender status. The above-mentioned policy reasons will then be examined to provide an evolutionary perspective on the overall presence of a sufficient legal basis for the issuance of a digital Euro under the ESCB's monetary mandate. Furthermore, for the purpose of delimiting the scope of the analysis, the considerations provided will be based on a digital Euro issued for retail payments purpose as envisaged by the ECB in its report[205]. Accordingly, the possible issuance of a wholesale digital Euro as described above will not be discussed, as: (i) on one hand, the indications provided by the ECB and the European Commission by date have depicted a digital Euro as a retail means of payment, provided as a complement to cash and "accessible to all citizens and firms"[206]; (ii) on the other hand, in order to properly assess the suitability of a digital Euro as a means of settlement of wholesale payments, more information would be needed with respect to its differences with the wholesale settlement system currently in use by the ECB, namely TARGET 2 as discussed above. Finally, in this chapter, the provisions governing the legal tender status and the ESCB's mandate will be analysed separately for purely systematic

[205] European Central Bank, "Report on a Digital Euro", 2020

[206] European Central Bank, "FAQs on digital euro", available on the ECB website at: https://www.ecb.europa.eu/paym/digital_euro/html/index.en.html

reasons, while it is argued that the competence to issue banknotes with legal tender status – as further discussed below – should be interpreted as part of the overall ESCB mandate as enshrined in article 127 of the TFUE. This clarification is deemed appropriate as some authors have proposed an interpretation of the competence to issue banknotes with legal tender status as a power in its own right, separate from the general mandate of the ESCB, arguing that the issuance of a digital Euro could occur under this competence. In other words, the provisions related to the issuance of banknotes were placed as separate provisions rather than part of the ESCB's mandate. In this respect, they argue that the introduction of a digital Euro based on article 128 (1) of the TFEU would preclude the use of CBDC as used as an instrument of monetary policy (for instance, as interest-bearing), or it would lose its status as legal tender[207]. However, this article proposes a different view of such provisions, which agrees with other authors who have pointed out that such a systemic reading of the TFEU provisions seems in contrast with a recent intervention from the Court of Justice of the European Union (CJEU)[208]. In the judgement on joined cases *Dietrich and Häring v. RundFunk*[209], as further discussed in this chapter, the CJEU took a more extensive approach with respect to the ESCB competence to issue euro banknotes by qualifying it as a precondition to the ECB's main objective of price stability. In particular, the Court noted that the "interpretation of the concept of "monetary policy is also supported by the wording of Articles 128 and 133 of the TFEU […] which may be regarded as monetary law provisions linked to the status of the euro as the single currency"[210]. In light of the above, it can be observed how the CJEU indicated article 128 of the TFEU as part of the broader monetary mandate entrusted to the ECB by assuming that without the euro as a single currency there could be no single monetary policy. This perspective was also supported by the Opinion of Advocate General Giovanni Pitruzzella provided with respect to the above-mentioned cases, where it was argued that the "competence to issue and authorise the issue of euro banknotes and to regulate the issue of euro coins, the competence to define the status of legal tender and the competence to issue the measures necessary for the

[207] Seraina Grünewald, Corinne Zellweger-Gutknecht, Benjamin Geva, "Digital Euro and ECB Powers", Common Market Law Review 58: 1029-1056, Kluwer Law International, 2021, p. 1053-1054, available at: https://kluwerlawonline.com/journalarticle/Common+Market+Law+Review/58.4/COLA2021066

[208] Annelieke A. M. Mooij, "A digital euro for everyone: Can the European System of Central Banks introduce general purpose CBDC as per of its economic mandate?", Journal of Banking Regulation, 2021, p. 4 available at: https://doi.org/10.1057/s41261-021-00186-w

[209] Judgement delivered in joined Cases C-422/19 and C-423/19 *Dietrich and Häring v. Rundfunk*, 2021, ECLI:EU:C:2021:63, available at: https://curia.europa.eu/juris/document/document.jsf?text=&docid=236962&pageIndex=0&doclang=EN&mode=req&dir=&occ=first&part=1&cid=6366289

[210] Judgement delivered in joined Cases C-422/19 and C-423/19 *Dietrich and Häring v. Rundfunk*, 2021, ECLI:EU:C:2021:63, par. 40

use of this currency underpin the unique character of the euro currency and are also a precondition for the conduct of a single monetary policy"[211]. As a result, it can be argued that: (i) the singleness of the euro currency ensured by the ECB's exclusive competence to issue euro banknotes constitutes a precondition for the conduct of a single monetary policy; (ii) contrary to the considerations proposed by Grünewald et al., the CJEU did not object to recognise a digital Euro as both legal tender and monetary policy instrument. Regarding the possibility for a digital Euro to be endorsed as legal tender under the existing European monetary framework, it seems appropriate to first recall the role of monetary law and the provisions governing legal tender in the existing European monetary framework. The provisions regarding the issue of a currency by a sovereign state are commonly referred to in the international legal environment as "*lex monetae*". In principle, this concept defines the power of a sovereign state to choose its own currency and use it as unit of account, their value being regulated by the law of such state. Regarding the European Union, the transfer of sovereignty resulting from the adoption of the single currency constitutes an uniform basis for the regulation of monetary relations between European citizens based on EU law. This transfer is enshrined in Article 128 of the TFEU and mirrored in Article 16 of Protocol No. 4 on the Statute of the ESCB and of the ECB. According to these provisions, the banknotes issued by the ECB and the NCBs shall be the only banknotes with legal tender status in the union. This transfer of sovereignty by countries that have adopted the euro led to the unification of *lex monetae*, which has also been defined as a typical prerogative of the state, closely and intimately linked to the absolute sovereignty over its own territory, which stands as an insurmountable limit to the effect of such legislation, where the intangible sovereignty of another nation begins[212]. Overall, *lex monetae* forms part of monetary law, this being defined as the set of rules regulating not only the issuance and distribution of currency, but also the management of the value of such currency. In this light, monetary law represents a branch of the law where both public and private interests are represented. The latter is due to the substantial effects of monetary law on the economy. Indeed, the management of monetary law entails several political choices, which mainly materialise in the setting of the official interest rates for the economic environment of reference, namely: (i) the interest rate paid on commercial banks' deposits held at the central bank; and (ii) the interest rate at which

[211] Opinion of Advocate General Pitruzzella, Joined Cases C-422/19 and C-423/19, delivered on 29 September 2020, par. 65, available at: https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:62019CC0422
[212] Various Authors, "Enciclopedia del Diritto, Volume 4: Amministrazione e controllo S.p.A. Tempo di non lavoro", published by Giuffré Editore, 2011, p. 159

commercial banks can borrow money from the central bank in contexts of short-term liquidity needs. As mentioned above, these rates influence the quantity of money available in the economy by affecting the rate at which commercial banks borrow and lend money each money, and consequently the rate at which money is available to the public at large via loans and other credit arrangements. The ultimate aim of this management is to regulate the stability of prices by controlling the level of inflation in the economy. This results in monetary law being an instrument aimed not only at guaranteeing the sovereignty of a state from an economic perspective, but also at providing it with economic tools to navigate the budgetary, fiscal, commercial, and industrial contingencies that may arise.

2. The Eurosystem's Exclusive Competence to Issue a Digital Euro

The potential features and related issues of a digital Euro as discussed above, despite clarifying its magnitude and scope, leave us with a major question. This is whether a digital Euro might assume the role of legal tender in the digital realm. Art. 3 (4) of the Treaty on European Union provides in principle that "the [European] Union shall establish an economic and monetary union whose currency is the euro. As a monetary Union, the power to issue banknotes with legal tender value constitutes one of the exclusive competences which Member States whose currency is the Euro (so-called euro area) have delegated to the Eurosystem. The competence of the ESCB is enshrined in the Treaty on the Functioning of the European Union (TFUE) as primary law. According to article 128 of the TFUE as reproduced in the first paragraph of article 16 of the Protocol No. 4 on the statute of the ESCB and of the ECB, "the European Central Bank shall have the exclusive right to authorise the issue of euro banknotes within the Union. The European Central Banks and the national central banks may issue such notes. The banknotes issued by the European Central Bank and the national central banks shall be the only such notes to have the status of legal tender within the Union"[213]. On the other hand, Member States retained control over the issuance of euro-denominated coins under article 128 (2) of the TFUE. However, since the volume of coins issued is made subject to approval by the ECB, the power of Member States is limited. As the difference between banknotes and coins (which regards their larger or smaller denomination) is only relevant in the physical realm, the technological design of a digital Euro would presumably go beyond this denomination. Holdings of digital Euro would rather resemble commercial bank money, where no separable

[213] Article 128 (1), Treaty on the Functioning of the European Union

"50 cents" or "ten-euro piece" of euro-denominated funds can be distinguished. Even though technological solutions might allow these functionalities, it has been argued that it would be "unnecessary, and indeed complex, to segregate the powers of the Eurosystem and those of Member States' governments"[214]. Based on these premises, it has been argued that the competence for the issuance of a digital Euro should necessary be deemed as an exclusive competence of the Eurosystem, since the retention of coin issuance by Member States should be interpreted as a complementary power (together with the power of implementing monetary policy) in the context of the overall transfer of monetary sovereignty as enshrined in the TUE and TFUE. Reportedly, this consideration would be supported by a historical reading of the TFUE, according to which the provisions of article 128 (2) of the TFUE were never intended to supersede or compete with those contained in article 128 (1) of the TFUE. The retention of complementary monetary powers by Member States through the issuance of coins were rather meant as both upholding of a sentimental tradition and maintaining fiscal income. Indeed, on one hand coins issued by Member States typically display national heroes and historical moments, whilst on the other hand Member States maintained a seignorage income flowing from the issuance of coins, which is estimated at about € 900 million per year[215]. The exclusive competence of the European Union with respect to the issuance of a digital Euro could also be argued from its exclusive competence in defining the scope and effects of legal tender status. Indeed, as it is evident from article 128 (1) of the TFUE, as well as articles 10 and 11 of Regulation 974/1998[216], the powers relating to the issuance of euro banknotes and coins are ultimately aimed at the preservation of the singleness of the euro currency. Their endorsement with legal tender status points to the same objective. For this purpose, as a monetary law concept, it should be given an independent and uniform interpretation throughout the Union. This approach would be consistent with the opinion recently provided by Advocate General (AG) at the Court of Justice of the European Union Giovanni Pitruzzella, who argued that the determination of the scope of the concept of legal tender "falls within the exclusive competence of EU law", and that it should be deemed as "the expression of sovereign power conferred exclusively on the Union, by the Member States whose currency is the euro, to define which good or instrument (tangible or non-tangible) has the status of legal tender"[217].

[214] Seraina Grünewald, Corinne Zellweger-Gutknecht, Benjamin Geva, "Digital Euro and ECB Powers", Common Market Law Review 58: 1029-1056, Kluwer Law International, 2021, p. 1039
[215] Seraina Grünewald, Corinne Zellweger-Gutknecht, Benjamin Geva, "Digital Euro and ECB Powers", Common Market Law Review 58: 1029-1056, Kluwer Law International, 2021, p. 1039-1040
[216] Council Regulation (EC) No 974/98 of 3 May 1998 on the introduction of the euro
[217] Opinion of Advocate General Pitruzzella, Joined Cases C-422/19 and C-423/19, delivered on 29 September 2020, par. 88-94

3. A Digital Euro as Legal Tender

After having argued about the competence for the issuance of a digital Euro and for the definition of the concept of legal tender based on primary EU law provisions, it is deemed appropriate to further analyse the scope of legal tender status in the European Union. Despite the absence of a clear definition of legal tender both in primary and secondary law, guidance in this respect is offered: (i) on one hand, by Recommendation 2010/191/EU[218], which specifically addressed the scope and effects of legal tender of euro banknotes and coins; (ii) on the other hand, by Recital 19 of Regulation 974/1998 on the introduction of the euro. Regarding the former, it is based on the main conclusions of a report prepared by a working group set up under the aegis of the Commission and the ECB and consisting of representatives from Ministries of Finance and National Central Banks of the Member States of the euro area. Paragraph 1 of the Recommendation provides that, where a payment obligation exists, the status of legal tender of euro banknotes and coins should imply three things: (i) mandatory acceptance; (ii) acceptance at full face value; and (iii) the power to discharge from payment obligations. Particularly regarding mandatory acceptance, paragraph 1 (a) of the Recommendation states that the creditor of a payment obligation cannot refuse euro banknotes and coins unless the parties have agreed on other means of payment. This implies that the general obligation provided in principle by the paragraph 1 (a) is not absolute, and it might be waived by the contractual freedom of the parties involved. In this respect, it could be argued that the ability a recommendation to influence the legal status of the legal tender concept in the European Union is uncertain. Indeed, according to article 288 (5) of the TFEU, recommendations are not either intended to produce binding effects, nor capable of creating enforceable rights. However, these are not completely without legal effect. According to established case law of the CJEU[219], the national courts are required to consider recommendations issued by European institutions in the context of dispute resolution, where recommendations' provisions are aimed at supplementing binding EU provisions. Moreover, the CJEU also recognised that where a document has been drafted by a group of experts as it is the case with Recommendation 2010/191/EU, it might contribute to the uniform application

[218] Recommendation No 2010/191/EU, Report of the Euro Legal Tender Expert Group (ELTEG) on the scope and effects of legal tender of euro banknotes and coins

[219] Judgments of 13 December 1989, *Grimaldi* (C-322/88, EU:C:1989:646, paragraphs 7, 16 and 18); of 21 January 1993, *Deutsche Shell* (C-188/91, EU:C:1993:24, paragraph 18); of 11 September 2003, *Altair Chimica* (C-207/01, EU:C:2003:451, paragraph 41); and of 24 April 2008, *Arcor* (C-55/06, EU:C:2008:244, paragraph 94)

of Union binding provisions if it provides useful information for the interpretation of these[220]. On the other hand, Recital 19 of Regulation 974/1998 establishes that "limitations on payments in notes and coins, established by Member States for public reasons[221], are not incompatible with the status of legal tender of euro banknotes and coins, provided that other lawful means for the settlement of monetary debts are available". Despite the concept of legal tender is not precisely defined with regard to banknotes and coins, it has been argued that through this provision the European Union legislators recognised that "not only individual freedom, but even more importantly, the pursuit of the public interest may justify a waiver of the mandatory acceptance by creditors of euro banknotes and coins which have the status of legal tender"[222]. Regarding the value that of a recital contained in a European Union legal act, despite its lack of binding force because it does not in itself constitute a legal rule, it might constitute important elements for the purpose of the interpretation of the provisions contained in the act according to relevant case law of the CJEU[223]. Based on these provisions, it could be argued out that the lack of a clear definition of the concept of legal tender in primary and secondary EU law involves (at least partially) flexibility in the interpretation of its meaning. This might be confirmed by the fact that, despite the EU has not yet provided a specific definition of the concept of legal tender, it is free to do so at any time by defining the meaning to be attributed to this legal notion under its exclusive competence as discussed above. Moreover, despite the wording of the provisions regulating legal tender seems to explicitly refer to physical banknotes and coins, it should be acknowledged that these are a result of negotiations that occurred before the internet and IT technologies had begun to have a significant impact on economic and social interactions. Furthermore, this flexibility has also been highlighted by AG Pitruzzella, who argued that "it does not follow, in my view, from article 128 (1) of the TFEU or from any other rule of EU law, that the constitutional legislature of the Union intended to exclude the possibility for the Union to assign, alongside euro banknotes (and coins), the status of legal tender to other forms of currency that are not necessarily physical"[224], as well as that "although the Union has not explicitly assigned the status of legal tender to forms of currency other than cash, it has nevertheless comprehensively regulated payment services […] and the issue of

[220] Judgment of 6 September 2012, *Chemische Fabrik Kreussler* (C-308/11, EU:C:2012:548, paragraph 25)
[221] For instance, those related to anti-money laundering and countering the finance of terrorism.
[222] Opinion of Advocate General Pitruzzella, Joined Cases C-422/19 and C-423/19, delivered on 29 September 2020, par. 116
[223] Judgment of 19 December 2019, *Puppinck and Others v Commission* (C-418/18 P, EU:C:2019:1113, paragraph 75), and judgment of 10 January 2006, IATA and ELFAA (C-344/04, EU:C:2006:10, paragraph 76)
[224] Opinion of Advocate General Pitruzzella, Joined Cases C-422/19 and C-423/19, delivered on 29 September 2020, par. 96

electronic money […] within the framework of internal market regulation"[225]. This phenomenon is also evident with respect to other European rules recently adopted in the policy area of anti-money laundering, as well as those regarding controls on cash entering or leaving the union[226]. With respect to AML, it should be highlighted that policy inputs towards electronic forms of money were not only provided by the European legislator, but also by Member States. Indeed, as discussed above, absent European legislation on limits on the use of cash for AML purposes, several Member States have enacted frameworks aimed at limiting the use of cash in high-volume transactions. In line with Article 19 of Regulation No. 974/1998 as recalled above, by establishing a different settlement method for certain monetary transactions, these provisions did not affect the legal tender status of the euro banknotes, though they did limit their use. Overall, despite not seeking to regulate the legal tender status of euro banknotes and coins, these provisions inevitably affected the European payments landscape and consequently had an impact on euro banknotes and coins as means of payment. Moreover, these were enacted on the basis of public interests, namely those of: (i) preserving the uniformity of the euro by maintaining the forms of money through which the single currency is expressed up to date with the technological developments and citizens' payment habits; and (ii) ensuring the security and legality of monetary transactions exceeding a certain value. The tendency towards electronic forms of money is crucial to a systemic reading of legal tender provisions, as the above-mentioned frameworks not only have encouraged the use of electronic means of payment, but have also limited the circumstances under which it is legitimate to use legal tender cash as a method of payment. The scope and magnitude of the shift towards electronic forms of money has already led some authors to assert that excluding scriptural money (as defined above) from the notion of legal tender seems an unrealistic perspective[227]. Echoing Grierson's quote from chapter one, according to which money "must be considered in the context of the society in which it exists"[228], the narrative of this paper aims to highlight how the evolution of the concept of money is also influencing the state theory of money, whereby the existence of money as a creation of the State (or, in the case of the euro, of the Economic and Monetary Union) can only be understood within a given legal system. A digital Euro might by definition assume the status of legal tender only where it is issued by the

[225] Opinion of Advocate General Pitruzzella, Joined Cases C-422/19 and C-423/19, delivered on 29 September 2020, par. 97
[226] For instance, see Regulation (EU) 2018/1672 of the European Parliament and of the Council of 23 October 2018 on controls on cash entering or leaving the Union and repealing Regulation (EC) No 1889/2005
[227] De Stasio, V., "Verso un concetto Europeo di Moneta Legale: valute virtuali, monete complementari e regole di adempimento", Il Fallimentarista, 2018, p. 9
[228] Philip Grierson, "The Origins of Money", lecture given at Cambridge University, 1976, p. 9

Eurosystem. Should its design provide for the delegation of its issuance to non-Eurosystem entities (*e.g.* commercial banks), it would be prevented form assuming the status of legal tender according to article 128 (1) of the TFUE, which – despite allowing the issuance of euro-denominated monetary instruments by non-Eurosystem entities – restricts the bestowal of legal tender status to banknotes issued by the ECB and National Central Banks (NCBs). With this in mind, should the design of a digital Euro involve token-based technology (as defined above), it has been argued that the wording of article 128 (1) of the TFUE and article 16 of Protocol No. 4 on the statute of the ESCB and of the ECB might allow a digital Euro to assume the status of legal tender without the need for changes in the legislation. This consideration stems from both an historical and teleological reading of those provisions. From a historical perspective, as the provisions regulating the status of legal tender date back to the Maastricht Treaty, it is argued that working groups tasked with the drafting of these provisions might not have contemplated the issuance of forms of money other than physical due to the lack of technologies allowing it. Moreover, it is argued that this silence on the part of Treaty drafters should not be interpreted as a "qualified silence" aimed at "excluding media other than paper for banknotes covered by Article 128 (1) TFEU"[229], nor should be interpreted as such the fact that no amendments were made to these provisions in the context of the Treaties of Amsterdam, Nice and Lisbon. Indeed, these were negotiated at a time where digital currencies were still at their outset notwithstanding some primitive experiments[230]. On the other hand, the fact that the European framework on legal tender does not explicitly exclude a digital Euro from its scope might be reinforced by more recent contributions from the ECB and CJEU. In relation to the ECB, in its "Report on a digital euro" issued in 2020 it proposed a teleological interpretation of the legal tender provisions by stating that "although it follows from EU primary law that euro banknotes issued by the Eurosystem shall be the only "notes" to enjoy legal tender status, neither the TFEU nor the Statute of the ESCB explicitly exclude the issuance by the Eurosystem of assets or obligations other than euro banknotes […] that might enjoy legal tender status. Moreover, the right to issue "euro banknotes" could be understood to encompass the right to determine the format or medium of "euro banknotes". If the digital Euro were to be treated as a banknote, then the Eurosystem's exclusive competence under Article 128(1) of the TFEU to "authorise the issue of euro banknotes within the Union" could be invoked to enable

[229] Seraina Grünewald, Corinne Zellweger-Gutknecht, Benjamin Geva, "Digital Euro and ECB Powers", Common Market Law Review 58: 1029-1056, Kluwer Law International, 2021, p. 1033
[230] Seraina Grünewald, Corinne Zellweger-Gutknecht, Benjamin Geva, "Digital Euro and ECB Powers", Common Market Law Review 58: 1029-1056, Kluwer Law International, 2021, p. 1033-1034

the issuance of a digital euro with the status of legal tender"[231]. Regarding the CJEU, in the recent judgement delivered in joined cases *Dietrich and Häring v. RundFunk* it had the opportunity to assess for the first time matters related to the legal tender status of euro banknotes. In particular, object of interpretation were three key provisions regulating the status of legal tender of euro banknotes: (i) article 128 (1) of the TFEU; (ii) article 16 of Protocol No. 4 on the statute of the ESCB and of the ECB; and (iii) article 10 of Council Regulation No. 974/1998. In line with the already mentioned opinion provided in the same case by AG Pitruzzella, the court confirmed that the legal tender status is subject to a certain degree of flexibility. In particular, the court confirmed that it does not conflict with the status of legal tender of euro banknotes to exclude them as a means of payment for the satisfaction of a payment obligation. However, this exclusion was made subject by the court to five criteria: "(i) that the legislation providing for such exclusion does not have the object or effect of establishing legal rules governing the status of legal tender of such banknotes; (ii) that it does not lead, in law or in fact, to abolition of those banknotes, in particular by calling into question the possibility, as a general rule, of discharging a payment obligation in cash; (iii) that it has been for reasons of public interest; (iv) that the limitation on payments in cash which the legislation entails is appropriate for attaining the public interest objective pursued; and (v) that it does not go beyond what is necessary in order to achieve that objective, in that other lawful means of discharging the payment obligation are available"[232]. These considerations from the CJEU and the related opinion provided by AG Pitruzzella, combined with the ECB intervention as discussed above, provides scope to argue for a teleological interpretation of the European provisions regulating the status of legal tender of euro banknotes. In this light, their status of legal tender does not appear to depend on their paper form, but rather to their function, which needs to evolve by responding to the technological developments that are contributing to the transformation of the concept of money and the payment habits of European citizens. It is deemed appropriate to mention that such an interpretation was provided in a case where the limitation of cash as a means of payment in favour of electronic forms of money (namely, direct debit and bank transfer) was related to the discharge of a statutorily imposed obligation for the fruition of a broadcasting service administered by a German public entity. Interestingly, the public interest which – in the reasoning of the CJEU – rendered this limitation by the German public broadcaster "both appropriate and necessary" was found in "the objective of actually

[231] European Central Bank, "Report on a Digital Euro", 2020, p. 25
[232] Judgement delivered in joined Cases C-422/19 and C-423/19 *Dietrich and Häring v. Rundfunk*, 2021, ECLI:EU:C:2021:63

recovering the radio and television licence fee, in that it enables the administration to avoid having to bear an unreasonable financial burden given the cost that would be involved in the widespread establishment of a procedure that allows licence fee payers to pay the radio and television licence fee in cash"[233]. Based on this statement, it could be argued that the "reasons of public interest" requirement envisaged by the CJEU as one of the criteria for the establishment of limitations on the use of cash can be considered as satisfied even when driven by purely economic considerations such as avoiding maintaining a cash register. Commenting the judgment, some authors have argued that the legitimation of limitations on cash payments "demonstrates the decreasing importance of cash as a legal tender"[234]. Moreover, as the "lawful means" referred to by the CJEU currently entail private digital currencies, this perspective further empowers the case for the issuance of a digital Euro as a response to the technological advances that constitute the underlying factor behind the decrease in the use of cash and which – as it is evident from the case brought to the attention of the court – can benefit business activities for instance by resulting in lower operating costs. In light of the foregoing, it seems possible to argue that the current interpretation of the provisions regulating legal tender in the European legislative framework would allow the bestowal of legal tender value to a digital euro. Arguing from the difference between the definition of banknotes and that of electronic money as stored monetary value that is not given the status of legal tender, some authors observed that a digital Euro "would not be able to classify as legal tender, but rather as electronic money"[235]. This paper disagrees with this consideration, which stems from a literal interpretation of article 128 (1) of the TFUE and article 16 of Protocol No. 4 on the statute of the ESCB and of the ECB. The considerations provided above demonstrate that a paradigm shift is taking place among European institutions with respect to the concept of legal tender towards a functional rather than a literal interpretation. In this light, the European provisions governing legal tender might be deemed as encompassing the concept of electronic money if issued by the Eurosystem. This could be argued based of three elements. Firstly, considering the new understanding of the concept of legal tender as proposed by EU institutions, it is observed that whether electronic money could assume the status of legal tender should not be determined by its ontological and normative difference from banknotes, but rather by the entity

[233] Judgement delivered in joined Cases C-422/19 and C-423/19 *Dietrich and Häring v. Rundfunk*, 2021, ECLI:EU:C:2021:63, par. 76

[234] Annelieke A. M. Mooij, "European Central Bank Digital Currency: the digital euro. What design of the digital euro is possible within the European Central Bank's legal framework?", SSRN, 2021, p. 7, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3838729

[235] Annelieke A. M. Mooij, "European Central Bank Digital Currency: the digital euro. What design of the digital euro is possible within the European Central Bank's legal framework?", SSRN, p. 6

issuing this type of monetary instrument as mentioned above. It is in fact natural to state that electronic money issued by a private subject (bank), even where subject to regulation and supervision, could not assume the status of legal tender. On the other hand, should that entity be the Eurosystem, it is argued that electronic money should by definition assume the status of legal tender by virtue of a teleological interpretation of Article 128 (1) of the TFEU and Article 16 of Protocol No. 4 on the Statute of the ESCB and of the ECB. Secondly, in chapter three of this paper the concept of electronic money as defined by EU law has been assimilated to that of scriptural money. Absent a definition of the concept of scriptural money in EU law, such definition was proposed by the ECB. The ECB distinguished between scriptural money in the form of commercial bank money and scriptural money in the form of central bank money. Regarding the latter, it was defined as a "liability of the central bank in the form of either (i) existing bank deposits held at a central bank for wholesale settlement purposes or (ii) digital base money (DBM) for the general public and central bank digital currency"[236]. The inclusion by the ECB of a central bank digital currency within the definition of scriptural money is significant. It suggests an assimilation of the concepts of e-money, scriptural money, and legal tender status under the notion of "digital base layer" of the European currency. Thirdly, within the categories of electronic money issuers proposed by the EMD2, Article 1 (1) (d) interestingly includes among such issuers "the European Central Bank and national central banks when not acting in their capacity as monetary authority or other public authorities", thus recognizing the ability of the ECB to act not in its capacity as a monetary or public authority. Although this might raise questions from a legal perspective, it reinforces the potential suitability of a digital Euro as a digital legal tender.

4. Introducing a Digital Euro under the Monetary Mandate of the ESCB

The issuance of a digital Euro would constitute a policy measure with several consequences, both from a legal and economic perspective. As discussed above, it would significantly impact the Eurosystem's balance sheet while posing numerous challenges from an operational perspective. Set aside the possibility for a digital Euro to assume legal tender status, it should be assessed whether the policy objectives enshrined in the ESCB's mandate might constitute an adequate legal basis for its introduction. This section will focus on the possibility to

[236] European Central Bank, "Crypto-Assets: implications for financial stability, monetary policy and payments and market infrastructures", Occasional Paper Series No. 223, 2019, p. 8

introduce a digital Euro based on the monetary policy mandate of the ESCB. This solution would appear preferable for two main reasons: (i) firstly, because of the great margins of autonomy and independence (as better detailed below) which the ESCB can benefit from in the pursuit of monetary policy; (ii) secondly, because of the above-mentioned interrelation between the ESCB's competence to regulate legal tender and to conduct monetary policy, which led the CJEU in *Dietrich and Häring v. RundFunk* to qualify the ESCB's competence to issue euro banknotes as a precondition to its primary objective of price stability. Due to the uncertainty of the design features and the relatively early stage of discussions regarding a digital euro, this overview will be limited to illustrating possible starting points for a legal analysis that would overall necessarily depend on the specific features of a digital euro. The question here is whether the introduction of a CBDC might be deemed within the aim of the ESCB's monetary policy mandate and whether such introduction might be deemed as proportionate to the objectives pursued. These questions stem from two of the fundamental principles of EU law, namely the principle of conferral and the principle of proportionality, which are incorporated in article 5 of the TEU. According to the former, the EU may only act within the limits of the competences that Member States have conferred upon it in the Treaties. These competences are defined in Articles 2 to 6 of the TFEU. Competences not conferred on the EU by the Treaties thus remain with Member States. Thus, the principle of conferral represents a "horizontal" limit to the competences of the EU. On the other hand, while the principle of conferral governs the limits to EU competences, the principle of proportionality governs the use of those competences, therefore providing a "vertical" limit to their exercise[237]. Moreover, the analysis will borrow insights from recent judgments of the CJEU concerning the interpretation of the purpose and limits of the ESCB's monetary mandate. Finally, it is assumed that the introduction of a digital Euro under the monetary policy mandate of the ESCB would require it to be designed as interest rate-bearing. Absent the power of the ESCB to directly set an interest rate on digital euro holdings, a digital Euro would be functionally equivalent to cash and could not qualify as a monetary policy instrument. After having argued above about the possibility for a digital Euro to both assume the status of legal tender and be

[237] In areas where the EU does not have exclusive competence, the exercise of EU powers is further guided by the principle of subsidiarity, which seeks to safeguard the ability of the Member States to take decisions and authorises intervention by the Union when it is deemed that policy objectives cannot be sufficiently achieved by the Member States, but can be better achieved at Union level, "by reason of the scale and effects of the proposed action". For more information in this respect, please refer to: https://www.europarl.europa.eu/factsheets/en/sheet/7/the-principle-of-subsidiarity

used as a monetary policy instrument, this analysis will assume the introduction of an interest rate-bearing digital Euro with legal tender status.

4.1. Competence

Monetary policy is one of the exclusive competences of the European Union. The legal foundations of this exclusive competence can be found in article 3 (1) (c) of the TFEU, whilst the contours of this competence are detailed by article 127 (1) of the TFEU, which entrusts the operation of monetary policy to the ESCB and indicates price stability as its primary objective. As a secondary objective, and without prejudice to the objective of price stability, article 127 (1) of the TFEU provides that "the ESCB shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union. The ESCB shall act in accordance with the principle of an open market economy with free competition, favouring an efficient allocation of resources, and in compliance with the principles set out in Article 119". This provision fundamentally distinguishes the objective of price stability from that of economic support and envisages a link between the ESCB's objective of supporting the general economic policies in the Union, article 3 of the TEU and article 119 of the TFEU. Article 119 (2) of the TFEU provides that the ESCB's power to support of general economic policies in the Union must be exercised "in accordance with the principle of an open market economy with free competition". Moreover, establishes the separation between the two objectives and reinforces the above-proposed idea that the monetary policy should be deemed as including activities related to the management and regulation of the single currency. The wide independence and discretion of the ESCB in the monetary policy area (as further discussed below) might constitute a reason to consider the introduction of a CBDC on the grounds of monetary policy. This idea is further backed by the considerations made above with respect to the inclusion of legal tender regulation within the scope of the monetary policy mandate of the Eurosystem. Indeed, it would seem a logical solution to assume that the introduction of a digital Euro should occur under the same powers which regulate the status of legal tender. In the recent *Gauweiler* ruling[238], besides analysing the scope and limits of the Eurosystem's monetary mandate, the CJEU

[238] Judgement delivered in Case C-62/14, *Gauweiler a.o. v. Deutscher Bundestag,* 2015, ECLI:EU:C:2015:400, available at: https://curia.europa.eu/juris/liste.jsf?num=C-62/14

provided insights as to how the introduction of a CBDC might be framed under this mandate, by stating that "the ability of the ESCB to influence price developments by means of its monetary policy decisions in fact depends, to a great extent, on the transmission of the 'impulses' which the ESCB sends out across the money market to the various sectors of the economy. Consequently, it can be argued that if the monetary policy transmission mechanism is disrupted, that is likely to render the Eurosystem's actions ineffective in a part of the euro area and thus to undermine the singleness of monetary policy. Moreover, since disruption of the transmission mechanism undermines the effectiveness of the measures adopted by the Eusosystem, it is argued that this would necessarily affects the Eurosystem's ability to guarantee price stability. Accordingly, measures that are intended to preserve that transmission mechanism may be regarded as pertaining to the primary objective laid down in Article 127(1) TFEU"[239]. As mentioned above, the introduction of a digital Euro might affect monetary policy transmission mechanisms, especially should this be designed as an interest rate-bearing CBDC. This conclusion by the CJEU led some authors to argue that a legitimate purpose for the introduction of a CBDC might be found in the restoration of monetary policy transmission mechanisms as a result of their potential disruption due to the rise and mass adoption by European citizens of private digital currencies. On the other hand, it was observed that this restoration might be achieved through the introduction of a new monetary policy transmission mechanism, where the issuance of a digital Euro would be deemed as a method for the ESCB to maintain its operational infrastructure up to date with current technology and European citizens' payment habits[240]. Importantly, this argument would seem in line with the considerations provided by the CJEU in *Dietrich and Häring v. Rundfunk* and with the opinion delivered in that case by AG Pitruzzella as discussed above. However, it should be highlighted that the current stage of development and adoption by the public of private digital currencies does not yet involve a concrete risk for the transmission of monetary policy in the European Union. Consequently, it is observed that these arguments should be considered as conditional to the presence of a concrete risk of impairment of the ESCB's monetary policy transmission infrastructure. Finally, some authors observed that the indirect economic effects on alternative digital currencies and commercial banks (as further discusses below)

[239] Judgement delivered in Case C-62/14, *Gauweiler a.o. v. Deutscher Bundestag,* 2015, ECLI:EU:C:2015:400, par. 50

[240] Annelieke A. M. Mooij, "A digital euro for everyone: Can the European System of Central Banks introduce general purpose CBDC as per of its economic mandate?", Journal of Banking Regulation, 2021, p. 11

resulting from the introduction of an interest rate-bearing digital Euro might change the nature of such intervention by the ESCB from monetary to economic. However, in a recent ruling delivered by the CJEU in *Weiss a.o. v. Deutscher Bundestag*, it stated that indirect effects have no consequences for the purposes of classification as monetary or economic of the measures adopted, even where these constitute foreseeable consequences of those measures[241]. As a result, it is argued that the introduction of an interest rate-bearing digital Euro might be deemed within the scope of monetary policy notwithstanding the indirect economic effects ensuing its introduction.

4.2. Proportionality

In *Gauweiler*, the CJEU, recalling settled case law of the court, stated that "the principle of proportionality requires that acts of the EU institutions be appropriate for attaining the legitimate objectives pursued by the legislation at issue and do not go beyond what is necessary in order to achieve those objectives"[242]. Thus, besides being within the aim of ESCB's monetary mandate, the issuance of a digital Euro should be appropriate as regards to the objective of restoring the monetary transmission mechanism, and its scope should not go beyond what is necessary for the purpose of that objective.

4.2.1. Appropriateness

Regarding the appropriateness of introducing a digital euro, it is argued that it should be assessed against the two main drivers identified by the ECB as potential causes of the euro currency take-over and thus of the monetary policy transmission mechanism impairment, namely: (i) the rise in popularity of private unregulated digital currencies such as stablecoins; (ii) the introduction of foreign CBDCs. These constitute phenomena that could effectively jeopardise the ability of the ESCB to pursue its monetary mandate. As discussed above, monetary sovereignty is deemed lost when citizens start using a foreign public or private currency in their daily activities, since this leads to domestic monetary and financial conditions being determined by a foreign

[241] Judgement delivered in Case C-493/17, *Weiss a.o. v. Deutscher Bundestag,* 2017, ECLI:EU:C:2018:1000, par. 63, available at: https://curia.europa.eu/juris/document/document.jsf?docid=208741&doclang=EN
[242] Judgement delivered in Case C-62/14, *Gauweiler a.o. v. Deutscher Bundestag,* 2015, ECLI:EU:C:2015:400, par. 67

public or private authority, and to the ability of a central bank to control the unit of account in the respective jurisdiction being undermined. Like an interest rate-bearing digital euro, foreign interest rate-bearing CBDCs would constitute new monetary transmission mechanisms that could generate cross-border monetary spillovers if these were to achieve a substantial footprint in the European economy. Indeed, as observed by the ECB, "the specific design features of a CBDC would be important for its global outreach and, ultimately, the international role of the currency in which it is denominated"[243]. The same reasoning would apply for some private digital currencies, such as stablecoins. As shown above, some types of stablecoins (*e.g.* fiat-backed stablecoins) tie their value to a fiat currency by holding and managing reserve assets denominated in that currency. How already mentioned, stablecoins with highest market capitalisation and wider diffusion are referenced to the US Dollar, whilst the first major euro-denominated stablecoin (EUROC) only launched on June 30, 2022. As stablecoins' value is inevitably associated with that of the fiat currency they are referenced to, their widespread adoption in the European economy could also result in cross-border monetary spillovers. In such a scenario, issuers of stablecoins denominated in a currency other than the euro would act as a vehicle for the import into the euro area of the domestic monetary policy of the state in which that currency is legal tender. However, it should be noted that, as of today, these risks are not yet concrete. For instance, as detailed above, the diffusion of stablecoins in the euro area is still limited. On the other hand, regarding foreign CBDCs, one of the most advanced projects is the Digital Currency Electronic Payment (DCEP), currently being pursued by the People's Bank of China (PBOC). Although China is expected to become the first major economy to launch a CBDC, the PBOC only started real-world trials of the DCEP in several cities in the last few months. Consequently, the introduction of a digital Euro would represent a pre-emptive step from the Eurosystem. The question here is whether the CJEU would consider such a step as legitimate. The scope of the ECJ's judicial review with regard to the exercise of the ESCB's powers has been partially addressed in the *Gauweiler* judgment. In that context, referring to the judicial review of the ECB's compliance with the principle of proportionality, the court stated that "since the ESCB is required […] to make choices of a technical nature and to undertake forecasts and

[243] European Central Bank, "The International Role of the Euro", 2021, p. 8

complex assessments, it must be allowed, in that context, a broad discretion"[244]. Besides recalling the independence of the ECB, these considerations highlight the wide discretion it enjoys when making technical choices and forecasts under its monetary mandate. Furthermore, within this broad discretion, the CJEU indicated an interpretative criterion for the assessment of the legitimacy of the ECB's choices, namely that of "manifest error of assessment"[245]. Based on these premises, it could be argued that the introduction of a digital Euro under the monetary mandate might be deemed legitimate. Indeed, due to the complexity of the pre-emptive assessment regarding the implications of the current economic and geopolitical environment requested to the Eurosystem for the preservation of the monetary policy transmission mechanism, an intervention from the CJEU on the grounds of a manifest error of assessment seems unlikely. This view might be supported by another statement made by the court in the *Gauweiler* judgment, according to which it could be argued that the risks ensuing from the impairment of the monetary policy transmission mechanisms, such as fragmentation of banks' refinancing conditions and credit costs, might be deemed relevant not only when affecting the entire euro area, but also a significant part of it[246]. Therefore, based on the interpretation of the ESCB's monetary mandate provided by the CJEU in *Gauweiler*, it could be argued that in order for the introduction of a digital Euro aimed at preventing or countering the euro currency take-over by foreign CBDCs or unregulated private digital currencies to be considered legitimate, it would be sufficient that such risks materialise in a (significant) part of the euro area (*e.g.* where they might have greater influence for various reasons).

4.2.2. Not going beyond

Regarding the requirement for the ESCB not to go beyond what is necessary to achieve the objectives mentioned above, this should be assessed against the overall objective of preserving financial stability underpinning the purpose of preserving monetary policy transmission mechanisms. In this respect, chapter III of this paper – based on

[244] Judgement delivered in Case C-62/14, *Gauweiler a.o. v. Deutscher Bundestag,* 2015, ECLI:EU:C:2015:400, par. 68
[245] Judgement delivered in Case C-62/14, *Gauweiler a.o. v. Deutscher Bundestag,* 2015, ECLI:EU:C:2015:400, par. 74
[246] Judgement delivered in Case C-62/14, *Gauweiler a.o. v. Deutscher Bundestag,* 2015, ECLI:EU:C:2015:400, par. 73

considerations made by the ECB – highlighted how the introduction of an interest rate-bearing CBDC would entail the presence of a new inherently risk-free asset in the financial environment, which might affect commercial banks' business model by challenging their intermediation role. As these consequences might generate financial stability concerns, when determining the consistency of an interest-bearing digital Euro with the proportionality principle, its potential negative effects on the banking system must also be considered. These considerations are required because, as mentioned earlier, the actions of the ESCB are also subject to review against the principle of an open market economy with free competition. The suitability of a digital Euro in relation to these two principles is discussed concomitantly because it is considered that the proportionality of the ESCB's intervention depends largely on whether competition in the banking system can be preserved against the introduction of an interest rate-bearing digital euro. The position of the ECB in this respect was clear, as it stated that "the digital euro should be an attractive means of payment, but should be designed as to avoid its use as a form of investment and the associated risk of large shifts from private money (for example bank deposits) to digital euro"[247]. Based on this statement, it is evident that the aim of the ESCB would not be that of outcompeting commercial banks by setting an interest rate high enough to channel its use as a means of investment. Rather, it has been argued that the remuneration system might be structured in a way that the interest rate applied to holdings of digital Euro below a predefined threshold are remunerated positively, thus incentivizing such holdings, whilst holdings above the threshold might be subject to zero or negative remuneration[248]. Despite there is not yet a predominant economic opinion as to how the interest rate applied to digital Euro holdings should be structured, based on these premises it is argued that the ESCB might be able to demonstrate that the rate is not competing with commercial banks. Should the ESCB be able to provide such an argument, it is argued that it is unlikely that the CJEU would consider the introduction of an interest-rate bearing digital Euro as going beyond what is necessary for the pursuit of the objective of financial stability by preserving the transmission mechanisms of monetary policy. In this scenario, some authors have argued that setting limits on holdings of digital Euro would "conflict with

[247] European Central Bank, "Report on a Digital Euro", 2020, p. 18
[248] Ulrich Bindseil, "Tiered CBDC and the financial system", Working Paper Series No. 2351, European Central Bank, 2020

a legal tender concept that encompasses limitless use of cash as a store of value"[249]. This paper disagrees with this perspective, which – *inter alia* – was proposed before the *Dietrich and Häring v. Rundfunk* ruling was delivered by the CJEU. Indeed, as discussed above, in that judgment the CJEU officially recognised the relevance of Recommendation No. 2010/191/EU in the interpretation of concept of legal tender. Interestingly, when mentioning the functions and properties relating to the legal tender status of euro banknotes and coins, that Recommendation does not include that of store of value. As a result, it is argued that the interest rate-bearing feature of a digital Euro would not conflict with the status of legal tender. Moreover, other authors have argued that, for the purpose of preventing the euro currency take-over as discussed above, it would not be essential for a digital Euro to be interest rate-bearing by stating that "the [monetary] aim itself does not seem influenced by the question of whether such an account is interest bearing"[250], thus posing doubts on the compliance of an interest rate-bearing digital Euro with the principle of proportionality. Instead, they proposed that this feature would only provide more direct control to the ESCB over the monetary transmission. Absent further information from the European institutions on this point, this statement might be deemed accurate from a conceptual perspective. However, this paper proposes a different approach. In this chapter, we explored the possibility of introducing an interest rate-bearing digital Euro under the monetary policy mandate of the ESCB. The legal grounds for such an introduction were found in the preservation of financial stability against a possible take-over of the euro currency either by foreign CBDCs or unregulated private digital currencies. As is evident, this objective includes that of price stability as the primary objective of the ESCB under Article 127 (1) of the TFEU. Within this purpose, building on the interpretation of the ESCB's monetary mandate as provided by the CJEU in *Gauweiler*, the discussion focused more specifically on the restoration of the monetary policy transmission mechanisms. Based on these premises – although the economics of this reasoning cannot yet be ascertained due to the relatively early stage of discussions – it is argued that the interest rate-bearing feature of a euro digital would constitute a crucial element in avoiding the euro currency take-over by foreign CBDCs or unregulated private digital currencies. This assertion is

[249] Seraina Grünewald, Corinne Zellweger-Gutknecht, Benjamin Geva, "Digital Euro and ECB Powers", Common Market Law Review 58: 1029-1056, Kluwer Law International, 2021, p. 1048
[250] Annelieke A. M. Mooij, "European Central Bank Digital Currency: the digital euro. What design of the digital euro is possible within the European Central Bank's legal framework?", SSRN, p. 13

based on the assumption that the substitution of the euro currency in favour of these instruments could not be prevented if they were endowed with more attractive features, such as that of bearing an interest rate. This consideration seems to be confirmed by the ECB. Indeed, although the ECB in its report on a digital Euro deliberately did not advocate for a specific type of digital euro, it nevertheless stated that "any potential solution must satisfy a number of principles and requirements that are identified in this report"[251]. In other words, it expressed key requirements that, regardless of its design, should be observed in the introduction of a digital euro. Requirement no. 3 provides that a digital Euro "should have features which are at the technological frontier. It should offer the basis for providing functionalities that are at least as attractive as those of payment solutions available in foreign currencies or through unregulated entities"[252]. Therefore, for the digital Euro to be as attractive as other payment solutions, it seems at least unlikely that the interest rate-bearing feature would not have to be taken into account in the overall assessment regarding its introduction. Based on these premises, it is also argued that the interest rate-bearing feature would not conflict with the statement made by the ECB that "a digital Euro would not replace cash, but rather complement it"[253]. A literal interpretation of this statement might induce to think that a digital Euro should have the same features of cash, which would involve no interest rate being applied to digital Euro holdings. However, absent further insights from the European institutions and based on the reading of the concept of legal tender recently offered by the CJEU and AG Pitruzzella in *Dietrich and Häring v. Rundfunk*, we assume that the term "complement" might be interpreted as meaning "updating" the concept of legal tender in the European context by (at least initially) by complementing cash as a form of non-remunerated central bank money with a remunerated CBDC. On the other hand, a potential euro currency take-over by foreign CBDCs or by unregulated private digital currencies would not only entail a loss of control over monetary policy by the Eurosystem due to the disruption of the monetary policy transmission mechanisms, but also a risk of disintermediation of the banking industry through the reduction of deposits held at commercial banks. However, as already mentioned, such a risk of disintermediation of the banking industry could also arise from the introduction of a digital euro, if it is not structured appropriately from an economic point of view.

[251] European Central Bank, "Report on a Digital Euro", 2020, p. 4
[252] European Central Bank, "Report on a Digital Euro", 2020, p. 12
[253] European Central Bank, "FAQs on digital euro", available on the ECB website

Overall, this risk would have significant effects from the point of view of the stability of the financial system. In fact, any significant decrease in the loss of deposits with commercial banks, regardless of whether this is in favour of foreign CBDCs, unregulated private digital currencies, or in favour of a digital euro, would entail a significant increase in the funding costs of commercial banks, which would thus be forced to structure their operations according to a higher level of risk-taking in order to maintain their profitability. Moreover, this process could also jeopardise economic growth, as it might lead to an increase in the volatility of interest rates applied by commercial banks on loans. Based on these premises, it is evident that the risk of banking disintermediation might also lead to an argument for the introduction of a digital euro, if designed properly. Indeed, as stated also by the ECB in another of the requirements indicated as fundamental for the design of a digital euro, unlike foreign CBDCs or unregulated private digital currencies, a digital Euro "should be designed so as to avoid its use as a form of investment and the associated risk of large shifts from private money (for example bank deposits) to digital euro"[254].

4.3. Specific Issues Regarding a Retail Digital Euro

Although the introduction of a digital Euro might be considered within the aim of the ESCB's monetary policy mandate and – depending on its design – proportionate to the objectives pursued, it was noted that this alone could not, however, justify the introduction of a retail CBDC (as opposed to a wholesale CBDC how defined above) as envisaged by the European institutions. Rather, it has been argued that the introduction of a CBDC directly[255] accessible to natural and legal persons would consist of a socio-economic measure aimed at providing access to the banking system to individuals who, due to lack

[254] European Central Bank, "Report on a Digital Euro", 2020, p. 18

[255] It should be clarified that "direct accessibility" in this chapter does not mean accessibility by end users to technological infrastructures operated directly by the ECB, but rather direct accessibility for end users to a digital euro as a form of central bank money issued by the Eurosystem. As discussed above, this type of design is denominated "retail CBDC", as opposed to a "wholesale CBDC", where accessibility to such form of central bank money would be limited to selected financial institutions and monetary policy counterparties. In this respect t is important to distinguish between: (i) accessibility of a CBDC, which might either be broad (retail CBDC) or restricted (wholesale CBDC); (ii) distribution of a CBDC, which might occur through technological infrastructures operated either directly by the ECB, or by supervised intermediaries. For instance, as stated by the ECB and as reported in Chapter III, the issuance of a retail CBDC should preferably take place through supervised intermediaries in order to avoid imposing a significant operational burden on the ECB.

of income or documentation, are prevented from opening a bank account[256]. As discussed above, the aim of financial inclusion is one of the main drivers for the introduction of a CBDC. However, it is argued that its pursuit should be considered in light of the specific circumstances affecting the relevant economic scenario. From an international perspective, the issue of segments of the population being unable to access the banking system varies greatly among different economies and is far more evident in developing economies. For instance, as of 2021, the share of the population without access to the services of banks or similar organizations in developing economies was estimated at: 71 per cent for Morocco, 69 per cent for Vietnam, 67 per cent for Egypt, 66 per cent for Philippines, 63 per cent for Mexico, 60 per cent for Nigeria. On the other hand, the percentages for European Union countries are well below those related to developing economies. For instance, it is estimated at: 0 per cent for Denmark, Netherlands, Finland, and Sweden, 1 per cent for Germany and Belgium, 2 per cent for Austria, 6 per cent for Italy, France and Spain[257]. The stronger emphasis on the element of financial inclusion as a supporting rationale for the introduction of a CBDC by developing economies has also been confirmed in a recent survey proposed by the BIS[258]. As a result, while the objective of financial inclusion could provide a strong argument for the introduction of a CBDC in developing economies due to the significant impact of the unbanked share of individuals on the effective transmission of monetary policy, the same cannot be said with regard to the European Union. Indeed, considering the low percentages of the population prevented from accessing financial services in European Union countries, it would be difficult to imagine that these would constitute a real disruption to monetary policy transmission. Consequently, notwithstanding the fact that the monetary mandate of the ESCB could be interpreted as enabling the issuance of a digital euro, it has been argued that the legal basis for its broad accessibility to natural and legal persons – absent Treaties amendments – should be searched for in other policy areas[259]. However, this paper disagrees with this view. The issue of having parts of the population unable to access financial services must be distinguished from that of a potential euro currency take-over by foreign CBDCs and unregulated private digital currencies. Equally,

[256] Annelieke A. M. Mooij, "A digital euro for everyone: Can the European System of Central Banks introduce general purpose CBDC as per of its economic mandate?", Journal of Banking Regulation, 2021, p. 13-14
[257] Source STATISTA, available at: https://www.statista.com/statistics/1246963/unbanked-population-in-selected-countries/
[258] Codruta Boar, Henry Holden and Amber Wadsworth, "Impending arrival – a sequel to the survey on central bank digital currency", BIS Papers No 107, 2020, p. 4
[259] Annelieke A. M. Mooij, "European Central Bank Digital Currency: the digital euro. What design of the digital euro is possible within the European Central Bank's legal framework?", SSRN, p. 14

the socio-economic objective of providing access to the banking system to individuals who, due to lack of income or documentation, are prevented from opening a bank account must be distinguished from the monetary objective of ensuring the efficiency and effectiveness of the monetary policy transmission mechanisms. As discussed above, this underpins the Eurosystem's objective of ensuring price stability, and ultimately of preserving financial stability. Having proposed this distinction, it is considered that the direct accessibility for natural and legal persons to a digital Euro – irrespective of the method of distribution which, as shown in chapter III, could assume various configurations and is still uncertain – might also be framed within the scope of the Eurosystem's monetary policy mandate. In particular, according to the same reasoning proposed above, it is argued that the scope of the legal grounds which would legitimise the issuance of a CBDC for the purpose of protecting financial stability by preserving monetary policy transmission mechanisms, namely: (i) the restoration of existing transmission mechanisms in accordance with the interpretation of the ESCB's monetary mandate provided by the CJEU in *Gauweiler*; or (ii) the introduction of a new transmission mechanism to maintain the ESCB's operation up to date with current technologies as supported by the considerations offered by the CJEU and AG Pitruzzella in *Dietrich and Häring v. Rundfunk*, would (and should) include direct accessibility by natural and legal persons to a digital euro. Besides being within the scope from a policy perspective, it is argued that direct accessibility to a digital Euro by natural and legal entities would be essential for the achievement of the aforementioned objective. Indeed, should its accessibility be restricted to certain monetary policy institutions and counterparties (*i.e.* wholesale CBDC), it is argued that: (i) the restoration of existing monetary policy transmission mechanisms against the euro currency take-over by foreign CBDCs and unregulated private digital currencies could not be achieved, as their widespread uptake among the general public in the EU could not be prevented; (ii) the introduction of a new monetary policy transmission mechanism would not be feasible either. Indeed, as discussed above, a form of wholesale CBDC already exists in the EU and is represented by the TARGET 2 system. Since the public and private institutions which are currently members of TARGET 2 would presumably be the ones to which access to a wholesale digital Euro would be granted, the introduction of a wholesale digital Euro would not strengthen nor widen the Eurosystem's control on monetary policy. Based on these premises, there would be no need to resort to the socio-economic objective of promoting financial inclusion to legitimise the issuance of a digital Euro directly accessible to natural and legal persons.

CONCLUSIONS

The purpose of this paper has been to analyse the evolution of the concept of money in the light of the modern economic and monetary context. In the first chapter, the narrative focused on the characteristics of the relationship between the intrinsic and extrinsic value of money, observing how, over time, the latter has prevailed over the former, fostering the rise of monetary system governed by a nominalistic principle that constitutes the nexus between money and sovereignty. In this context, it was analysed how developments in the concept of money were mainly guided by economic needs and applied through technological innovations (*e.g.* the replacement of metallic coins with paper certificates in the 14th century). Subsequently, it was observed how the derivations of the nominalistic principle affect the economic and legal structure at the basis of the social fabric. In particular, the key role of central banks in managing monetary policy was highlighted as the basis for regulating the economy through the determination of the official interest rates applied, which are then reflected in the real economy through the financial intermediation role played by financial institutions. The basic features of modern monetary systems were then analysed considering the current economic scenario, where the concept of money – although formally anchored to a paper form – appears to be an essentially virtual phenomenon. It is argued that this is due to two main factors. The first is the significant penetration of technological innovation in the social fabric, which has changed individuals' behavioural habits in favour of digital payment solutions. The second is the tendency of legislative interventions – both at an European and national level – in various sectors of the economy to favour the regulation of monetary transactions through technological solutions. The paper highlighted how these legislative interventions are mainly driven by the public interest of ensuring the security and legitimacy of transactions against money laundering or terrorist financing risks. Based on these initial considerations, the paper highlighted how changes in the concept of money that have taken place in recent decades have been driven by two main causes: the economic need to adapt the forms and rules governing monetary transactions to the technological innovations available from time to time; and the public interest of authorities in maintaining or increasing the control exercised over such monetary transactions. The first chapter observed that the rise of digital currencies, which started during the last decade, is now at a stage of advancement where the systemic impact on financial stability and monetary sovereignty of their potential large-scale

diffusion can no longer be ignored. In particular, it is argued that, while some types of digital assets (e.g. electronic money) do not entail – also due to their widespread regulation and diffusion – new risks for the economic-financial system, the impact of digital assets based on distributed ledger technologies could be significantly different in relation to both these aspects. The paper then noted how the phenomenon of crypto-assets might pose a major challenge to monetary and economic institutions, as well as to central banks. This is due to a fundamental difference existing between crypto-assets and other digital assets, namely the fact that technologies based on distributed ledgers allow the exchange of value between individuals without the need for the intervention of a third party as a fiduciary intermediary to validate the transaction. This technological feature is the result of an ideology that aims for the transformation of the financial system in a more democratic and inclusive sense through its decentralisation and disintermediation. However, the paper noted that technologies based on distributed ledgers can also be structured according to centralised operational models, without compromising the benefits typically associated with this type of technology (*e.g.* transparency, security, etc.). Subsequently, it has been pointed out that several crypto-assets projects with a higher market capitalisation (*e.g.* Bitcoin, Ethereum) involve a completely decentralised structure and thus place themselves completely outside of the traditional monetary and financial system. This is because on the one hand, the production of new units is not under the control of any public entity, while on the other hand their overall operation is not conditioned by the intervention of any private financial intermediary. After having outlined the potential systemic impact of the crypto-assets phenomenon on the financial and monetary system, the first chapter concluded by observing how such a scenario would make an institutional intervention desirable. Such intervention might take the form of the pursuit of the public interest in the preservation of financial stability and monetary sovereignty and would provide an opportunity to adapt the legal and economic infrastructure to the current state of advancement of technology, aligning it to the renewed relationship between individuals and money it has generated in the last decade. Considering the complexity of the crypto-asset phenomenon as a whole, as well as the variety of functional sub-categories into which it unfolds, the second chapter provided a detailed assessment of the main legal and economic characteristics of the different crypto-asset types, analysing the operational patterns that make them unique. Based on these considerations, the chapter highlighted the legal issues crypto-assets pose with respect to consumer protection, money laundering, terrorist financing and financial stability. This analysis acknowledged the definitions and policy choices proposed by the European legislator through the recent MiCA Regulation proposal, which is currently in

the final stage of approval. The paper then outlined the regulatory regime envisaged by the MiCA Regulation proposal for the different types of crypto-assets against the aforementioned legal issues. This assessment also made use of recent economic data to highlight how the category of crypto-assets potentially best suited to replace traditional fiat currencies is that of stablecoins. These in fact constitute a particular type of crypto-assets which tend to stabilise their value by tying it to a traditional fiat currency or a pool of underlying assets, thereby diminishing its volatility. In the third chapter, the concept of a central bank digital currency (CBDC) was introduced in the digital asset landscape. The potential introduction of a sovereign digital currency by central banks was argued against of the diversity, fragmentation and variety that currently characterise the concept of money. It was pointed out how these circumstances have the potential to undermine the uniformity of a currency by increasing the volatility in the value of its different representations, as well as how the introduction of a CBDC could support its preservation. With this in mind, the paper proceeded to analyse the main design choices for a CBDC that would influence its impact both from an economic and legal perspective. These considerations were followed by an analysis of the approach pursued by the European institutions in relation to these design choices, aimed at forecasting which could be the structure of a "digital euro" on the basis of currently available data. The third chapter concluded with an analysis of the risks and benefits that the various design choices for a digital Euro might entail. In the fourth and final chapter, the paper offered an overview regarding to the compatibility of a CBDC with the current European monetary and legal tender framework. In particular, the paper first dwelt on the European regulation concerning the status of a legal tender. In the absence of a definition of the concept of legal tender and the precise consequences of this status in European primary law, the discussion focused on secondary regulatory sources such as the European Commission Recommendation No. 2010/191/EU on the scope and effects of legal tender of euro banknotes and coins and the recent intervention of the CJEU in *Dietrich and Häring v. Rundfunk*. Based on the functional interpretation of the concept of money which arose from the considerations provided in the previous chapters, the paper argued for the possibility for a CBDC to assume the status of legal tender in the European context by offering a teleological interpretation of the European provisions on the status of legal tender. After assuming the possibility for a CBDC to be endowed with the status of legal tender, the paper argued that control over status of legal tender and the regulation of its characteristics might be framed within the Eurosystem's monetary policy mandate by considering the status of legal tender as a pre-condition for the conduct of monetary policy. After qualifying the introduction of a CBDC as a monetary policy measure, the paper examined the Eurosystem's monetary

policy mandate in order to assess whether, and under which conditions, the introduction of a digital Euro could could occur as part of these powers. Building on the recent intervention of the CJEU in *Gauweiler a.o. v. Deutscher Bundestag*, where the court had the opportunity to analyse the monetary policy mandate of the Eurosystem, the paper identified a possible policy rationale that would justify the introduction of a digital Euro in the restoration of monetary policy transmission mechanisms with respect to their potential disruption as a consequence of a take-over of the euro currency due to the significant diffusion of private digital assets (*e.g.* stablecoins), as already mentioned in the previous chapters. After envisioning the legitimacy of such an intervention by the Eurosystem, the paper also outlined its limits (*e.g.* the principle of proportionality), as well as the design features that a digital Euro ought to satisfy for this purpose. Overall, this paper aimed at highlighting the innovative capacity of distributed ledger-based technologies, while also emphasising their potential systemic impact on the monetary and financial system. Although this impact cannot yet be defined as actual due to the relatively low diffusion of crypto-assets in the euro area, this particular moment provides a significant opportunity for the European Union to modernise its monetary system through the introduction of a CBDC. By doing so, it is believed that it would be possible to prevent future systemic risks while at the same time capitalising on the potential benefits of new technologies, as well as ultimately to enhancing the international role of the euro as the needle in an increasingly polarised geopolitical environment.

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