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For discussion

Draft Guidance Note on The Recording of Non-Fungible Tokens (NFTs) in Macroeconomic Statistics

Prepared by the Digitalization Task Team (DZTT)

SNA/M4.22/21

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Agenda item: 21
Digitalisation Task Team - Draft guidance note on
The Recording of Non-Fungible Tokens (NFTs) in Macroeconomic Statistics

This guidance note (GN) discusses the recording of a specific type of crypto asset -- non-fungible tokens (NFTs) -- in macroeconomic statistics. The NFTs record the rights assigned to the NFT owner and are distinct from the associated asset or product. Accordingly, the classification of NFTs in national accounts should be based not on the characteristics of the associated asset or product but instead on the rights that are embedded in the NFT. The NFT could, based on the rights it conveys, be classified as consumption, as a type of asset, or as neither (assuming the associated asset or product is already recorded). NFTs that are assets could reasonably be classified as a type of non-produced nonfinancial asset, similar to contracts, licenses, and leases. The recognition and proper classification of NFTs is likely to lead to numerous measurement challenges because of limited source data.

Questions for the AEG

Q.1. Does the AEG agree with the proposed categorization of NFTs into:

a. NFTs that only grant personal use and display rights

b. NFTs that grant limited commercial rights

c. NFTs that grant full ownership rights?

Q.2. Does the AEG agree with proposed recording of NFTs?

a. NFTs that only grant personal use and display rights: recorded as consumption;

b. NFTs that grant limited commercial rights: recorded as assets (contracts, licenses, or leases) if the owner can derive economic benefits from these rights (e.g., some form of royalties);

c. NFTs that grant full ownership rights: should not be separately recorded, assuming that the associated assets or products have already been counted.

Q.3. Does the AEG agree to submit this GN to global consultation?

Draft Guidance Note on

The Recording of Non-Fungible Tokens (NFTs) in Macroeconomic Statistics[1]

INTRODUCTION

1. Crypto assets are digital representations of value that rely on cryptography and decentralized peer-to-peer architecture based on distributed ledger technology (DLT), which enables two parties to directly transact with each other without the need for trusted intermediaries. Because crypto assets have proliferated in recent years, as they may fulfil different roles in the economy, and as users want separate information on distinct types of crypto assets, developing a sufficiently granular classification of crypto assets is important for national and international accounts.

2. This GN is the latest of several efforts to address the treatment of crypto assets. The IMF and the OECD started to explore the measurement and taxonomy of crypto assets in 2018, mainly focusing on fungible crypto assets, i.e., those that are divisible and non-unique. Discussions took place at the meetings of the IMF Committee on Balance of Payments Statistics,[2] the OECD Working Party on Financial Statistics (WPFS),[3] and the Advisory Expert Group (AEG) on National Accounts, leading to interim guidance on the recording of these types of crypto assets in macroeconomic statistics and an IMF paper that was published in 2019.[4] The OECD further explored the issue and released updated proposals in 2020.[5]

3. A recent GN, "F.18 The Recording of Crypto Assets in Macroeconomic Statistics,"[6] included updated discussions on the recording of fungible types of crypto assets. This category includes crypto assets that are designed to act as a general medium of exchange, which can be with or without a corresponding liability. Those with a corresponding liability include those that are issued by a monetary authority (e.g., central bank digital currencies) or that are not issued by a monetary authority (e.g., stablecoins with a claim on the issuer). Crypto assets without a corresponding liability include those designed to act as a general medium of exchange (CAWLM, e.g., bitcoin) and those designed to act as a medium of exchange within a platform only (CAWLP). Other types of fungible crypto assets include security tokens, which can be debt security, equity, or derivative tokens.

4. As stated in GN F.18, there is consensus among the international statistical community that crypto assets with a corresponding liability should be recorded as financial assets, but no consensus has yet been reached on the recording of CAWLM and CAWLP. The GN presents a few recording options (focusing on financial, nonfinancial produced, and nonfinancial nonproduced assets) for these crypto

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[1] Prepared by Allison Derrick and Robert Kornfeld (United States Bureau of Economic Analysis) and John Mitchell, Itai Walk and Jorrit Zwijnenburg (OECD).

[2] https://unstats.un.org/unsd/nationalaccount/aeg/2018/M12_3e_Cryptocurrencies_IMF.pdf

[3] https://unstats.un.org/unsd/nationalaccount/aeg/2018/M12_3e_Cryptocurrencies_OECD.pdf

[4] https://www.imf.org/external/pubs/ft/bop/2019/pdf/Clarification0422.pdf

[5] https://community.oecd.org/docs/DOC-176257

[6] https://unstats.un.org/unsd/nationalaccount/RAconsultation.asp?cID=30

assets along with their pros and cons. The BOPCOM and AEG are likely to take a decision on this issue in their joint meeting in October 2022. *[Note: the text in this paragraph will be updated to take into account any decision taken, before the note is issued for global consultation]*

5. Because these issues were sufficiently complex for one GN and as these all concerned fungible types of crypto assets that are quite different from non-fungible tokens, GN F.18 recommended that the classification of NFTs be addressed in a separate guidance note. This current GN addresses this need and provides guidance on the recording of NFTs.

BACKGROUND: WHAT ARE NFTs?

6. Non-fungible tokens (NFTs) are digital records hosted on a blockchain that are associated with a digital or physical asset, and which may serve a functional purpose. An NFT is distinct from the associated asset and should not necessarily be recorded in the same way. In this regard, the association may come in different forms dependent on the specific rights embedded in the NFT. This may range from full ownership rights with regard to the underlying asset, to being entitled to some future benefit streams regarding the asset, to only being entitled to personal use of the underlying asset. Like fungible crypto assets, an NFT is hosted on a blockchain and relies on DLT to record the creation and transfer of the NFT but differs in that it reflects rights with regard to a unique (or semi-unique[7]) digital or physical asset.

7. NFTs are relatively simple to create for those with the necessary coding skills, though many platforms that provide NFT marketplaces also offer services that assist potential issuers, usually for a small fee or free of charge. The figure below illustrates the information recorded in an NFT. Except for the current owner, the on-chain information cannot be changed once the NFT is issued. In theory, a digital asset and/or license agreement associated with an NFT can be stored on-chain, but usually the cost is too high and/or storage capacity is limited by the blockchain software. The off-chain information can be altered or removed by the NFT issuer at any time,[8] dependent on the arrangement of the rights embedded in the NFT. This stresses the importance of carefully assessing the specific rights as laid down in the NFT in order to decide on their classification.[9]

8. NFTs and other fungible crypto assets are traded in a similar fashion. Regardless of the licensing agreement attached to the NFT, the NFT owner has full control over the NFT itself and can sell it at any

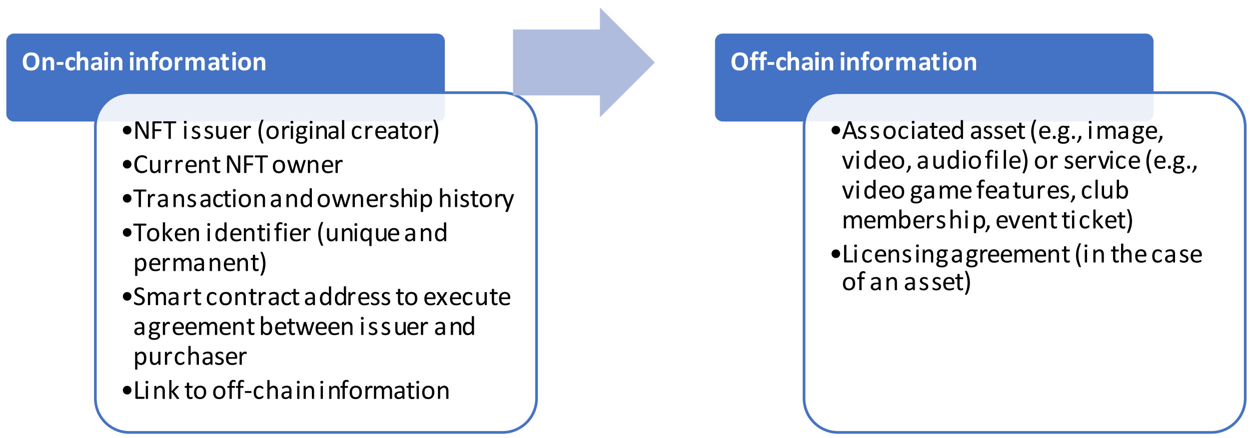
[7] Related to NFTs are semi-fungible tokens (SFTs), which are semi-interchangeable with each other. For example, at a Broadway play, a front-row seat may be interchangeable with the seat directly beside it in some cases, but not interchangeable with a seat in the back row. SFTs involve similar conceptual issues as NFTs and are not distinguished in this note.

[8] For example, the NFT collection Moonbirds originally advertised on its website that NFT holders "own the IP." However, in August 2022, PROOF Collective, Moonbirds' owner, changed to a Collective Commons license; now, the digital assets associated with Moonbird NFTs are in the public domain and NFT holders have no special rights. This change happened without notice or permission of NFT holders. See "A Survey of NFT Licenses: Facts and Fictions" by Galaxy Digital Research for more information.

[9] It is important to note that the legal status of NFT licensing agreements is uncertain in many jurisdictions, so even if rights are conveyed by an NFT, it is unclear whether those rights will be protected by a court and whether the issuer has the standing to sell those rights. See an academic article on regulating smart contracts (Ferreira, 2021), an article on NFT intellectual property lawsuits (Geron, 2022), and a Forbes news article on smart contracts and the law (Herpy, 2022) for more information on this evolving topic.

time for any price. The actual record of ownership is recorded on a blockchain, and transfers are finalized when a block is validated by the miners or validators on a blockchain network. Ethereum and Solana are popular choices of blockchains for NFT issuers. Also, like other crypto assets, NFTs are most often traded on third-party platforms, which create a marketplace for buying and selling NFTs and execute trades on the blockchain for their customers. Because an NFT can only be traded for another crypto asset, an NFT buyer usually must pay with the crypto asset native to the blockchain the NFT is hosted on (e.g., Ether if the NFT is hosted on the Ethereum blockchain).

9. A special feature of NFTs is the ability for the issuer to collect a percentage of future sales. This is an optional feature that is possible with all NFTs through the embedded smart contract, and so must be determined when the NFT is issued.



10. It is expected that in the future most uses of distributed ledger technology will take the form of NFTs. For example, blockchain-based identity systems would require unique records similar to NFTs, as would blockchain-based medical records, supply chain logistics, and other records that need to be private and secure. These are all just new applications of DLT, and the underlying service already has a defined treatment in the SNA and BPM.

11. There are many types of NFTs, but they generally can be categorized according to the rights conferred upon the NFT owner:

1. Personal use and display rights to the associated digital or physical asset
2. Some commercial rights, or other rights beyond personal use but short of full ownership, to the associated digital or physical asset
3. Full ownership of an associated digital or physical asset

1. NFTs that only grant personal use and display rights

12. In many cases, owning an NFT confers only a limited personal use and display license to the associated asset. Instead, the owner of the associated asset, which may often be the issuer of the NFT, usually retains copyrights, intellectual property rights, or other commercial rights. Often the associated asset is a digital file that is hosted online, either in a centralized or decentralized location. This digital file can contain image, video, or audio files. Because the associated asset is often a digital file, NFT owners display the associated content online. For example, Twitter, Instagram, and Facebook are testing features

that allow users to display online content associated with an NFT after verifying users' ownership.[10] These use and display rights are similar to those given to the purchaser of physical artwork. The purchaser of an NFT associated with digital artwork has the right to display the art, hold the NFT as an investment, and sell the NFT for a profit or loss in the future, while the artist retains all commercial and IP rights to the art.[11] Though owning these types of NFTs is not equivalent to owning the associated asset, they do arguably derive their value based on the characteristics of that asset, such as rarity and popularity, which vary in importance across individuals. In short, like other goods and services, certain NFTs of this type may appeal to some individuals and not others.

13. An example of NFTs that only convey limited personal use and display rights are the NFTs associated with "Moments" owned and created by National Basketball Association (NBA). The website's terms and conditions describe these Moments as being "comprised of a photograph of one or more NBA players, a video of one or more NBA players, and a set of statistics that are associated with one or more NBA players. Each Moment has a defined set of attributes – including scarcity – that help determine the value of the Moment. […] The value of each Moment is inherently subjective in the same way the value of physical collectibles (e.g., an autographed poster) is inherently subjective. […] Some collectors might prefer to have a Moment featuring a certain NBA player, while another might prefer an equivalent Moment featuring a different NBA player. Each NBA player can have more than one Moment associated with them, and those Moments will each have different characteristics."[12] The NBA retains most of the rights associated with the content of the Moment, though the owner of the NFT associated with the Moment has the right to use, copy, and display the content on a personal basis, as well as sell the NFT to others. The most expensive NFT from this collection sold for $400,000 and was associated with the video clip of LeBron James' dunk in tribute to Kobe Bryant.

2. NFTs that grant limited commercial rights

14. NFTs can grant rights to an associated asset beyond personal use. For example, NFTs from the World of Women collection grant the NFT owner some intellectual property rights and commercial rights to the associated digital artwork. However, the NFT owner must abide by a moral clause with regards to using and commercializing the artwork, while also being prohibited from substantially altering the artwork or copying special attributes of the artwork that serve as a mark of the original artist.[13]

15. CryptoPunks are one the of the first and most famous digital assets that have been used in NFT collections. A composite image of all 10,000 punks is hosted online.[14] The NFTs, which are traded on the Ethereum blockchain, reference a punk according to its position in the image. The punks are differentiated from each other based on certain characteristics, some of which are rarer than others, and punks with more rare characteristics are generally more valuable. One of the most expensive punks was sold for 8,000 ETH ($23.7 million) in February 2022. It was considered especially rare because it

[10] https://www.coindesk.com/learn/nfts-on-instagram-how-to-show-off-your-digital-collectibles/

[11] Moringiello, Juliet M. and Odinet, Christopher K., The Property Law of Tokens (November 1, 2021). Florida Law Review (Forthcoming 2022), U Iowa Legal Studies Research Paper No. 2021-44, Widener Law Commonwealth Research Paper, Available at SSRN: https://ssrn.com/abstract=3928901

[12] https://nbatopshot.com/terms

[13] https://worldofwomen.art/about-us.html

[14] https://www.larvalabs.com/public/images/cryptopunks/punks.png

referenced one of the nine punks in the alien collection and one of 333 with a bandana. Currently, the license agreement issued by the CryptoPunks' owner, Yuga Labs, grants the NFT owner some commercial rights while retaining IP rights.[15]

3. NFTs that grant full ownership rights

16. NFTs can also be used to represent full ownership of an asset. In these cases, the NFT acts as a method of recording and verifying ownership, rather than acting as an independent asset itself. For example, in February 2022, a house in Florida was sold via an NFT.[16] Other real estate properties have been sold through NFTs in similar ways.[17]

17. Growing in importance are NFTs that act as features in the metaverse,[18] virtual reality, and blockchain-based games. These features could be an avatar used in these online experiences. NFTs can also be traded in blockchain games and give the owner access to special characters, fashion, virtual weapons, and other in-game accessories. These online platforms confirm ownership of the NFT before the associated virtual object can be used to ensure exclusivity of the object. NFTs in online games also address the issue of inflation by limiting the number of each object. An example of this type are the Pokémon-like characters called Axies from the blockchain game Axie Infinity. In the metaverse, NFTs can also be issued to represent ownership of virtual real estate in platforms like Decentraland and The Sandbox. These NFTs can be considered as recording and authenticating the purchase of gaming or other audio-visual products.

18. NFTs can be used as a method of selling and confirming the purchase of other services, such as membership in social clubs or access to events. A notable example of this type of NFT social club is Friends with Benefits, which describes itself as "a group of Web 3-focused thinkers, builders, creators, and friends," with more than 3,000 members. The club functions primarily online but sometimes hosts in-person events for members.

HOW SHOULD NFTs BE RECORDED?

19. As this overview shows, NFTs vary widely in the ownership rights they convey, and can be linked to a wide variety of associated digital and physical assets, goods, and services. There is no single way to classify all of these diverse NFTs in the national accounts. In developing a classification for NFTs, it is important to distinguish between the NFT and the associated asset or product. The NFT is a digital recording of rights to an associated asset or product and is distinct from that associated asset or product. Accordingly, the classification of NFTs in national accounts should be based not on the characteristics of

[15] The original creator of CryptoPunks, Larva Labs, granted NFT holders a license to use the associated punk on a personal basis. When Yuga Labs purchased the collection, they changed the license agreement to grant NFT holders some commercial rights. This example demonstrates (1) the associated asset's owner retains IP rights and (2) that NFT license agreements can and do change.

[16] https://www.tampabay.com/news/real-estate/2022/02/04/this-tampa-bay-home-is-being-sold-as-an-nft/

[17] Tokenization was reportedly achieved by transferring ownership of the house to a limited liability corporation (LLC). The NFT represented ownership of the LLC, so the NFT owner indirectly purchased the house.

[18] The metaverse is a virtual space, accessed via the Internet, in which they can interact with a computer-generated environment and other users.

the associated asset or product but instead on the rights that are embedded in the NFT. The purchase of an NFT could, based on these rights, be classified as consumption, as a type of asset, or as neither (assuming the associated asset or product is already recorded).

20. The 2008 SNA (European Commission et al., 2009) already discusses the treatment of most assets or products associated with NFTs, such as physical artwork, housing, event tickets, and club memberships. The only exception would be digital artwork, but these easily fit the definition of valuables as defined in the 2008 SNA.

21. Whilst there can be numerous challenges in measuring the associated assets and products, particularly when it concerns digital assets or products, the main focus of this GN is the theoretical treatment of the NFTs, a new topic in national accounts. A brief review of definitions of assets and asset categories in the 2008 SNA is helpful for determining options for classifying NFTs. This is done for each of the three categories mentioned above.

1. Do NFTs meet the asset boundary?

22. As the 2008 SNA states, an asset (paragraph 10.8) "is a store of value representing a benefit or series of benefits accruing to the economic owner by holding or using the entity over a period of time." "The economic owner of entities … is the institutional unit entitled to claim the benefits associated with the use of the entity in question… by virtue of accepting the associated risks" (paragraph 10.5). By this definition, some NFTs may be classified as assets.

1. NFTs that only grant personal use and display rights

23. NFTs that do not entail any ownership beyond personal use will not qualify as an asset, i.e., these NFTs confer only rights to use or display the asset. The asset may have already been placed in the public domain, and so the token confers no special rights upon the owner. Even if the NFT owner can sell the NFT, it may not be considered an asset; it would then just constitute second-hand trade in a same way that a person can sell clothes or books, etc. They are therefore not considered SNA assets because they are not used in production and/or they do not represent a store of value. This will only change if the NFT itself will become a valuable, but this is no different from any other (physical) consumer goods that may turn into collectibles over time (e.g., stamps).

24. NFTs that only grant personal use and display rights may be recorded as consumption For example, if the NFT grants personal use and display rights to a piece of digital artwork, the purchase of the NFT may be recorded as the purchase of artwork. The exact classification of each NFT purchase depends upon the associated asset, which likely has an existing category in the SNA. Classifying these NFT purchases as consumption also assumes they are produced – more on this below.

2. NFTs that grant limited commercial rights

25. NFTs that transfer rights beyond personal use (e.g., rental leases or commercial rights) may constitute an asset to the NFT owner when "its use can create some form of monopoly profits for its owner. When it is no longer protected or becomes outdated by later developments, it ceases to be an asset" (paragraph 10.98). Thus NFTs that convey partial rights to works of art or video clips may be an asset if the owner can derive economic benefits from these rights (e.g., some form of royalties). If this is not the case, the NFT would normally not be regarded as an asset, unless it becomes a valuable in itself,

which may be the case if the NFT has enough exclusivity, authenticity, or other features to give it sufficient market value relative to similar assets without these features.

3. NFTs that grant full ownership rights

26. NFTs that provide full ownership rights and are inseparable from the associated asset or product are merely a record of ownership of the associated asset or the product (an event ticket or membership). Assuming the associated assets or products have already been counted (e.g., as valuables, house, or consumption), there is no need to also record the NFT itself. By analogy, a household balance sheet should not value the deed for the house as equal to the value of the house itself, because the value of the house is presumably already recorded on the balance sheet. The Classification of Individual Consumption According to Purpose (COICOP 2018)[19] has consumption categories that are a good fit for these associated services, such as subscription to audio-visual content, streaming services and rentals of audio-visual content (08.3.9.2); rental of game software and subscription to online games (09.4.3.1); recreational and sporting services (09.4.6); or services provided by cinemas, theatres and concert venues (09.6.1).

2. What type of assets are NFTs that grant limited commercial rights?

27. The next decision is how to classify NFTs that grant limited commercial rights. Some NFTs may seem similar to valuables. Valuables are "produced goods of considerable value that are not used primarily for purposes of production or consumption but are held as stores of value over time. Valuables are expected to appreciate or at least not to decline in real value, nor to deteriorate over time under normal conditions" (para. 10.13 in 2008 SNA). This value is derived from artistic and/or sentimental reasons. They include "precious metals and stones, antiques and other art objects and other valuables. However, not all items that may be described by one of these titles should necessarily be included as a valuable in the balance sheet of the owner. The intent of the heading is to capture those items that are often regarded as alternative forms of investment" (para. 10.149). NFTs that convey limited commercial rights to works of art, video clips and images, music, and other artistic works seem in some ways similar in definition to valuables in the SNA.

28. However, the classification of some NFTs as valuables introduces several problems. It is important to recall the distinction between the NFT and the associated asset. If the NFT is merely a record of ownership of the valuable (similar to owning a house and the deed for the house), then the NFT should not be counted as an asset because the associated asset should already be counted on balance sheets. For that reason, NFTs providing full ownership rights are not regarded as assets themselves (see previous section). Furthermore, the owner of the NFT that confers limited rights to the associated asset does not actually own the asset, so it would make no sense to regard the NFT itself as a valuable. These would also not likely qualify as produced assets, because they require minimal labor and capital to create.

29. NFTs that grant limited commercial rights seem most similar to contracts, leases and licenses because they record specific rights conveyed to the NFT owner. The 2008 SNA treats contracts, leases and licenses as assets under two conditions (para. 10.186). First, the terms specify a price for the use of an asset or provision of a service that differs from the price that would prevail in the absence of the contract, lease or license. Second, one party to the contract must be able legally and practically to realize

[19] https://unstats.un.org/unsd/class/revisions/coicop_revision.asp

this price difference. The SNA recognizes four types of these assets (10.189). Marketable operating leases (10.190) are third-party property rights relating to fixed assets (such as a tenant who can sublet for a price higher than a fixed lease). The other three types are permits to use natural resources (10.191, such as a fishing quota that can be sold), permits to undertake specific activities (10.192), and an entitlement to future goods and services on an exclusive basis.

30. Some NFTs can be seen as similar to third-party property rights, a permit for a resource or for a specific activity, or a contract for an entitlement to future products, from which the owner of the NFT may derive economic benefits. Consequently, classifying NFTs as contracts, leases and licenses is a reasonable option for these NFTs.

OPTIONS FOR RECORDING NFTs?

31. As this discussion suggests, the correct classification of an NFT differs for different types of NFTs, and ultimately depends on the (ownership) rights conveyed by the NFT. NFTs may be usefully divided into three broad categories based on their ownership rights:

- 1:NFTs that convey *no* ownership rights and only allow for personal use of another asset
- 2:NFTs that convey *some* rights beyond personal use for another asset or commodity
- 3:NFTs that convey *full* ownership rights for another asset or commodity

1. NFTs that only grant personal use and display rights

32. For the first type of NFT that only allows for personal use of another product or asset (usually a digital valuable), the classification of the NFT depends on the rights embedded in the NFT, and some judgment is required. Some of these NFTs may be recorded as consumption. If, over time, an NFT gains more features of a valuable, it may transform into a valuable through methods already established in the SNA.

2. NFTs that grant limited commercial rights

33. The second type of NFT conveys some commercial or other rights beyond personal use for another asset (e.g., rental leases, commercial rights to use IP product) and should be recorded as a non-produced nonfinancial asset, distinct from the associated asset or product. Specifically, these NFTs should be recorded as contracts, licenses, or leases.

3. NFTs that grant full ownership rights

34. The third type of NFT conveys *full* ownership rights for an associated asset (e.g., real estate, digital valuables, other property). These NFTs are essentially inseparable from the asset and are simply a digital recording of ownership. They need not be recorded as assets in the national accounts. By analogy, a household balance sheet should not record a deed to a house and the house itself as two equally valued assets; the deed merely records the ownership of the house.[20] Similarly, NFTs that simply record

[20] Even when an NFT seems to influence the value of the associated digital asset, it still should not be recorded as a separate asset. For example, an NFT may be more effective at establishing, conveying, and verifying ownership than

consumption of goods and services (an event ticket, a membership) need not be recorded in addition to the consumption of these services. This non-recording of NFTs that convey full ownership rights assumes that one is already recording the purchases of the associated asset or product.

MEASUREMENT CHALLENGES

35. While this GN has focused on theoretical issues concerning the classification of NFTs, the recognition and classification of NFTs will also lead to several measurement challenges. One needs detailed information on the rights conveyed by NFTs, and the spending to purchase NFTs, separate from the purchases of the associated assets or products. These comprehensive data may be difficult to obtain. Although this GN makes a distinction between the recording of NFTs and the associated assets, many of these associated assets – especially physical artwork and digital objects – may be poorly measured or entirely missing from national accounts. In many cases, the NFTs may be used as the only available source of data on these associated assets. Given these measurement challenges, it may be difficult to produce estimates of consumption of NFTs, acquisitions less disposals of both NFTs and the associated produced assets, price changes and net asset stocks. This GN hopefully provides a starting point for addressing these difficult topics.

36. Fortunately, some useful information on NFTs is already available. Currently, only a few websites host the majority of the transactions and can provide information on the range of rights conveyed by the NFTs.[21] In deciding how to record and measure NFTs, statistical agencies will need to weigh the benefits and costs of producing these measures against other priorities. Many of the challenges that exist for measuring NFTs are similar to those challenges for measuring other crypto assets. Please see the GN F.18 “The Recording of Crypto Assets in Macroeconomic Statistics” for detailed more information and recommendations for collecting data on crypto assets, which this GN endorses.

the previous method. As a result, the presence and recognition of NFTs may make people willing to pay more for the associated asset. In this case, however, the NFT is still merely a recording of ownership of the associated asset.

[21] See, for example, see this list of popular NFT marketplaces as well as NFT collections like Bored Ape Yacht Club and Robotos.

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