

Issues in reflecting digital assets in the official statistics¹

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Abstract

This paper proposes an idea for how digital assets could be reflected in the financial accounts. Issues regarding the definition and classification are mainly discussed. In addition, to facilitate active discussions on digital assets in a comprehensive and consistent manner within the SNA framework, the issues of whether non-liability crypto assets should be classified either as financial or non-financial, and produced or non-produced assets in the case of non-financial assets are reviewed.

Keyword: System of National Accounts, crypto assets, digital assets

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1. Introduction

Recent years have been an evolutionary age for digital assets. There is significant attention on digital assets, including crypto-assets—particularly on how they behave, who participates in transactions, and where they are actually held. However, with no common definition of digital assets, no consensus has been made on what should or should not be included in statistics. Against this backdrop, international organizations are working together with the national compilers of macroeconomic statistics to update the system of national accounts (SNA) —towards the 2025 SNA— on how to include digital assets in macroeconomic statistics.

This paper discusses the issues regarding the definition and classification of digital assets. Chapter 2 gives an overview of the criteria for financial assets in the SNA. Following the review of the Guidance Note on the recording of crypto assets (GN), issues and ideas are discussed on how digital assets could be covered in the financial accounts. Chapter 3 considers the classification of non-liability crypto assets used as a means of payments (NLCA) within the category of non-financial assets. It briefly looks at the current status of international discussions towards 2025SNA, and then compares the definition and recording of produced and non-produced assets in order to consider the appropriate classification. Chapter 4 concludes by proposing a way forward.

2. Digital assets in the context of the financial accounts

2.1 Criteria for financial assets

What are the attributes that matter in the compilation of the financial accounts? More specifically, what kind of digital assets should be regarded as financial assets? Some crypto-assets are used as a medium of exchange and as such one may want to classify them into financial assets. However, the answer to these questions is not straightforward.

Financial assets in the SNA, in principle, should have a counterpart liability. The 2008SNA, the current version of the SNA, defines an asset as: *a store of value representing a benefit or series of benefits* (¶3.5). *Benefits are exchanged by means of payments. From this, a financial claim, and hence a liability, can be defined* (¶3.32). *A liability is established when one unit (the debtor) is obliged, under specific circumstances, to provide a payment or series of payments to another unit (the creditor)* (¶11.5). ... *Whenever either of these types of liability exists, there is a corresponding financial claim that the creditor has against the debtor. A financial claim is the payment or series of payments due to the creditor by the debtor under the terms of a liability* (¶11.7). This means that in recording the financial accounts, which are based on the current SNA, all financial assets (the creditors) entail corresponding liabilities (the debtors), with the exception of monetary gold.

Recognizing this current SNA criteria for financial assets, all digital assets which act as a means of payment will not be categorized as financial assets. It is clear then, that in defining the classification of digital assets, attention should be paid to the existence of an issuer (liability).

2.2 Issues on the Guidance Note

As part of the updating process from the current 2008SNA towards 2025SNA, guidance notes (GN) for prioritized issues have been developed by the Intersecretariat Working Group on National Accounts (ISWGNA), which has received its mandate from the United Nations Statistical Commission (UNSC). One of the issues covered by the guidance notes is on the recording of crypto-assets in macroeconomic statistics, which calls for global consultation on the classification of crypto-assets. For the purpose of discussion on whether they should be classified as financial

or non-financial assets, the GN proposes grouping crypto-assets into three broad categories.³

- Crypto-assets designed to act as a general medium of exchange
 - with a corresponding liability:
 - issued by a monetary authority (e.g., central bank digital currencies (CBDCs) that qualify as crypto-assets)
 - not issued by a monetary authority (e.g., stablecoins with a claim on the issuer)
 - without a corresponding liability (CAWLM) (e.g., crypto-assets such as Bitcoin)
- Crypto-assets that only act as a medium of exchange within a platform or network (i.e., payment tokens)
 - with a corresponding liability
 - without a corresponding liability (CAWLP)
- Security tokens (which always have a counterpart liability)
 - Debt security crypto-assets (e.g., Bond-i issued by the World Bank); this also includes utility tokens that provide the holders future access to goods or services.
 - Equity crypto-assets
 - Derivative crypto-assets (i.e., derivative contracts that rely on cryptography and that can be exchanged peer-to-peer even if the underlying asset is not a crypto-asset).

Here, there are three issues which need to be addressed. Firstly, it is important to point out that the CBDCs are not "crypto-assets" (G7 (2021)). Recent literature defines cryptocurrencies or crypto-assets, which are used interchangeably, as "private digital assets with their own currency unit of account, such as Bitcoin and Ethereum. Cryptocurrencies do not represent a claim on a central bank, which makes them different from CBDCs" (Kosse and Mattei (2022)). Since CBDCs are not crypto-assets, it is appropriate to use a wider terminology of "digital assets" instead of "crypto-assets."

Secondly, the above mentioned categories in the GN puts the highest priority on whether the digital assets act as a medium of exchange. If they act as a medium of exchange, then the scope of the exchange is examined whether they only act within a specific platform or are used more generally. However, a question arises on how they are used "generally". It could change and depend on the technologies available at the time of evaluation. In fact, there may be digital assets developed in future that can be exchangeable across platforms. Therefore, from the viewpoint of statistical continuity and stability, it is appropriate to avoid setting statistical classifications based on a medium of exchange, considering the possibility of future technologies enabling a variety of other types of crypto-assets to emerge.

Finally, as closely related to the above, given the volatile value of crypto-assets, they will not act as a unit of account, which could be one of the attributes to define the medium of exchange. It lends support to the view that the medium of exchange attribute should not be the highest priority in deciding the assets as financial assets.

2.3 Classification proposal

Sato (2023) proposes a classification of digital assets which aligns with the current SNA (Chart 1).⁴ The proposed criteria that digital assets are classified as financial or non-financial depends on

³ Foreseeing diverse opinions on the treatment of crypto-assets, the guidance note presents three recording options; treating crypto-assets without a corresponding liability (CAWLM) as any one of "financial", "non-financial", or "hybrid" assets. Thereafter, as discussed in Chapter 3, user consultation has been undertaken to reach a consensus. Discussions are still ongoing for international agreement.

⁴ This classification is based on currently existing digital assets and may vary according to the future market development.

whether there is a corresponding liability, irrespective of whether and how they generally act as a means of payment. The examples of digital assets are listed below; among them, there may be those issued by public sector and others by private sector. Crypto-assets and CBDCs are both categorized as digital assets, but are separated into different categories.

Stablecoins: There are a variety of so called stablecoins observed in the market but they have no robust definition. The common feature is that they are designed to achieve stable value (G7WG(2019)) or aim to maintain stable value (FSB(2022)). For statistical purposes, this paper defines stablecoins as only those with a corresponding liability. This treatment is in line with the definition of Boar and Wehrli (2021) which requires stablecoins to have an identifiable issuer as key criterion.

The methodologies to maintain stable value are either (1) collateralized or (2) uncollateralized but algorithmically controlled. In the case of (1), collaterals may be a specific asset or a basket of assets. Furthermore, collaterals may be in some cases held on the issuers' balance sheet, and in other cases segregated from the issuers' balance sheet and administered, for instance, in trust accounts.⁵ In the case of (2), only those which have a corresponding liability should be treated as financial assets.

Other types of crypto-assets used as a means of payment with a corresponding liability: This category contains crypto-assets which are not called stablecoins but have a corresponding liability and are used as a means of payment. As a means of payment, the value of the assets is expected, to a certain extent, to have low volatility. For that reason, there may not be many digital assets classified in this way at this moment, although this category is conceptually possible.

Prepaid payment instruments: Prepaid payment instruments are the digital assets that already exist, typically as prepaid card or e-money. Some countries have already reflected them in their statistics. They are currently issued based on traditional techniques but if they are issued in the form of crypto-assets, they could become close to the above category of other types of crypto-assets used as a means of payment with a corresponding liability.

Bank deposits: Bank deposits are in a broad sense one form of digital assets.

Central bank digital currency (CBDCs): As is described in CPMI-MC (2018), CBDC is a digital form of central bank money that is different from balances in traditional reserve or settlement accounts. CBDCs are not crypto-assets since they are liabilities of central banks.

Security tokens: Security tokens are digital assets that represent negotiable financial claim on the issuer such as debt securities, equity, and derivatives. In most cases, they are issued or managed using distributed ledger technology (DLT). Given these roles, they will not be expected to act as a means of payment.

Digital assets without a corresponding liability: These are assets which according to our proposed classification—prioritizing existence or non-existence of corresponding liability—are not to be classified as financial assets. Discussions on the classification within non-financial assets are given to the latter part of this paper. Bitcoin and Ethereum might be possible examples of other types of crypto-assets used as a means of payment without a corresponding liability. Non fungible tokens (NFT) also might be an example of digital assets without a corresponding liability.

An example of recording digital assets with a corresponding liability is presented in the case for stablecoins (Table 1). Other examples of recording CBDCs and security tokens are presented in

⁵ It is important to recognize that tying the value to underlying assets does not always mean collateralizing the underlying assets. Moreover, collateralizing is not the same as assuring legal claim of the holders to the underlying assets.

Sato (2023).

3. Classification of non-liability crypto assets

This chapter focuses on non-liability crypto assets (NLCA) used as a means of payments. NLCA are digital assets without corresponding liabilities, so as reviewed in the previous section, they are not to be classified financial assets. However, there are diverse opinions in determining the classification of the assets in the SNA, either as financial or non-financial, and produced or non-produced assets in the case of non-financial assets. The remaining part of this section aims first to look at the current status of international discussion towards 2025SNA, compare the definition and recording of produced and non-produced non-financial assets based on the current 2008SNA, and then consider the appropriate classification.

3.1 Current status of the international discussions towards 2025 SNA

Since the release of the GN, worldwide active discussions on the treatment of NLCA have taken place. Even through these discussions, there has not been a consensus reached on the classification of the NLCA. In order to move forward, user consultation was undertaken from January to March 2023. The result was that no strong preference emerged, however, the majority of respondents favored treating NLCA as nonfinancial assets, and as non-produced assets within this category (Harper (2023)).⁶

3.2 Definition and recording of produced and non-produced assets

This section looks into the definition of non-financial assets in the SNA. When NLCA are classified as non-financial assets, they are further classified into either produced or non-produced assets.

3.2.1 Definition

The 2008SNA explains that **produced assets** are *non-financial assets that have come into existence as outputs from production processes that fall within the production boundary of the SNA* (¶10.9a). The fact that bringing NLCA into circulation entails production process, requiring a large amount of resources including labor, capital and electricity, could reasonably support the classification of produced assets. In determining the sub-category within produced assets, a possible way of thinking is to classify NLCA as valuables. Valuables have two important features; they are *stores of value* (¶10.13) and often regarded as *alternative forms of investment* (¶10.149). These features align with those of NLCA.

In spite of the above mentioned similarities, the idea of classifying NLCA as valuables is not always preferred. Heys, et al (2021) argues that the idea these assets (NLCA) will increase (or at least retain) their value over time "clearly sounds like the antithesis of how these assets have behaved in the past and might behave in the future". Statistics Canada expresses that NLCA value is "highly speculative and the notion of store of value definitely questionable" (FITT (2022b)).⁷

The disagreements arise because of the narrow and strict definition of valuables to allow price volatility in the current text of 2008SNA. As observed generally in valuables such as gold or silver, they are quite often held as alternative forms of investment, and therefore they do depreciate even if they were initially expected to appreciate. This disagreement could be easily resolved by

⁶ ISWGNA (2023) elaborates that among 127 respondents, 49 (39%) supports financial and 78 (61%) supports non-financial assets. The latter consists of 30 (39%) for produced, 43 (55%) for non-produced non-financial assets, and 5 (6%) undecided.

⁷ Heys, et al (2021) also argues that valuables have dual use criteria, such as adornment, with the pleasure of ownership, in addition to the aspect of investment assets. Admittedly, some valuables do have dual uses, but the 2008SNA does not explicitly define that valuables should have dual uses.

slightly expanding the scope of valuables in the current text.⁸

Another idea for the classification of NLCA is as **non-produced assets**. The 2008SNA explains that *non-produced assets are non-financial assets that have come into existence in ways other than through processes of production* (§110.9b). The main reason for NLCA to be classified as non-produced assets is that although significant production activities can be observed in coin mining, validation services, etc. (and involving large amounts of fixed assets), they do not constitute the production of the asset itself (FITT(2022a), FITT(2022b)). The idea is at least conceptually possible, but the problem arises practically; what activities are to be measured in the production account in the SNA? This issue is addressed in the next sub-section.

The 2008SNA also explains that non-produced assets consist of three categories: natural resources; contracts, leases and licences; and purchased goodwill and marketing assets. Each of these categories has a specific definition in the context of 2008SNA, and they are different from each other. In light of the definitions, NLCA does not fall into any of these sub-categories.⁹ If NLCA is to be classified as non-produced assets, introducing a new sub-category for NLCA within non-produced assets would need to be considered.

3.2.2 Recording

This sub-section compares the recording of NLCA when they are classified either in produced or non-produced assets in the SNA.¹⁰ Numerical assumptions are drawn from the Annex IV of the GN. Detailed examples of accounting in the SNA, from production accounts to balance sheets, including the items not shown in the GN are presented in Table 2 for the country where the miner/validator is resident.

Case 1: NLCA is recorded as **produced assets (valuables)**, as in the GN

In recording NLCA as produced assets (valuables), there is less ambiguity in accordance with the existing guidance in the 2008SNA. New coins (90) are created through production process, and output (100) is recorded together with the output of validation service paid by existing coins (10). Gross capital formation is recorded in the capital account as acquisition of valuables (100), not through economic appearance thus not using other changes in the volume of assets account. In the current account of the balance of payments, the export of the validation service and the import of the coins are recorded respectively in the same amount, and therefore, they do not affect current account balance, offsetting transactions of imported goods and exported services each other. This recording implies that classifying NLCA into valuables could minimize the changes from the current recording principles in the SNA. As mentioned in the previous sub-section,

⁸ For example, the paragraph 10.13 of the 2008SNA could be revised as follows: *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 often in the form of investments, including alternative investment of financial assets [over time]. Valuables are expected to appreciate [or at least not to decline] in real value, nor to deteriorate over time under normal conditions.* The words underlined are inserted and those with square brackets are deleted.

⁹ FITT (2022b) introduces opinions that support categorizing NLCA into either of the three. There is a view that NLCA could be treated in the same way as discovery/growth/depletion of natural resources. Natural resources in the 2008SNA, however, are defined as the assets owned by resident units, actually or notionally (§110.170, §110.27), which is less applicable for NLCA frequently changing hands between residents and non-residents. Other view is that NLCA is a kind of social contract and could be treated as contracts, leases and licences. Contracts, leases and licences in the 2008SNA are defined only when the assets have different prices from those that would prevail in the absence of the contract, lease or licence (§110.16). Furthermore, goodwill and marketing assets is viewed as having similarity to NLCA in that intrinsic value is zero per se, rather their value is derived entirely from the perception of their users/investors. As opposed to this view, however, in the current discussion on updating to the 2025SNA, marketing assets are being proposed to be treated as produced assets.

¹⁰ Though not going further in this paper, deflator is also another important issue considering the impact to GDP.

however, expanding the definition of valuables should be considered.

Case 2: NLCA is recorded as **non-produced assets**, as in the GN

Case 3: NLCA is recorded as **non-produced assets**, modified from the GN in the following two points:

- 1) Output is recorded only for the explicit fee.
- 2) New coins come into existence in miners' wallet when mined in the miners' country.

In recording NLCA as non-produced assets, there is more to take into account in the actual compilation. There are two main issues in recording NLCA as non-financial assets.

The first issue relates to the **recording of output**; Case 2 considers that the miner is producing 100 validation services measured by the total of both an explicit fee (10) and the new coins (90). The latter is regarded as implicit fee. As the GN explains, this view ensures consistency between the recording of output of validators of transactions that only receive an explicit fee and validators of transactions that are rewarded by both an explicit fee and a new coin. This approach requires further assumptions, specifically, who or what sector (households, corporations, other resident sectors or non-residents) consumes the validation service. The numerical examples in the GN assume that the owners of existing coins consume the validation services for new coins and that the owners of existing coins are all non-residents, thus the services produced are all exported. In reality, holders of existing coins are spread across a wide range of countries, so recording NLCA as non-produced assets in the SNA would become highly complex. From this standpoint, Case 2 could be modified as in Case 3. In Case 3, the output is recorded only for the actual service production activity rewarded in explicit fee. New coins are not regarded as implicit fees and not recorded in the production account. In parallel, the balance of payments records the current account only for the services paid by explicit fee. The issue in this treatment is that the value added could fall into negative. If the block rewards are huge, large negative value added would be recorded in the production account. Nonetheless, it describes the actual transaction as it occurs.

The second issue relates to the **recording of launch**. Case 2 in the GN explains only when the additional coins are brought into circulation via mining activity, and does not give an appropriate explanation for the case when a new kind of crypto asset is released to the market. Case 2 assumes that the new coins are regarded as initially owned by the owners of existing coins, and that they come to be held by miners when they are mined through economic transaction. It is also assumed that validation services paid by new coins are consumed by the owners of existing coins, looking on the owners of existing coins as the ones benefitting from the new coins being brought into circulation. The initial owner problem in Case 2 could be circumvented by assuming that, as in Case 3, new coins come into existence directly in miners' wallet when they are mined, in the miners' country. The acquisition of NLCA only for the existing coins is recorded in the capital account. The acquisition of new coins is not recorded in the capital account. Instead, the appearance of new coins is recorded through other changes in the volume of assets account in miners' country, which is in line with the recording principle of the appearance of non-produced assets in the SNA. In this regard, Case 3 seems rather realistic and simple compared to Case 2 in terms of recording of output, and in terms of recording of launch.

4. Conclusion

This paper proposes an idea for how digital assets could be reflected in the financial accounts. Emphasis is put on the existence of a counterpart liability as a criterion for financial assets.

Following this, the classification of NLCA is considered. Based on the current definition and accounting rules in the 2008SNA, it is implied that classifying into produced assets would have a slight advantage over non-produced assets. The current definition of the 2008SNA would call for only minor changes and the recording would be simple without complex assumptions. This paper

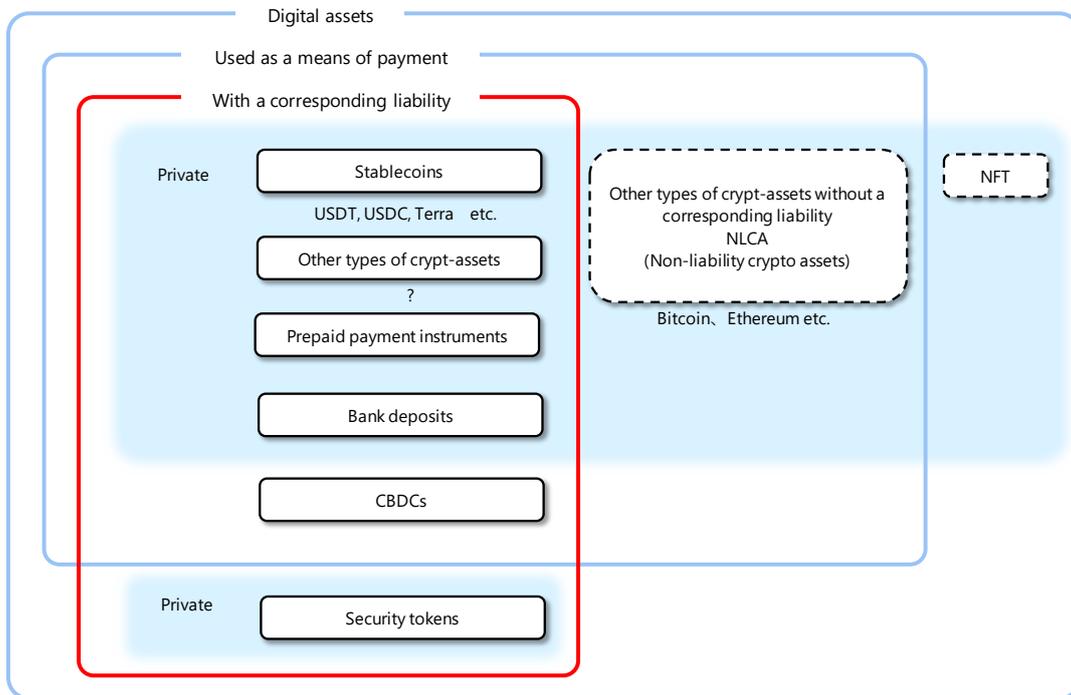
emphasizes the advantage of classifying NLCA into produced assets through detailed example of recording in the sequence of the national accounts, which is not fully explained in the current GN focusing mainly on cross-border transactions.

This paper proposes a way forward by presenting two suggestions. Firstly, in determining digital asset classification, it is important to have a comprehensive view of the national account and to consider, both practically and conceptually, any impacts the new classification of NLCA would have on them.

Secondly, further detailed explanation of the recording of the SNA is necessary, especially when NLCA is classified into non-produced assets. In accordance with the result of the aforementioned user consultation, 2025 SNA will most likely be drafted based on the NLCA classification as non-produced assets. The recording example in this paper suggests that further clarification is needed especially for the recording of validation services.

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USDT: Tether, USDC: USD Coin, Terra: UST(Terra), NFT: Non-fungible tokens

An example of recording stablecoins

Table 1

	FC		HH·NFC			
Initial holding			Currency			
			1,000			
With collateral on the issuers' balance sheet	FC		HH·NFC			
After purchase	Currency	Deposits	Deposits			
	400	money	money			
	Deposits	1,000	1,000			
	300					
	CP 300					
With collateral segregated from the issuers' balance sheet	TC		FC		HH·NFC	
After purchase	Currency	Trust	Trust	Deposits	Deposits	
	400	beneficiary	beneficiary	money	money	
	Deposits	certificates	certificates	1,000	1,000	
	300	1,000	1,000			
	CP 300					
Without collateral (algorithm type) - provisional idea -	FC		FC		HH·NFC	
After purchase		Deposits	Deposits	Deposits	Deposits	
		money	money	money	money	
		1,000	1,000	1,000	1,000	

1 The table illustrates the case in which only financial corporations (FC) are allowed to issue stablecoins. However, this is not always the case, for example, there are cases when non-financial corporations are allowed to issue stablecoins.
 2 Assets (left hand side) and liability (right hand side) are shown in each sector.

Source: Author

		Non-financial assets		
		Produced Case 1 (GN)	Non-produced	
			Case 2 (GN)	Case 3
Production account	Output	100	100	10
	output of services	10	100	10
	output of goods	90	0	0
	Intermediate consumption	80	80	80
	Value added	20	20	-70
Income account	Savings	20	20	-70
Capital account	Gross capital formation	100	0	0
	Gross fixed capital formation	0	0	0
	Consumption of fixed capital	0	0	0
	Acquisitions less disposals of valuables	100	0	0
	of which: digital valuables	100	0	0
	Acquisitions less disposals of non-produced assets	0	100	10
	Capital transfers	0	0	0
	Net lending/borrowing	-80	-80	-80
Financial account	Net lending/borrowing (financial account)	-80	-80	-80
	Currency and deposits	-80	-80	-80
Other changes in the volume of assets account	Change in stock of financial assets	-80	-80	-80
Revaluation account	Change in stock of non-financial assets	100	100	100
	Due to transactions	100	100	10
	Due to other changes in the volume of assets	0	0	90
	Due to revaluation	0	0	0
	Change in net worth	20	20	20
Balance sheets	Opening balance sheet	100	100	100
	Produced assets	0	0	0
	Non-produced assets	0	0	0
	Financial assets	100	100	100
	Closing balance sheet	120	120	120
	Produced assets	100	0	0
	Non-produced assets	0	100	100
	Financial assets	20	20	20
Balance of payments	Current account	0	100	10
	Goods	-10	0	0
	Services	10	100	10
	Capital account	0	-100	-10
	Financial account	0	0	0
International investment position	Opening value of IIP	0	0	0
	Closing value of IIP	0	0	0