

04

OCCASIONAL PAPERS 2020

OCCASIONAL PAPER ON CRYPTO-ASSETS

Banco de Portugal working
group on crypto-assets



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DECEMBER 2020

The analyses, opinions and findings of these papers represent
the views of the authors, they are not necessarily those of the
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Lisboa, 2020 • www.bportugal.pt

Occasional paper on crypto-assets

Banco de Portugal working group on crypto-assets

December 2020

Abstract

Crypto-assets are digital assets that may depend on cryptography and exist on a distributed ledger or similar technology. In the absence of a common and widely accepted taxonomy, we first try to characterise crypto-assets and differentiate them from goods fulfilling the three essential functions of money: medium of exchange, unit of account and store of value. We then analyse the (lack of) legislation applied to crypto-assets, before concluding with the identification of the associated main risks.

JEL: E42, G21, G23, O33

Keywords: Crypto-assets, crypto-assets characterisation, crypto-assets risks

Acknowledgements: This paper summarises part of the findings and reflections of a Banco de Portugal expert-team set up. The authors of the paper are: Agostinho da Silva, Carla Ferreira, Carla Marques, Catarina Nicolau Campos, César Costa, Cláudia Simões, Gisela Fonseca, Hugo Mira, Isabel Mota, João Luís Gonçalves, José Costa Nobre, Madalena Borges, Nuno Nóbrega, Pedro Tomé, Raquel Lima, Rita Sena de Castro, Rita Soares, Sónia Correia and Tiago Cordeiro. The authors would like to thank André Leal, Carlos Martins and João Rodrigues for their valuable comments and suggestions. We also gratefully acknowledge valuable inputs and insights from the heads of Departments, Divisions and Units involved and from the participants at Banco de Portugal meetings in which the conclusions of the paper were presented. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of Banco de Portugal or the Eurosystem.

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1. Introduction

Crypto-assets are one of the major applications of distributed ledger technology (DLT) for finance. In recent years, the unique features of these technologies, allied to the interest of some users in benefiting from solutions outside the traditional banking system, contributed to an increasing use of DLT and to the creation of a market for crypto-assets.

Crypto-assets are commonly defined as a type of private assets that depend primarily on cryptography and DLT as part of their inherent value (EBA, 2019). However, a widely accepted taxonomy is still absent. Many different crypto-assets have been launched in the last decade, with very diverse features and functions and different players involved.

In this paper, we first start by making clear that crypto-assets are digital representations of value that can be used as an alternative to money in certain circumstances, but do not fulfil the essential functions of money such as being a widely accepted medium of exchange, unit of account and store of value.

We then analyse both the national and the international regulatory framework applicable to crypto-assets. Reference has to be made, in particular, to the Legal Framework for Payment Services and Electronic Money (RJSPME),¹ in order to assess the possibility of crypto-assets being subsumed under the concept of electronic money in this regime. Also Law No. 83/2017 of 18 August, which establishes measures to prevent and combat money laundering and terrorist financing (ML/TF) is of particular relevance as, with the transposition of Directive (EU) 2018/843² operated by Law No. 58/2020 of 31 August,³ it now includes (some) crypto-assets service providers as obliged entities to comply with AML/CFT rules.

However, to date, there is no uniformity as regards the overall legal and regulatory framework applicable to crypto-assets-related services and providers, considering that the majority of these activities and entities are outside the scope of supervision of competent authorities. As stressed by the President of the European Commission, there is a need for a common approach on crypto-assets to ensure that Member States understand how to make use of the opportunities they may create and how to address the risks they may pose (Leyen, 2019). It was in this context that by the end of 2019, the European Commission launched a public consultation on a possible common regulatory framework for crypto-assets, which resulted in a

1. Published in annex to Decree-Law No. 91/2018 of 12 November, which transposes Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November on payment services in the internal market ("PSD2"). Throughout the paper, the Portuguese acronym is used: RJSPME, which stands for "Regime Jurídico dos Serviços de Pagamento e da Moeda Eletrónica".

2. 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.

3. <https://dre.pt/application/conteudo/141382321>.

proposal for a regulation on markets in crypto-assets, published on 24 September 2020,⁴ and still under discussion.

In the meanwhile, a continuous monitoring of the related risks must be pursued, since crypto-assets are evolving and their impact on the financial sector may increase in the future.

The remainder of the paper is structured as follows. Section 2 starts by defining the concept of crypto-asset. Section 3 presents the underlying regulatory framework, which includes the analysis of both the national and the international applicable legal and regulatory regimes. Section 4 revisits the main risks associated with crypto-assets and Section 5 concludes.

2. The crypto-asset concept

The technological innovation has been a common characteristic of the financial system. In recent years there have been numerous technological developments with the entry of new participants in payment systems, in financial intermediation services and in the provision of instruments with (some) similar functions to legal tender currencies.

The growing relevance of e-commerce, and the interest in processing electronic transactions without the need for a financial third-party intermediary, led to an increased interest in new digital payment methods, namely in some crypto-assets, such as Bitcoin, and in the underlying DLT technology/blockchain. The unique and different features of these technologies, allied to the interest of some users in benefiting from solutions outside the traditional banking system, contributed to the creation of a market for crypto-assets.

As a starting point for the analysis to be conducted in this paper, a proper taxonomy needs to be set. To this end, it will first be necessary to differentiate the concepts of "money" (what it is and which different types can it assume), "currency" (distinguishing between digital currency and virtual currency) and "crypto-asset".

Typically, goods fulfilling three essential functions are said to be "money": medium of exchange; unit of account; and store of value, for which its value stability over time is fundamental. Money can take a physical form, such as cash (coins and banknotes), or be non-physical, such as electronic and digital money.

From a legal point of view, the concept of "currency" is usually brought back into the concept of legal tender and thus, in the euro area countries, into euro coins and banknotes (cf. Articles 10 and 11 of Council Regulation (EC) No 974/98 of 3 May 1998 on the introduction of the euro). Without prejudice, a number of

4. https://ec.europa.eu/finance/docs/law/200924-crypto-assets-proposal_en.pdf.

arguments have been put forward⁵ to support the view that scriptural money enjoys a legal "value" equivalent to legal tender and is therefore money.⁶

In the case of "digital currency", a distinction has to be made between "central bank digital currency" and "commercial bank digital currency". The former represents a liability of the central bank. The second represents a liability of a commercial bank (e.g. deposit accounts) and behind its creation is the so-called credit multiplier mechanism.

"Electronic money" means a monetary value stored electronically, represented by a claim on the issuer and issued after the receipt of cash or scriptural money. This monetary value can be used to make payment transactions and is accepted by natural or legal persons other than the issuer of "electronic money".⁷

In turn, "virtual currency" can be defined as a digital representation of value, not issued by a central bank, credit institution or e-money institution, which can be used as an alternative to money in certain circumstances, but which is not money as it does not fully fulfil the functions described above.⁸

Finally, crypto-assets are defined as assets recorded in digital form that depend primarily on cryptography and DLT (or a similar technology) as part of their inherent value.^{9,10} Crypto-assets are one of the major applications of blockchain for finance. The blockchain technology is largely associated with crypto-assets such as Bitcoin, Ripple and Ethereum.

3. The regulatory framework

3.1. National regulatory framework

Over the past few years there have been notable developments with regard to the deepening of knowledge and legislative or regulatory initiatives concerning crypto-assets.

5. For instance, arguments related to Article 8(3) of Regulation (EC) No 974/98 as well as to legal restrictions on the use of cash and thereby its legal tender, which by reason of the value or nature of the payment typically require the payment to be made using a transfer of funds.

6. Regarding electronic money, in Portugal the doctrinal trend is not to consider it as money from a legal point of view.

7. Definition in Article 2(2) of Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009 on the taking up, pursuit and prudential supervision of the business of electronic money institutions ("EMD2").

8. See ECB (2015).

9. Please see EBA (2019).

10. For the purpose of the European Commission public consultation on an EU framework for markets in crypto-assets, launched between 19 December 2019 and 19 March 2020, a crypto-asset is defined as "a digital asset that may depend on cryptography and exists on a distributed ledger". In the Commission legislative proposal for a Regulation on markets in crypto-assets published on 24 September 2020, crypto-asset means "a digital representation of value or rights which may be transferred and stored electronically, using DLT or similar technology".

Crypto-assets have come to cumulate their role as a possible means of payment within specific communities, with the role as a possible instrument of investment/capital raising (issued through an Initial Coin Offering or ICO¹¹) and even as a basis for collaborative funding projects through donations. Additionally, crypto-assets can take the form of high-risk investment assets used for speculative purposes given the volatility of their value.

Therefore, it is considered useful to promote a more in-depth analysis of the national regulatory framework applicable to crypto-assets, focusing on the areas of competence of Banco de Portugal, namely the oversight of payment systems and the supervision in the field of prevention of ML/FT.

3.1.1. Legal Framework for Payment Services and Electronic Money (RJSPME)

As noted in ECB (2015), crypto-assets may pose risks to the stability of payment systems. Therefore, and although this risk has not yet materialised, Banco de Portugal, as the authority responsible for promoting the smooth operation of payment systems¹² and as the entity responsible for prudential and banking conduct supervision within the scope of the RJSPME, in particular with regard to the provision of payment services and e-money issuance services, has increased responsibilities.

In this context, one of the topics that needs to be addressed is whether and in what terms crypto-assets and crypto-assets' activities fall within the provision of payment services or e-money issuance services as foreseen in the RJSPME.

In general terms, the RJSPME lists, in its Article 4, the activities that qualify as payment services. The issuance of payment instruments or the acquiring of payment transactions are included in those activities, under Article 4(e).

According to Article 2(aa) of the RJSPME, a payment instrument is "a personalised device or set of procedures agreed between the payment service user and the payment service provider and used by the payment service user to issue a payment order". The definition of a payment order is linked to the definition of a payment transaction, which is broadly defined as the act, by the payer or the payee, of depositing, transferring or withdrawing funds. Therefore, it is imperative to understand if crypto-assets fit into the definition of "funds" of the said legal framework.

In Article 2(w) of the same legal framework, the legislator restricted the concept of funds to "banknotes and coins, scriptural money and electronic money". Since, as already stated, crypto-assets cannot be classified as banknotes and coins, it remains to be clarified whether they can be classified as electronic money.

11. Operations aimed at obtaining financing from the public, through the issuance of "tokens" or "coins" which, as a rule, confer rights or functionalities related to the project they are intended to finance.

12. See Article 14 of the Organic Law of Banco de Portugal, approved by Law No. 5/98 of 31 January 1998, as currently worded.

Article 2(ff) of the RJSPME, defines electronic money as "electronically, including magnetically, stored monetary value as represented by a claim on the issuer which is issued on receipt of banknotes, coins and scriptural money for the purpose of making payment transactions within the meaning of subparagraph (ii), and which is accepted by a natural or legal person other than the electronic money issuer". At present, there is the possibility of crypto-assets being considered an electronically stored monetary value and they may be accepted by entities other than the issuer. However, crypto-assets like Bitcoin do not represent a claim on the issuer which is issued after receipt of banknotes, coins or scriptural currency to make payment transactions, since those crypto-assets can be "mined" by any user.¹³

In addition, crypto-assets such as Bitcoin do not fulfil the essential requirement of e-money, which is to be redeemable. In fact, the possibility that, at the bearer's request, the e-money issuer redeems, at any time at its par value, the monetary value of the e-money held, is a condition that is not verified in the time of crypto-assets analysed in this paper.¹⁴

13. Regarding the specific case of Bitcoin, this crypto-asset can be "mined" i.e. obtained through an activity carried out by the user that consists in solving complex mathematical problems through appropriate hardware and software, and which is rewarded with new Bitcoins.

14. It should be noted, however, that the Court of Justice of the European Union (CJEU) ruled in Case C 264/14 (Hedqvist) that Bitcoin is a means of payment used in a similar way to means of payment with discharging value and, consequently, these transactions are subject to VAT, even if in practice exempted. See, for instance, Houben (2016).

Box 1**The new Payment Services Directive (PSD2) and the regulation of crypto-assets**

PSD2 was intended to respond to significant changes in the EU retail payments market by adapting the regulatory framework for the provision of payment services to the emergence of new types of services, such as "initiation of payment services" and "account information services". However, the definitions of payment service, payment order, payment instruments or funds have not changed significantly compared to the first Payment Services Directive (Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market, "PSD1"). In addition, without prejudice to some changes introduced by PSD2 to EMD2, the definition of e-money has also not changed. Thus, although the European legislator could have used PSD2 to consolidate the regimes for payment services and e-money and to regulate the issuance of crypto-assets, this step did not take place at that time. Given that PSD2 is a directive of maximum harmonisation, when transposing PSD2 into the Portuguese legal framework the national legislator also did not introduce changes to the regulatory framework for crypto-assets, remaining aligned with the Union's position at the time to not regulate their issuance and use.

*3.1.2. Prevention of money laundering and financing of terrorism**3.1.2.1. The 5AMLD*

On 19 June 2018, Directive (EU) 2018/843 ("5AMLD") was published, amending Directive 2015/849 on the prevention of the use of the financial system for the purpose of prevention of ML/FT ("4AMLD").

"Virtual currency" is defined in Article 1(2)(d) of the 5AMLD as a digital representation of value that is not issued or guaranteed by a central bank or a public authority, is not necessarily attached to a legally established currency and does not possess a legal status of currency or money, but is accepted by natural or legal persons as a means of exchange and which can be transferred, stored and traded electronically.

This definition has the merit of encompassing the different "virtual currencies", the current and future ones. This is the case not only because it presents itself as a technologically neutral definition – and, therefore, capable of accompanying *pari passu* the technological progress in this field – but, above all, because it is potentially applicable to the various possible uses of "virtual currencies". This is, moreover, highlighted by recital 10 of the 5AMLD, which states that "although virtual currencies can frequently be used as a means of payment, they could also be used for other purposes and find broader applications such as means of exchange,

investment, store-of-value products or use in online casinos. The objective of this Directive is to cover all the potential uses of virtual currencies".¹⁵

Among the main changes introduced by the 5AMLD is the inclusion of the providers of exchange services between "virtual currencies" and fiat money¹⁶ (typically named "exchangers") and of custodian wallet providers¹⁷ in the list of entities obliged to comply with the provisions of the Directive.

Both service providers must be registered with the respective competent authority and those who occupy management positions in those providers or who are their effective beneficiaries shall be subject to a fit and proper assessment.¹⁸

In carrying out their respective activities, both service providers must define and implement policies, procedures and controls that are appropriate to effectively manage the ML/FT risks to which they are (or will be) exposed, as well as to comply with the AML/CFT duties.

The inclusion of those service providers in the scope of the 5AMLD thus resolves – albeit only partially – the anonymity that, as a rule, is associated with crypto-assets since, as "obligated entities" in the provision of crypto-assets services, those entities will have to apply know-your-customer (KYC) and other customer due diligence (CDD) measures (cf. Articles 10 and following of the 4AMLD). It is also essential to stress the obligation, to which those providers are now bound, to report suspicious transactions to the relevant Financial Intelligence Unit, in line with Article 33 of the 4AMLD.

However, as has been said – and without prejudice to the essentiality of the contribution made by the 5AMLD – the question of the anonymity (total or

15. The definition of "virtual currency" given in the proposal for a Directive submitted by the European Commission (COM (2016) 450 final) was different, with the emphasis on the fact that it was limited to the use as a means of payment: "a digital representation of value which has not been issued by a central bank or a public authority, nor is it necessarily linked to a fiduciary currency, but which is accepted by natural or legal persons as a means of payment and can be transferred, stored or traded by electronic means". However, the contributions of the ECB, which have been incorporated into the text of the Directive, are essential to the definition that has come to be accepted by the 5AMLD. First, the ECB argued that "virtual currencies" do not qualify as currencies from a Union perspective. In accordance with the Treaties and the provisions of Council Regulation (EC) No 974/98, the euro is the single currency of the Union's economic and monetary union, i.e. of those Member States which have adopted the euro as their currency. Therefore, the ECB recommended defining "virtual currencies" in a manner that explicitly clarifies that these are not legally established currencies or money. Second, given that "virtual currencies" are not in fact currencies, it is more accurate to regard them as a means of exchange, rather than as a means of payment. The DLT underlying many "virtual currency" schemes have a much broader application beyond payments.

16. It should be noted that despite the absence of a legal notion of fiat money, this includes, according to Recital 8 of the 5AMLD, "coins and banknotes designated as legal tender and electronic money of a country, accepted as a means of exchange in the country of issue".

17. They are defined under Article 1(2)(d)(19) of the 5AMLD as those who provide private cryptographic key safeguard services on behalf of their clients to hold, store and transfer "virtual currencies".

18. See Article 47 of the 4AMLD, as amended by the 5AMLD.

partial) for certain crypto-assets, which are particularly suited to use for illicit purposes, has not been fully resolved.¹⁹ First, the 5AMLD does not cover certain operations involving crypto-assets, such as direct exchange between crypto-assets, the acquisition of goods and services with crypto-assets without involving the exchange with fiat money or the use of custodian wallet providers. Second, certain relevant players in the crypto-assets market have not been included in the list of obligated entities, such as, for example, mining and trading platforms.

Nevertheless, in the light of the minimum harmonisation of the provisions of the 4AMLD,²⁰ Member States may decide to include such operations or those players in the scope of their national AML/CFT legislation.²¹ However, it is important to bear in mind that the transnational dimension of the crypto-assets phenomenon may impact, to a greater or lesser extent, the effectiveness of the national measures adopted.

3.1.2.2. Recommendation 15 of FATF

Through its Recommendation 15,²² the Financial Action Task Force ("FATF") issued global, binding standards to prevent the misuse of virtual/crypto-assets for ML/TF, as it determines that "to manage and mitigate the risks emerging from virtual assets, countries should ensure that virtual asset service providers are regulated for ML/FT prevention purposes, and licensed or registered and subject to effective systems for monitoring and ensuring compliance with the relevant measures called for in the FATF Recommendations".

FATF defines "virtual assets"²³ as "a digital representation of value that can be digitally traded, or transferred, and can be used for payment or investment purposes. Virtual assets do not include digital representations of fiat currencies, securities and other financial assets that are already covered elsewhere in the FATF Recommendations".

For the purposes of the FATF Recommendations, "virtual asset service providers" include "any natural or legal person who is not covered elsewhere under the Recommendations, and as a business conducts one or more of the following activities or operations for or on behalf of another natural or legal person: (i) exchange between virtual assets and fiat currencies; (ii) exchange between one or

19. This is highlighted in Recital 9 of the 5AMLD, where it is even stated that "much of the virtual currency context will remain anonymous".

20. According to Article 5 of the 4AMLD, "Member States may adopt or retain in force stricter provisions in the field covered by this Directive to prevent money laundering and terrorist financing, within the limits of Union law".

21. See Articles 4 and 5 of the 4AMLD.

22. As amended in the October 2018 Plenary Session.

23. The FATF has therefore adopted a different (broader) designation from that used by the 5AMLD ("virtual currency").

more forms of virtual assets; (iii) transfer of virtual assets; (iv) safekeeping and/or administration of virtual assets or instruments enabling control over virtual assets; and (vi) participation in and provision of financial services related to an issuer's offer and/or sale of a virtual asset".

However, although they go beyond the scope of 5AMLD in this matter, FAFT recommendations are also not applicable to all "virtual activities" and players (e.g. the mining activities), focusing mainly on the provision of services analogous to financial services.

3.1.3. Law No. 83/2017 of 18 of August

With the aim of transposing the 5AMLD, Law No. 83/2017 of 18 August was amended by Law No.58/2020, of 31 August. Among other changes, Law No. 83/2017 now includes (some) virtual assets services providers (VASP) as obliged entities to comply with the AML/CFT duties.²⁴ Under the new regime, Banco de Portugal is the national authority responsible for registering and supervising VASP (only) for AML/CFT purposes.

In this matter, the option taken was a transposition that goes beyond the minimum required by the 5AMLD, as are subject to the national AML/CFT rules not only those providers engaged in exchange services between virtual assets and fiat money and custodian wallet providers, but also those providing exchange services between one or more forms of virtual assets and transfer of virtual assets.

3.2. International regulatory framework

3.2.1. At European Union level

For several European Union (EU) Member States analysed (e.g. Germany, Spain, France, Ireland, Italy, Luxembourg and the United Kingdom) crypto-assets do not meet the essential functions of money (store of value, unit of account and medium of exchange). In certain circumstances (e.g. in the context of ICO) crypto-assets are considered as financial instruments where investment rights or expectations are in place. The characteristics of the instrument in question are analysed on a case-by-case basis to determine the applicable legal framework, if any.

European authorities identify multiple risks associated with crypto-assets, namely the risk of total loss of investment, fraud and ML/FT. In order to mitigate and prevent existing risks, national supervisors have been proactive in issuing warnings and recommendations to financial institutions, investors and the general public, often echoing warnings issued by European supervisory authorities. As a rule, these alerts highlight the high risk that crypto-assets have for users and the fact that they do not offer any degree of protection, as: i) they are not guaranteed

24. See in particular Article 2 (1)(II) and (mm), Article 4(1)(o) and Articles 112.-A and 112.-B.

by a central bank or a national authority; ii) they are not legal tender; iii) they are not guaranteed by any tangible asset; and iv) they are not regulated at European level.

It appears that in some Member States, progress has been made or is being made towards the need for authorisation, registration or reporting by entities providing crypto-assets services to a national authority (e.g. France and Italy), with one of the main objectives being to address ML/FT risks. One of the jurisdictions analysed adopted a more restrictive approach, by prohibiting investment in this type of asset by certain types of investors, such as pension funds (Luxembourg). Malta adopted three laws on technological innovation in the financial sector in 2018, one of which (the “Virtual Financial Assets Act”²⁵) aims at regulating not only ICOs but also the intermediation of other crypto-assets.

In any case, it can thus be observed that, to date, there is no uniformity as regards the legal and regulatory framework applicable to crypto-assets-related services and providers, the majority of these entities and players being outside the scope of supervision by national authorities. Many Member States and their competent authorities consider that crypto-assets should be subject to internationally harmonised regulation and supervision, given the essentially cross-border nature of mining and intermediation activity.

In this context, by the end of 2019, the European Commission launched a public consultation on a possible EU regulatory framework for crypto-assets. For crypto-assets that are covered by EU rules by virtue of qualifying as financial instruments under the Markets in Financial Instruments Directive – MiFID II²⁶ – or as electronic money under the EMD2, the Commission has screened EU legislation to assess whether it can be effectively applied. For crypto-assets that are currently not covered by the EU legislation, the Commission is considering a possible proportionate common regulatory approach at EU level to address, inter alia, potential consumer/investor protection and market integrity concerns. The second set of crypto-assets include the so-called “stablecoins” which incorporate features aimed at stabilising their ‘price’ (the value at which consumers can exchange them). The outcome of this public consultation should provide a basis for concrete and coherent action, by way of a legislative action. This led the Commission to publish, on 24 September 2020, a proposal for a Regulation on markets in crypto-assets, which is, at the time of the publication of this paper, still under discussion, which is the reason why it is not taken into account in our analysis.²⁷

25. Available at <https://www.mfsa.com.mt/fintech/virtual-financial-assets/guidance/financial-instrument-test/>

26. Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU.

27. The Commission proposal for a Regulation on markets in crypto-assets is available here: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020PC0593>.

3.2.2. *At third countries level*

In line with the Member States of the EU, for the several third countries analysed (e.g. China, South Korea, the United States of America, Japan, Russia, Singapore and Switzerland) crypto-assets do not fulfil the traditional functions of money and are not legal tender in their respective countries.

Most authorities in these jurisdictions have warned about the various risks associated with the transaction of crypto-assets, although they have taken different approaches, either to restrict or even prohibit activities related to crypto-assets or to create specific regulatory frameworks to cover these activities.

On the one hand, some jurisdictions prohibit the use of crypto-assets as underlying assets of financial instruments, or prohibit any activity related to crypto-assets by institutions belonging to the financial system (South Korea and China, respectively).

On the other hand, in some countries, providers of crypto-assets exchange services are subject to registration and must comply with obligations related to user protection and ML/FT prevention (Japan), or the exercise of activities associated with crypto-assets require a specific authorisation (New York State with the so-called BitLicense), being the authorised entity subject to compliance with capital requirements, supervision rules, consumer protection duties, among others. One of the most crypto-assets "friendly" jurisdictions, Switzerland, intends to become a "Crypto Nation", allowing the development of "crypto-assets" related activities (which are considered a means of payment, although different from e-money), subjecting them, on a case-by-case basis, to a banking license.

Other jurisdictions are also attentive to the phenomenon by monitoring its developments and/or preparing the issuance of regulations applicable to crypto-assets through their integration in the scope of payment services (Singapore) or in civil legislation (Russia).

Despite these national initiatives, several of the jurisdictions analysed also highlight the need for coordinated action at international level to define a common regulatory framework.

4. **Crypto-assets main risks**

Technological developments, the offer of innovative products and services and the emergence of new entities, namely FinTechs, fostered the need to deepen central banks and financial supervisors' knowledge on the interplay between technology and financial services. As a result, studies have been published and warnings have been issued to consumers, investors and the financial system in general, detailing the multiple risks related to crypto-assets. In particular, these risks can be associated with entities that are not regulated or supervised by any public, national, European or other authority.

Monitoring financial activities and issuing, when justified, guidelines and recommendations with the objective of promoting the security, reliability and soundness of the financial system, the protection of consumers and the convergence of regulatory practices, fall within the responsibilities of central banks and financial supervisory authorities.

On this subject, ECB (2019) considered the risks to the Eurozone's financial stability, monetary policy, payments and market infrastructures to be limited or "manageable". Firstly, the ECB assessed the crypto-assets' market as relatively small in the euro area, notwithstanding the need to monitor this market and its interrelations with the financial system, given that the prudential regulatory framework applicable to credit institutions does not provide specific rules on this matter.²⁸ The risks to monetary policy were also considered to be reduced, as crypto-assets do not fulfil the functions assigned to money and do not have a tangible impact on the real economy. Should crypto-assets, such as, for instance, "stablecoins", be perceived as a credible substitute for money and deposits, there could be a risk for monetary policy. Finally, also no major risks for payments and financial market infrastructures were identified.

Nevertheless, in areas outside of the scope of the ECB's paper, it concluded that other risks, such as the risks for ML/FT and consumer protection, may already have materialised and justify continuous monitoring of the future implications of crypto-assets for the stability and efficiency of the EU financial systems and financial market infrastructures.

It is intended, at this point, to reflect on the main risks underlying the use of crypto-assets, not exhausting the list of associated risks, but highlighting those that assume greater preponderance.

28. One of the risks identified by the ECB concerns the supervision and prudential treatment of crypto-assets. The volatility associated with crypto-assets leads to a difficulty in defining the applicable accounting treatment. However, the possible qualification of crypto-assets as intangible assets may result that, from a prudential point of view, exposures to these assets are deductible from own funds portfolio, in this case, CET1.

Note that the interconnection with the financial system can take place in several ways, such as through direct investments, derivatives, indirect investments (through investment portfolios) or the granting of credit for the acquisition of crypto-assets. The current regulatory framework, namely CRD4 (Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC) and CRR (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), does not have specific rules regarding crypto-assets, either in terms of managing the risk, whether in the context of the assessment and adequacy of internal capital (ICAAP) or the liquidity coverage ratio (LCR). ECB (2019) mentions, however, that if the risks prove to be relevant, the ECB intends to update its supervision tools, without prejudice to the fact that, within the scope of the analysis and evaluation process for supervision purposes (SREP), it is already possible to carry out a holistic risk analysis (credit, counterparty, market, operational, government, solvency and liquidity) and propose the necessary measures to adequately adjust risks that are not provided for in pillar 1.

4.1. Volatility risk

One of the main risks identified by most studies and warnings, in particular the warnings issued by the supervisory authorities of EU Member States and by central banks, including the ECB, concerns the volatility of crypto-assets, which is measured by the fluctuation or standard deviation of their value or profitability: the difference between how much the asset has cost and how much it is worth at the time of use, in relation to a fiat currency.

As crypto-assets are not denominated in any fiat currency, their value is typically more unstable, exposing the holders to the risk associated with the fluctuation (speculative or not) of the market value.

Particularly in the case of crypto-assets' models with bidirectional flow,²⁹ there is a risk that the value of a commercial or investment operation involving a crypto-asset will be affected by changes in the conversion into fiat currency ("exchange rate" risk). It should be noted that some crypto-assets are based on an archetype characterised by a limited number of units issued and not indexed to a sovereign currency with legal tender, which carries a greater risk of speculation which, in turn, may cause relevant price volatility.

In this regard, it should be noted that the issuance of crypto-assets based on the referred model, obtained through "mining activity", has an inherent deflationary nature. However, taking into account that the pace of issuing crypto-assets is slower than that of legal tender currencies (due to the slow pace of mining activity), there has been, at same points in time, an increasing appreciation of some crypto-assets based on this model, due to the relatively high volume of exchanges, where demand has exceeded supply.

The vast media coverage, the reaction of the regulatory and supervisory authorities and their respective communication efforts, the speculations inherent to the transactions, the risk of hacking and the closing of exchange platforms highlighted the risk of crypto-assets' price volatility.

"Stablecoins", defined as digital units of value that rely on a set of stabilisation tools to minimise fluctuations in their price against a currency or basket, have emerged as a type of crypto-asset aimed at reducing the volatility risk. To maintain the stability of their value, some "stablecoins" pledge to hold funds and/or other assets against which "stablecoins" holdings may be redeemed or exchanged (ECB, 2020).

4.2. Operational risk

The acquisition of crypto-assets can be carried out through direct purchases or through trading platforms. These platforms include portfolios ("wallets") of crypto-assets not regulated or supervised at national or European level.

29. Models in which users can buy and sell crypto-assets according to an exchange rate to fiat currency. These models allow the purchase of both real and virtual goods and services.

Crypto-assets are particularly exposed to operational risks, such as cyber security attacks (which can occur at the individual level, due to the loss or theft of private cryptographic keys or user credentials, or on a wider scale, e.g. via the interruption or invasion of the technical infrastructure) and systems unavailability, due to their high dependence on IT and network infrastructures. There is a wide spectrum of risks, from technical failures of trading platforms to hacking of crypto-assets portfolios, which can cause large losses for investors. Contrary to the case of central banks in what regards legal tender currencies, in the case of crypto-assets there is not a competent authority in place to ensure supervision or superintendence to mitigate those risks.

Due to the opaque nature of crypto-assets' models, the lack of regulatory safeguards and the complexity of the inherent technology, holders are more vulnerable to theft and fraudulent investment schemes carried out through digital platforms. Crypto-assets are generally designed to reproduce fiduciary currency transactions, and are usually stored in wallets. These portfolios have specific security features, with passwords to access the units of value existent in the portfolios. However, the referred passwords can be stolen, as well as the units of value in the portfolios, with no tool in place that allows to recover the units of value due to several factors, including the robustness and resilience of the computer implementations

4.3. Regulatory risk and risk of the absence of a regulatory framework

As already mentioned in this paper, regulators, supervisors and other authorities do not have a common approach in relation to crypto-assets and associated activities' regulation. Furthermore, crypto-assets infrastructures, in contrast to traditional payment systems, are not regulated, lacking an adequate legal structure, as well as a clear definition of the rights and obligations of the parties. Key concepts of payment systems, such as settlement, are also not clearly defined.

The legal uncertainty surrounding these activities is a challenge for the authorities, which made an effort to promote public information on the risks associated with crypto-assets, namely by issuing warnings to consumers to highlight that crypto-assets are not subject to regulation and therefore do not benefit from any public guarantee regarding their investment.³⁰

According to Carney (2018) and in the wake of Demertzis and Wolf (2018) study on the possible need for a regulatory framework, authorities may follow one of three possible approaches in relation to this issue: to isolate, integrate or regulate.

30. See, for instance, the joint European Supervisory Authorities warning on virtual currencies (available at <https://eba.europa.eu/documents/10180/2139750/Joint+ESAs+Warning+on+Virtual+Currencies.pdf>), followed by a similar warning by the Portuguese National Council of Financial Supervisors (available at <https://www.bportugal.pt/sites/default/files/anexos/comcnsf20180705.pdf>).

The option to isolate, which advocates the exclusion of crypto-assets from the financial system, namely through their ban, may have the advantage of preventing any risk contamination to the traditional financial system. This approach may also help to prevent consumers with a conservative risk profile and institutional investors from investing in these types of assets (European Parliament, 2018). Nevertheless, the disadvantages arising from not developing the technology underlying crypto-assets, which could be beneficial for the innovation of payment systems, should be taken into account (Carney, 2018; Demertzis and Wolf, 2018).

The approach that favours integration highlights the need to regulate the interface between crypto-assets and the financial system (Demertzis and Wolf, 2018), although it is not clear how this could be operationalised.

Finally, the regulation approach faces the difficulty to define what to regulate (the activity, the entity, or both), at what level (national, European, or international), and who should be the responsible supervisor, an issue that is particularly pressing in the EU, with the possibility that, in a Capital Market Union, the assignment may be given to a single supervisory authority/mechanism.

The decision to regulate requires a stable and simultaneously evolving definition of the concept of crypto-asset, in order to create legal certainty and security but, at the same time, not to crystallize in face of the technological innovation.

Enria (2018) raises some reservations both on the creation of a specific regulatory framework to crypto-assets and on the application of the existing framework to crypto-assets. Against the creation of a regulatory framework for crypto-assets it can be argued that it is not desirable to offer official recognition to this market, which is very heterogeneous, dynamic and therefore difficult to regulate and supervise, given all the risks it poses to consumers and the financial system.

However, the regulation of certain elements of the crypto-assets ecosystem may be the answer to tackle illicit activities, promote market integrity and safeguard the financial system. To this end, Carney (2018) argues that the crypto-assets' ecosystem should be subject to the same standards of regulation and supervision that are applied to the financial system: "being part of the financial system brings enormous privileges, but with them great responsibilities".

According to ECB (2019) "given the global dimension of the crypto-assets phenomenon, uncoordinated and/or inconsistent regulatory approaches undertaken at the country level may prove ineffective and create incentives for regulatory arbitrage. Whilst this need not pose an immediate threat to the financial system, it calls for vigilance at the level of the EU, to prevent a proliferation of national initiatives from triggering regulatory arbitrage and, ultimately, hampering the resilience of the financial system to crypto-asset market based shocks".

Taking into account the decentralised and cross-border dimension of crypto-assets' related activities and in order to ensure that the players operate on a level playing field, the definition of a possible regulatory framework should be made, desirably, at least at the European level. It is in this context that, following the consultation launched by the end of 2019, the European Commission launched a

proposal for a possible EU regulatory framework for crypto-assets, which is still under discussion.

4.4. *Anonymity and ML/FT risk*

The risk of crypto-assets being used for criminal purposes, especially ML and FT depends, to a large extent, on the degree of anonymity (or pseudo anonymity) they provide and on the predisposition to their widespread acceptance, in particular, in cross-border transfers.

Certain crypto-assets are only apparently anonymous, which means that it is possible for authorities to discover the identity of users. However, this way of identifying users is complex and costly to become the universal answer to address the anonymity issue.

Crypto-assets represent a double risk in terms of criminal offenses, since they facilitate the practice of the underlying crime and serve as a tool for the laundering of the results of said crime. The fact that the flow of crypto-assets schemes occurs on the internet and their use is dematerialized and anonymous leads to the expansion of some forms of ML.

As explained previously, at EU level, with the 5AMLD, providers engaged in exchange services between crypto assets and fiat money and custodian wallet providers are now obliged to comply with AML/CFT rules, including to perform KYC and other CDD measures to clients and operations and to report suspicious transactions to the national Financial Intelligence Unit. However, as the Directive leaves out of its scope a large part of the universe of transactions with crypto-assets and relevant players in this market, a large part of the risks for ML/FT associated with the use of crypto-assets remain to be mitigated.

In this scenario, FATF Recommendation 15 proves to be essential, as it applies to a wider range of crypto-assets activities and providers. Furthermore, taking into account the international dimension of the FATF's action and considering that the members of that body are bound to comply with its recommendations, Recommendation 15 represents a step forward in the search for solutions in this matter.

4.5. *Tax evasion risk*

The sale, exchange and holding of crypto-assets is associated, at present, to the uncertainty regarding the taxation of its income. Crypto-assets transactions could be subject to taxation, however, tax authorities are unaware of the parties involved due to the aforementioned anonymity of transactions, which makes crypto-assets a means of payment especially exposed to tax evasion.

In the current European legal framework, there are no specific rules that require removing the anonymity associated with crypto-assets. The currently existing rules assume knowledge of the taxable base, so, in the absence of this knowledge, which

is enhanced by the anonymity that characterises crypto-assets, it is not possible to encourage the exchange of information for tax purposes.

Anonymity combined with tax evasion practices may lead to crypto-assets providing havens or alternatives to non-cooperative jurisdictions for tax purposes (offshores).

4.6. Risk arising from the absence or deficiency of information

The ECB, the IMF and the EBA have all expressed concerns that crypto-assets' risks especially affect consumers with low levels of financial literacy.

In fact, uninformed consumers or those with low financial and digital literacy can easily be deceived by the prospects of a high return, neglecting the complexity and volatility that are inherent to crypto-assets and, sometimes, be unaware that their level of protection is very limited or non-existent and their investments are not covered by guarantee funds, remedies or compensation mechanisms. In addition to the above, the issuance and exchange of crypto-assets is not an activity regulated or supervised by most jurisdictions.

Uninformed consumers or those with low levels of literacy may be especially vulnerable to: products that do not suit their characteristics and needs; risks associated with fraudulent activities and cybercrime; infrastructure failures and disruptions in service providers' systems related to crypto-assets (for example, trading platforms and crypto-assets portfolio providers) and the immaturity of market structures. Although the characteristics and digital nature facilitate their access to the general public, the ease of access also exposes a greater number of consumers to risks. Decentralised crypto-assets are especially problematic, as it is not clear who has an obligation to provide information to users.

This lack of transparency can be easily exploited for fraudulent purposes and mislead users in assessing the risks and the value of crypto-assets. There is, specifically, the risk of uninformed users investing in units of a crypto-asset or deciding to incur credit to extract financial return from mining activity.

In this context, central banks, as promoters of financial literacy, should inform the public with due clarification of the differences between fiat currency and crypto-assets and the respective risks that the latter entail as a means of payment of goods and services and/or for investment activities.

5. Conclusions

In this paper we have differentiated the concepts of "money", "currency" and "crypto-asset". We have looked into the regulatory framework currently framing (or still lacking to frame) crypto-assets related activities and/or players.

We have identified some of the major risks of crypto-assets, namely volatility, operational, tax evasion, ML/FT and information deficiency risks and have concluded for the adequacy of a common regulatory framework, as foreseen by the

current work of the European Commission, although the option to regulate entails certain risks that should be mitigated. Features like decentralisation, anonymity and lack of supervision increase users vulnerability to potential losses arising from crypto-assets' activities.

The analysis made in this paper is subject to change. Banco de Portugal should continue to monitor crypto-assets' markets and players, in particular given the evolving nature of this type of "assets", following the analysis and developments at European level. As a future avenue for analysis, a deeper assessment of specific sets of crypto-assets, such as the so-called "stablecoins", could be pursued, in line with what the Eurosystem has recently done.³¹

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