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A primer on stablecoins

Abstract

Note: Although this Topical Briefing Note may be read as a standalone document, an earlier Topical Briefing Note titled "The financial stability implications of crypto assets in South Africa" provides context on the development of the crypto asset ecosystem both globally and in South Africa. It is available at https://www.resbank.co.za/content/dam/sarb/what-we-do/financial-stability/topical-briefings---june-2021/Topical%20Briefings%20-%20June%202021.pdf.

The total value of stablecoins in issue has grown from around US$10 million at the beginning of 2017 to around US$150 billion currently. After originally gaining popularity as an instrument to hedge volatile crypto asset markets, stablecoin use cases continue to gain traction, with stablecoins increasingly used as a payment instrument (both domestically and across borders), for cross-border remittances, as an investment (i.e. through 'staking'), as a store of value or safe-haven asset, by serving as collateral in crypto-asset derivative transactions, and facilitating trading, lending and borrowing activity in the crypto asset and decentralised finance (DeFi) ecosystems. As the first in a two-part series on stablecoins, this paper provides a general introduction to stablecoins, including definitions, use cases, design choices and the associated impact

on stablecoin stability, and risks and benefits of stablecoins. The transmission channels through which stablecoins could impact financial stability are also discussed with reference to the Tether, Terra USD and ZARP stablecoins.

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Glossary of terms

Term	Definition
algorithmic stablecoin	Protocols that increase or decrease the supply of the stablecoins in issue in response to changes in demand and market activity.
Asset-backed stablecoin	There are four types of asset-backed stablecoins, namely (i) currency-based; (ii) financial instrument-based; (iii) commodity-based; and (iv) crypto asset-based (or combination of the four types).
burning	The process of removing issued stablecoin tokens from circulation (i.e. redeeming and destroying issued stablecoin tokens).
minting	The process of creating new stablecoin tokens (i.e. issuance).
peg	The ratio at which the stablecoin is pegged to the underlying reference asset. Most, but not all, stablecoins are pegged 1-1 to the underlying reference asset.
reserve asset	The asset serving as collateral for the stablecoins in issue. The reserve asset guarantees the value of the stablecoin and ensures that stablecoins can be redeemed at par.
stabilisation mechanism	The process through which the stablecoin maintains a stable value relative to its peg.
staking	Decentralised finance (DeFi) applications and protocols require sufficient liquidity to ensure efficient execution of transactions. In order to stabilise the value of transactions, stablecoins are the preferred vehicle for entering the DeFi space. In the DeFi context, stablecoins allow crypto asset holders to lock their crypto asset holdings in liquidity pools, and earn a return based on the fees generated in the relevant liquidity pool.
underlying reference asset	The asset to which the stablecoin is pegged (i.e. the asset to which the stablecoin aims to remain pegged).

1 Introduction

This paper is the first in a two-part series on the financial stability considerations of stablecoins[1]. Its scope covers the fundamentals of stablecoins, including definitions, design options, use cases, risks, benefits and – based on three case studies – the transmission channels through which stablecoins could impact financial stability. The second paper in the series will expand on the identified transmission channels and explore the financial stability considerations of stablecoins in a South African context based on four hypothetical but plausible future scenarios.

2 What problems do stablecoins solve for?

Bitcoin was the first crypto asset developed and, in an earlier paper, Campbell and Steyn (2021) note that the original vision of Bitcoin[2] was to be a "peer-to-peer electronic cash system" (Bitcoin White Paper (Nakamoto, 2008)). However, Bitcoin critics were quick to point out that Bitcoin does not satisfy the three functions of money, namely being a medium of exchange, a store of value and a unit of account. Among other challenges, Bitcoin's historical and continued volatility has meant that it is unsuitable as a widely used means of payment. In addition, Bitcoin's fixed and limited supply in the face of growing demand and adoption supports its use case as an emerging alternative asset class rather than a medium of exchange. Bitcoin's volatility makes it unsuitable as a stable store of value and, by extension, a unit of account (Carstens, 2018; Carney, 2018b). In addition to its inherent volatility, Bitcoin's suitability as a payment instrument has been questioned consistently due to its 10-minute block time, which creates practical challenges if used for transactional purposes. Other issues, such as widespread acceptance, scalability, the cost of transactions and ease of use, have weakened Bitcoin's aspirations to become widely used as a medium of exchange.

[1] The SARB uses the Financial Stability Board (FSB) definition of a stablecoin being a "crypto asset that aims to maintain a stable value relative to a specified asset, or a pool or basket of assets" (FSB, 2020:5).

[2] Bitcoin remains the longest-operating crypto asset in existence and the largest crypto asset measured by market capitalisation, accounting for approximately 45% of the total crypto asset market value of US$1.2 trillion as at the end of May 2022. As a result, Bitcoin is often used as a proxy for the crypto asset market more broadly, as well as some of the challenges unbacked crypto assets present when compared to existing fiat currency. For the purposes of this paper, stablecoins are viewed as a subset of the broader crypto asset class.

Given these limitations, approximately two years after the launch of Bitcoin the first of the so-called 'alternative coins' (i.e. alternatives to Bitcoin) or 'altcoins' started to emerge, primarily trying to solve Bitcoin's shortcomings as a payment instrument by aiming to be cheaper, to confirm transactions faster and to be more scalable than Bitcoin. To this end, in 2011, the first altcoins, such as Litecoin, Namecoin, Peercoin and Dogecoin, started to emerge and offered purportedly more effective ways of transferring value. These first altcoins, however, did not address unbacked crypto assets' inherent volatility, which paved the way for the release of the first stablecoin, Tether, in July 2014.

The fundamental stablecoin use case is its use as trading pair with other crypto assets (i.e. the conversion and exchange into and out of other crypto assets (Jarno and Kolodziejczyk, 2021)). Conceptually, stablecoins hold the promise of functioning as a reliable bridge between sovereign fiat currencies and crypto assets, thus offering users the advantages and potential benefits of crypto assets while mitigating their volatility (Moin, Sirer and Sekniqi, 2019)[3]. From this original stablecoin use case – that is, to negate inherent crypto asset volatility – subsequent use cases emerged as considered in the next section, alongside stablecoin design options and how such decisions influence the risks associated with stablecoins.

3 Stablecoin design options, risks, benefits and use cases

3.1 Design options

While all stablecoins are created to be stable, not all stablecoins are created equal. There are various design features and options available when designing a stablecoin, all of which would influence the ultimate stability and riskiness of the stablecoin. The FSB (2020) distinguishes between two broad types of stablecoins, namely (i) asset-linked stablecoins (which peg the value of stablecoins to physical and/or financial assets (including crypto-assets), which may further be broken down into currency-based, financial instrument-based, commodity-based and crypto asset-based (or combination thereof); and (ii) algorithm-based stablecoins (which aim

[3] The authors acknowledge research by Hoang (2020), which suggests that stablecoins could contribute to excess volatility in other crypto assets. The potential impact stablecoin usage could have on unbacked crypto asset volatility falls wholly outside of the scope of this paper. A fundamental assumption of this paper is that stablecoins have a 1:1 peg with the underlying reference asset and, therefore, the paper's focus is limited to consideration of stablecoin design elements that could lead it breaking its 1-1 peg to the underlying reference asset. For the purposes of this paper, the terms "currency peg" and "linked-currency" are used interchangeably.

to maintain a stable value through protocols that increase or decrease the supply of the stablecoins in response to changes in demand). Although the focus of this paper is not on the almost infinite available stablecoin design elements and options, a non-exhaustive matrix illustrating the various permutations a stablecoin could draw on is included as Annexure A for illustrative purposes.

Drawing on the work of the FSB (2021), Bank of England (2021), Moin, Sirer and Sekniqi (2019), Jarno and Kołodziejczyk (2021), and Bullmann, Klemm and Pinna (2019) the following stablecoin design elements are identified:

1. Peg (i.e. to what is the stablecoin pegged)?
2. Stabilisation mechanism (i.e. how does the stablecoin maintain a stable value relative to the peg)?
3. Collateral and/or reserve assets underlying the stablecoin (i.e. what type and how much collateral is kept relative to the amount of stablecoins in issue)?
4. Governance arrangements (i.e. how are the rules governing the stablecoin arrangement initially established and amended once operational)?
5. Liability (i.e. are the stablecoins in issue anyone's liability and, if so, whose)?
6. Minting (i.e. issuance) and burning (i.e. redemption) process (i.e. how are the stablecoins minted (i.e. issued) and burned (i.e. redeemed)?
7. Market support services (i.e. who stores the private keys that provide access to the stablecoin, and who provides services related to the exchanging, trading, reselling, and market making of the stablecoin)?
8. Transaction validation/movement of value (i.e. how are transactions validated or how is value transferred via the stablecoin)?

3.2 Stablecoin risks

The strongest determinants of a stablecoin's stability and, by extension, its riskiness are the underlying reference asset and the degree to which stablecoins in issue are backed by the reserve asset (i.e. fully, over- or under-collateralised). However, the quality and implied or assumed stability of the underlying reference asset are not necessarily correlated with the liquidity of the reference asset, and thus the redeemability of the actual stablecoin. The ability to liquidate the assets underlying a stablecoin without breaking the peg under any market conditions – regardless of how

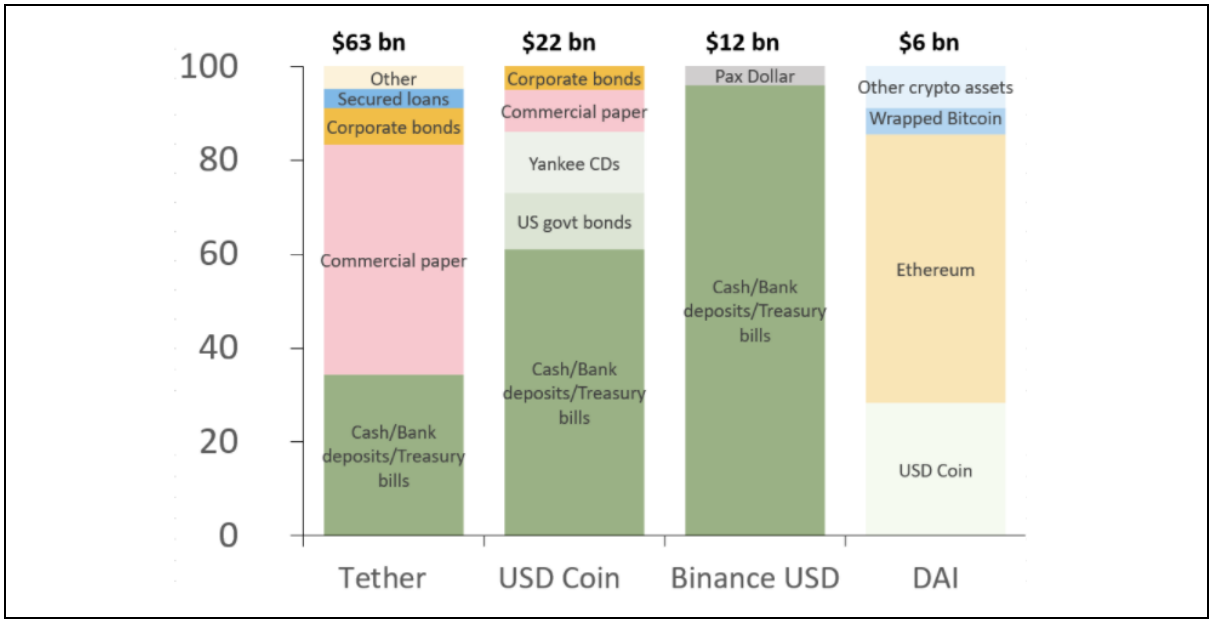
volatile – is therefore crucial[4]. If, for example, a stablecoin is backed by gold, significant selling pressure might have a negative impact on price where the market is flooded with an oversupply of the underlying reference asset, thus causing a drop in price (i.e. a downwards breaking of the peg). Jarno and Kołodziejczyk (2021) note that stablecoins pegged to and backed by sovereign fiat currency (or a basket of sovereign currencies) display lower volatility than other types of stablecoin design mechanisms[5]. Nevertheless, even if stablecoins in issue are backed on a 1-1 basis, the quality, composition and liquidity of the underlying reserve asset(s) is a crucial determinant of the stablecoin's actual stability, especially in cases of increased redemption during times of stress.

In view of the above, for the purposes of this paper, it is posited that the most stable and lowest-risk stablecoins would reference (i) a 1-1 peg; (ii) to a sovereign fiat currency (or basket of currencies); (iii) with reserve funds held in liquid instruments (i.e. those that maintain their value even during times of significant stress); (iv) with a highly trustworthy organisation that acts as custodian of the funds; (v) to the value of at least the number of stablecoins in issuance at all times; and (vi) which reserves are independently verified and audited on an ongoing basis. These characteristics of the most stable and lowest-risk stablecoins are broadly reflected in the US Office of the Comptroller of the Currency's (OCC) definition of a stablecoin quite narrowly as being "backed on a 1:1 basis by a single fiat currency where the bank verifies at least daily that reserve account balances are always equal to or greater than the number of the issuer's outstanding stablecoins" (OCC, 2020, p.1-2). Currently, relatively few stablecoins follow this route, and Figure 3 depicts the reserve composition of the current four largest stablecoins by market capitalisation as at the end of 2021.

[4] Most recently, in May 2022, the Terra USD-pegged stablecoin (UST) completely broke its peg and was trading at around $0.02 cents at the end of May 2022 (CoinMarketCap, 2022).

[5] The decentralisation of money and the store of value (including stability) of currency are not new concepts. For centuries, gold was the mainstay unit of value. During the 19th century, paper bank notes were linked (or pegged) directly to precious metals so that their value would be maintained. The value of these bank notes for the purposes of cross-border trade was determined by the link to the precious metal. Historically, it has been a challenge to maintain the stated peg – this challenge will have to be overcome for broad adoption of stablecoins. Furthermore, during the 17th to 19th centuries, the issuance of paper bank notes was decentralised – various commercial banks issued their own bank notes that were widely circulated.

Figure 3: Reserve composition of the four largest stablecoins as at end-2021



Sources: IMF, Centre, MakerDao, Tether and Paxos

Annexure B uses Tether as a case study to illustrate how stablecoins that do not necessarily employ a 1-1 peg to a sovereign fiat currency, but claims to be fully backed by reserve funds invested in highly liquid reserve assets could break its peg and potentially lead to a run on the reserve assets.

Although other risks related to consumer protection, money laundering and terrorist financing are highly relevant to financial stability as their existence indicates vulnerabilities within a financial system, they are not considered here as they are covered in detail in the existing literature (see, e.g., IMF, 2021; FSB, 2020, 2022; BIS; 2020; ECB, 2021).

3.3 Stablecoin benefits and use cases

Central banks, policymakers and regulators have been clear that crypto assets are not generally considered to be money because they are not issued by a central bank and are therefore not legal tender. While the same is true for stablecoins, their ability to perform the money-like features of functioning as a medium of exchange, a store of value and a unit of account means their use cases are essentially identical to sovereign currencies. Stablecoin use cases currently include (i) payments (especially for e-commerce); (ii) cross-border remittances; (iii) investment (i.e. by providing liquidity, stablecoin holders may earn interest on their holdings without giving up their

positions)[6]; (iv) stable store of value; (v) safe-haven asset; (vi) acting as a bridge between fiat currencies and the crypto asset ecosystem; (vii) serving as collateral in crypto-asset derivative transactions (i.e. escrow function); and (viii) facilitating trading, lending and borrowing activity in the crypto asset and decentralised finance (DeFi)[7] ecosystems (FSB, 2020; 2022; BIS, 2020; Adrian, 2019; ECB, 2021).

Stablecoins' money-like features allow them to be used similar to fiat currencies, but may offer certain efficiency benefits as they circumvent some of the requirements imposed on traditional currencies. This may lower costs and increase efficiency, especially for cross-border payments and remittances[8]. Through embedding smart contract functionality into stablecoins, the role of intermediaries may be reduced, with associated benefits to the consumer in terms of cost and efficiency.

Stablecoins have certain advantages over commercial bank money for low-income consumers in emerging market and developing economies (EMDEs). They do not require a bank account (the customer due diligence requirements are often challenging for low income consumers), they provide a low cost alternative to access US dollars (the global reserve currency, which is commonly used for cross-border remittances) and they can be accessed from a smart phone with internet connectivity (Feyen, Frost and Natarajan, 2020), which is widely available in South Africa[9]. Stablecoins could be particularly relevant to countries that have had a decline in correspondent banking relationships (FSB, 2019b) as well as those with youthful populations[10].

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6 Decentralised finance (DeFi) applications and protocols require sufficient liquidity to ensure efficient execution of transactions. In order to stabilise the value of transactions, stablecoins are the preferred vehicle for entering the DeFi space. In the DeFi context, stablecoins allow crypto asset holders to lock their crypto asset holdings in liquidity pools, and earn a return based on the fees generated in the relevant liquidity pool.

7 DeFi is essentially the provision of financial products and services without involving intermediaries, where self-executing smart contract protocols facilitate transactions.

8 The October 2020 FSB Cross-border payments roadmap (available here) consists of 19 building blocks aimed at enhancing the efficiency of cross-border payments. One of these building blocks is 'fostering the soundness of global stablecoin arrangements for cross-border payments', possibly in recognition of potential efficiencies and advantages stablecoins may have over existing options.

9 South Africa's smartphone penetration exceeded 90% in 2020 (Mzekandaba, 2020).

10 Younger demographics are more likely to own smartphones. For example, see https://www.pewresearch.org/internet/fact-sheet/mobile/ for the US demographic of smartphone ownership.

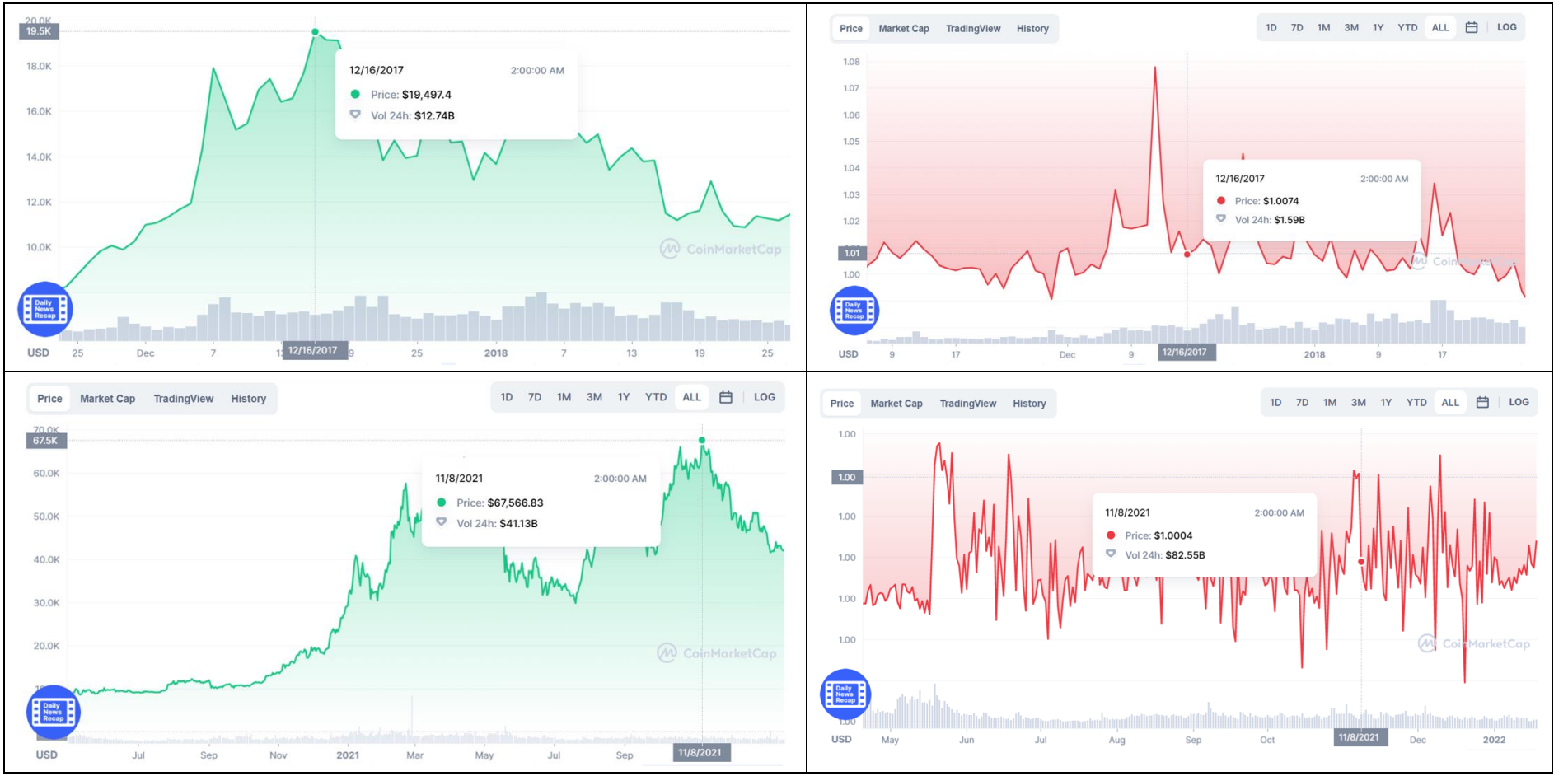
4 Stablecoin growth

4.1 Stablecoins' emergence as preferred crypto asset trading pair[11]

Figure 2 shows that during the 2017 hype cycle, Bitcoin was the preferred trading pair for buying and selling all other crypto assets, with most purchases of altcoins involving the in-between step of purchasing Bitcoin with fiat currency, and then purchasing the desired altcoin with Bitcoin (with the altcoins priced in 'Satoshis', or one-hundred-millionth of a Bitcoin). Because of Bitcoin's high levels of volatility, users would be subject to exchange-rate risk, both in terms of the Bitcoin price and the desired altcoin's price, with altcoins generally more volatile than Bitcoin. At the peak of the hype cycle in December 2017, the daily value of Bitcoin trades fluctuated between US$10-US$20 billion, while the daily value of Tether trades over the same period fluctuated between US$1-US$4 billion. However, during the 2021 hype cycle, the daily value of Bitcoin trades had roughly doubled to between US$25-US$50 billion, while the daily value of Tether trades over the same period had increased to between US$50-US$100 billion.

[11] Two crypto assets traded for one another are often referred to as a 'trading pair', and prices are quoted for trading pairs such as Bitcoin/Ether. The trading pair expresses the price of a particular crypto asset relative to another. Historically, Bitcoin was the de facto trading pair for almost all crypto assets, but this has changed in recent years to USD-pegged stablecoins given their aspirational near-perfect pegging against the US dollar.

Figure 2: Bitcoin versus Tether daily trading value for December 2017 vs November 2021



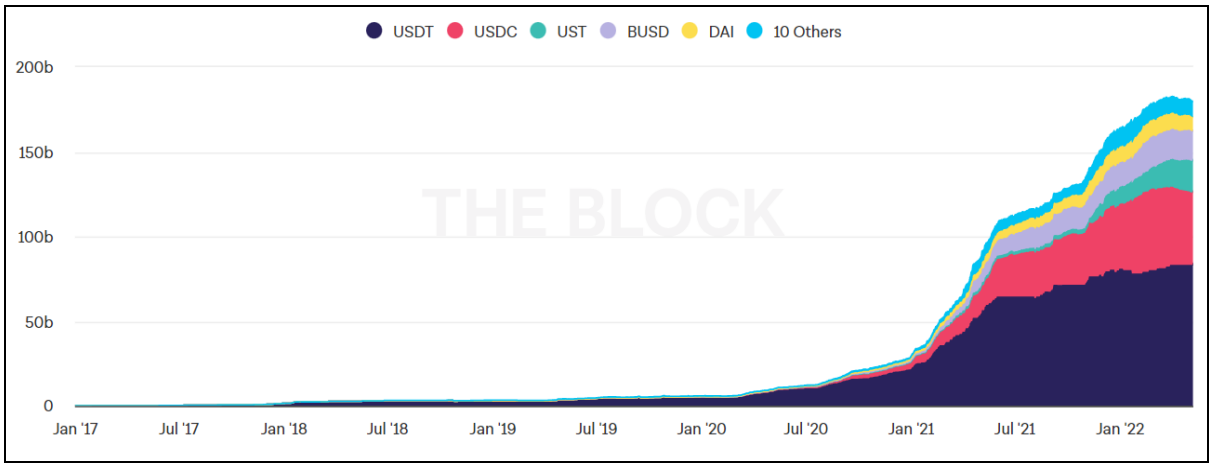
Source: CoinMarketCap

It should be noted that (i) Tether is not the only stablecoin (though it currently remains the largest by market capitalisation); and (ii) daily stablecoin trading values tend to increase during volatile periods of downwards price action as crypto asset traders move funds into the perceived safety of stablecoins, while in periods of upwards price action traders move funds out of stablecoins and into crypto assets to achieve better gains (see Caramichael and Liao, 2022, for a more detailed discussion of how periods of stress correlate with stablecoin prices and trading volumes). Annexure B provides a detailed overview of the case of Tether, and how its market share continues to decline against other prominent and emerging stablecoins such as USD Coin (USDC), Binance Coin (BNB USD), DAI and, before its recent collapse, Terra USD.

4.2 International stablecoin issuance

The value of all stablecoins in issue increased from around US$10 million at the beginning of January 2017 to around US$10.8 billion in May 2020, to just over US$180 billion as at 10 May 2022.

Figure 1: Growth in stablecoins since January 2017



Source: The Block

On an annualised basis, stablecoin issuance grew on average by 3,190% per year between 2017 and 2021 as depicted in Table 1.

Table 1: Annual growth rate in global stablecoin issuance since 2017

Year	Value of stablecoins in issue on 1 January	Value of stablecoins in issue on 31 December	Year-on-year growth (%)
2017	$10 million	$1.5 billion	14,900%
2018	$1.5 billion	$3.3 billion	120%
2019	$3.3 billion	$5.9 billion	79%
2020	$5.9 billion	$30 billion	408%
2021	$30 billion	$163 billion	443%
Average annual percentage growth			**3,190%**

4.3 Domestic stablecoin issuance

As at 30 April 2022, there were four known domestically operated, Rand-denominated stablecoins operating in South Africa totalling approximately R122 million worth of stablecoins in issue[12]. The four projects and their growth rate over the eight months to May 2022 are reflected in Table 1.

Table 1: South African stablecoin projects

Stablecoin name	No. of stablecoins outstanding	Website	Attestation report
ZARP	68,223,506	https://www.zarp.cash/	https://xzar.co.za/ACT%20-%20Proof%20of%20Reserves%20Report.pdf
xZAR (AltCoinTrader)	50,000,001	https://xzar.co.za/	https://kempengroup.co.za/wp-content/uploads/2022/03/ZARP-Stablecoin-report-8-March-2022.pdf
xZAR (Xago)	3,572,049	https://xago.io/	https://livenet.xrpl.org/accounts/rEaC7oNDB34K6CiSbSrA6xEPeVhXNgDZRY
CZAR	1,003,000	https://chainex.io/czar	https://bscscan.com/token/0x6d3a215694f2b86f21f5d6beab594cc856b17dcd
Total	**122,798,556**		

[12] It is acknowledged that there are likely more projects than reflected here. The SARB and the Intergovernmental Fintech Working continue to explore with the South African crypto asset industry the appropriateness and desirability of the issuance of a stablecoin by a consortium of banks in Project Khokha 2. Should commercial banks eventually issue stablecoins in production it may shift the view on volumes and values and their potential impact on financial stability.

Although none of the above stablecoins are systemic at current values, one of the main risks associated with stablecoins (FSB, 2020) is their ability to scale rapidly. For example, ZARP was launched in November 2021 with an issuance of slightly over 1 million ZARP, but has grown by more than 6,800% since to over 68 million ZARP tokens in issue at the end of May 2022[13].

5 Transmission channels through which stablecoins could impact financial stability

The FSB (2018) notes that crypto assets could threaten financial stability through various transmission channels, most notably through: (i) confidence effects; (ii) financial institutions' exposures to crypto assets, related financial products and entities that are financially impacted by crypto assets; (iii) the level of market capitalisation of crypto assets; and (iv) the extent of their use for payments and settlements. There is growing evidence that unbacked crypto assets such as Bitcoin are already interconnected with the traditional financial system to a non-trivial extent, and that the positive correlation between crypto asset valuations and listed equities will likely increase over time (Iyer, 2022). Although the positive correlation between crypto assets and equity prices does not imply crypto assets have become systemically significant, it does suggest that crypto assets are no longer on the periphery of the financial system and have emerged as a new, yet highly risky and volatile, asset class. Coupled with the earlier evidence of stablecoins replacing Bitcoin as the preferred crypto asset trading pair since the 2017 hype cycle, it suggests growing interconnectedness between traditional financial and crypto asset markets – particularly where stablecoins' reserve assets are tokenised (i.e. where issued stablecoin tokens are backed by real-world financial assets).

Stablecoins may threaten financial stability due to the growing interconnectedness between crypto assets and the broader financial system, especially if the reserves backing stablecoins are either of insufficient quality or quantity and there is a run on a stablecoin. Stablecoins have been likened to money market funds (MMFs), and are exposed to similar vulnerabilities: like MMFs, stablecoins need to be backed by liquid reserve assets to guarantee convertibility back into fiat currency (ECB, 2021).

[13] Please refer to Annexure C for an overview of ZARP as a case study.

However, losses on stablecoin reserve assets could cause a loss of user confidence and lead to large-scale redemptions, which could have negative fire-sale spillovers to the financial system (ibid.). As the case of Tether demonstrates, opacity around the quality, quantity and verifiability of stablecoins' reserves assets erodes confidence in their ability to remain stable during times of stress, and several newer stablecoin projects publish regular, independently audited statements of their reserve assets.

From a macroeconomic perspective, stablecoins could accelerate 'cryptoization' and digital dollarisation, especially in developing and lower-income economies[14]. Stablecoins may affect some countries more significantly than others depending on the sophistication of their existing financial and payment systems, the stability of their currencies and their level of financial inclusion (BIS, 2019).

Other studies on the potential impact of stablecoins use focused, hypothetical examples of how stablecoins could affect financial stability (see e.g. BoE, 2021; Liao and Caramichael, 2022). To this end, the second paper in the series will expand on the identified transmission channels and analyse the potential domestic financial stability considerations of stablecoins under four scenarios: (i) widespread adoption and use of an existing foreign-issued, foreign currency denominated stablecoin; (ii) rapid growth in the adoption and use of a domestically issued rand stablecoin by a registered bank or consortium of banks; (iii) rapid growth in the issuance of a domestic rand stablecoin by a non-bank entity; and (iv) a foreign issued, foreign currency denominated stablecoin by a bigtech firm for use on its global platform.

6 Conclusion

This topical briefing note provided an introduction to stablecoins and considered the transmission channels through which stablecoins could impact on financial stability - also referencing three case studies, including the recently collapsed Terra USD. As demonstrated by the case studies, a key risk associated with stablecoins concerns the quantity, quality and liquidity of the underlying reserve assets, as this could cause the peg to break during periods of heightened market stress and volatility, and potentially lead to a run on a stablecoin. Due to the interconnectedness of

[14] See Chapter 2 of the IMF's April 2022 edition of the *Global Financial Stability Report* for a more detailed discussion of the topic.

stablecoin reserves and the traditional financial system, fire-sale spillovers could potentially destabilise the financial system. The second part of this two-paper series explores the scenarios and conditions under which stablecoins could negatively impact on financial stability in South Africa.

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Annexure A: Non--exhaustive matrix of stablecoin design features and options

Table A.1: Stablecoin design features and option

No.	Stablecoin element	Description	Possible permutations
1.	Peg	To what is the stablecoin pegged?	• Sovereign/fiat currency • Commodity • Other traditional assets (e.g. gold) • Other crypto assets • Index • Combined/hybrid
2.	Stabilisation mechanism	How does the stablecoin maintain a stable value relative to the peg?	• Non-collateralised (i.e. stablecoin is pegged to rather than backed by assets) • Crypto collateralised • Fiat-collateralised • Other asset collateralised • Algorithm-based • Hybrid model
3.	Collateral and reserve assets	What type of collateral underpins the stablecoin (i.e. what is the quality of the collateral)?	• Sovereign/fiat currency • Commodity • Other traditional assets (e.g. gold) • Other crypto asset(s) • Combination/hybrid • No collateral
		What is the ratio of the collateral relative to the stablecoins in issue (i.e. what is the quantity of the collateral)?	• Over-collateralised • 1:1 collateralised • Partially collateralised • Not collateralised
		Who provides custody/trust services for the collateral (i.e. how are the collateral/reserve assets managed)?	• Single, centralised entity (e.g. a bank) • Multiple entities (i.e. consortium/association/council) • Tokenised funds • Off-chain collateralised • On-chain collateralised
		Who verifies / audits the existence of the claimed collateral?	• Unaudited / unverified • Independently audited / verified by a third party • Audited / verified by a non-independent/related third party
4.	Governance arrangements	Who is the stablecoin issuer?	• Single issuer • Multiple issuers • Decentralised issuer • Hybrid model • Smart contracts
		To what extent is the governance of the stablecoin centralised?	• Fully centralised • Fully decentralised • Initially centralised; then migrating towards a decentralised model • Hybrid model • Consortium/association/council • Consensus through approved participants/ node operators
		How are the rules governing the stablecoin arrangement initially established?	• Single entity • Multiple entities • Consortium/association/council

No.	Stablecoin element	Description	Possible permutations
			• Consensus through approved participants/ node operators
		How are the rules governing the stablecoin arrangement amended once operational?	• Single entity • Multiple entities • Consortium/association/council • Consensus through approved participants/ node operators
		How is the infrastructure operated?	• Permissioned • Permissionless • Consortium/association/council • Fully centralised • Fully decentralised • Hybrid model
		What is the ledger model?	• Wallet-based • Account-based • Centralised\Decentralised
5.	Liability	Whose liability are the stablecoins in issuance (i.e. does the stablecoin holder have a claim on the issuer)?	• Claim on issuer • Claim on issuer, subject to holder meeting compliance requirements • Claim on approved intermediary; users have no rights or claims on underlying reserve assets • Interest in an equivalent amount held in the reserve assets • No claim on the issuer • Partial claim on the issuer
6.	Minting (i.e. issuance) and burning (i.e. redemption) process	What is the process through which the stablecoins are minted (i.e. issued) and burned (i.e. redeemed)?	• Manual process: Issued and redeemed upon receipt/redemption of collateral • Automated process: Issued and redeemed upon receipt/redemption of collateral • Stablecoins issued independent of collateral
		With whom are stablecoins redeemed?	• Directly redeemable from the issuer • Directly redeemable, but not in full • Only indirectly redeemable through approved participants • Directly redeemable • Not redeemable
		To what extent is redemption guaranteed?	• Fully guaranteed on a 1:1 basis based on the underlying collateral • Partially guaranteed based on the underlying collateral • Not guaranteed
7.	Market support services	Who stores the private keys that provide access to the stablecoin?	• Issuing entity • Different to issuing entity • Single entity • Multiple entities • Consortium/association/council • Consensus through approved participants/ node operators
		Who provides services related to the exchanging, trading, reselling, and market making of the stablecoin?	• Issuing entity • Different to issuing entity • Single entity • Multiple entities • Consortium/association/council • Consensus through approved participants/ node operators

No.	Stablecoin element	Description	Possible permutations
8.	Transaction validation / movement of value	How are transactions validated?	• Fully centralised • Fully decentralised • Initially centralised; then migrating towards a decentralised model • Hybrid model • Consortium/association/council • Consensus through approved participants/ node operators
		What transfer mechanism is employed (i.e. how is value transferred via the stablecoin)?	• On-chain • Off-chain • Hybrid
		What medium of record (i.e. ledger model) is used?	• Single public blockchain • Single private blockchain • Single public blockchain • Multiple public blockchains • Hybrid model

Annexure B: Case study: Tether

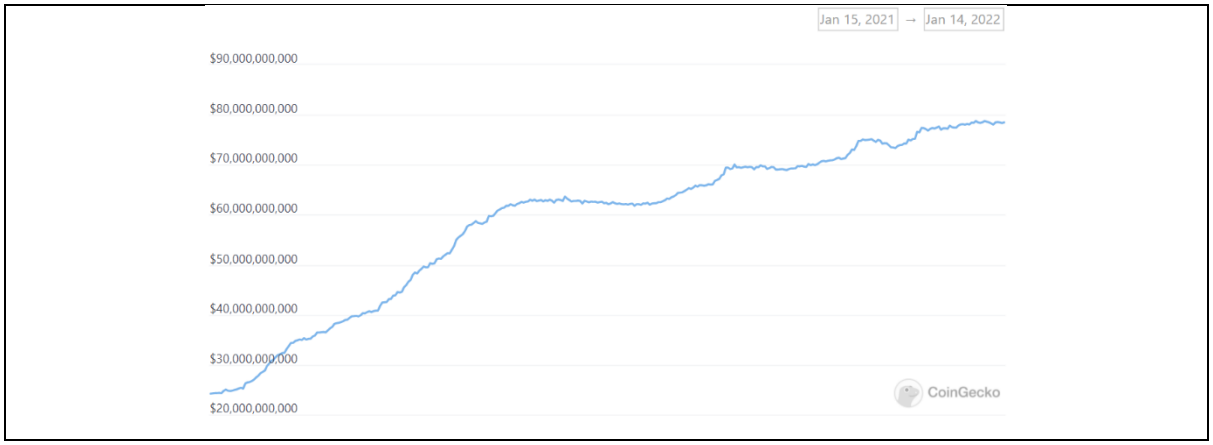
Tether is currently the third-largest crypto asset by market capitalisation after Bitcoin and Ethereum, increasing its market capitalisation almost thirty-fold over the past three years, from around $3 billion at the beginning of 2019 to approximately $80 billion as at December 2021. As revealed by the 2020 legal case of Tether Inc. (the company behind the largest stablecoin by market capitalisation, Tether[15]) and crypto asset exchange Bitfinex versus the New York Attorney General, simply calling something a stablecoin and stating that there are sufficient reserves for each stablecoin in issuance does not make it so (James, 2021). The case – which revealed that Tether Inc. generally held no more than around 70% of actual USD in cash and cash equivalents for the number of Tether USD in issuance at any given point in time (Kelly, 2021) – prompted some interesting reflections on the sequencing of stablecoin issuance, the amount and quality of stablecoin reserves, the holding and verification of reserves, redemption rights, governance and indeed a host of other permutations when thinking about stablecoins.

Tether was launched in July 2014 under the name 'RealCoin' before being renamed to 'Tether' in November 2014 (Lipscomb, 2021). As at 13 January 2022, the value of Tether in issuance was US$78,421,164,835 (CoinMarketCap, 2022), with Tether Inc. claiming that "every Tether token is always 100% backed by our reserves, which include traditional currency and cash equivalents *and, from time to time, may include other assets and receivables from loans made by Tether to third parties, which may include affiliated entities*" (Tether Inc., 2022, emphasis in italics added). Both the quality and quantity of Tether Inc.'s reserves have been the topic of much speculation from as early as 2017, with US regulators subpoenaing Tether Inc. to disclose its purported dollar reserves backing the Tether in issuance (Jenkinson, 2018). Interestingly, the audit firm appointed to perform the audit, Friedmann LLP, never completed the audit and parted ways with Tether Inc. shortly after starting the audit, further fuelling speculation as to the quality and quantity of Tether Inc.'s reserves. Then, in April 2019, the New York Attorney General accused Tether Inc.'s sister company, crypto asset exchange Bitfinex, of having used at least $700 million from

[15] Please refer to Box 1 on page 2 for an overview of Tether Inc.'s treasury's approach and the findings of the New York Attorney General in this regard.

Tether's cash reserves to conceal a loss of around $850 million (Browne and Huang, 2019). Following the New York Attorney General's formal inquiry into the matter, concluded in February 2021, it found that "Bitfinex and Tether [Inc.] recklessly and unlawfully covered up massive financial losses to keep their scheme going and protect their bottom lines", and that "Tether [Inc.]'s claims that its virtual currency was fully backed by US dollars at all times was a lie" (James, 2021). The New York Attorney General accordingly imposed a relatively small fine of US$18.5 million on Tether Inc. and Bitfinex, and Tether Inc. admitted to no wrongdoing in the settlement agreement (Kelly, 2021). Inexplicably, neither the New York Attorney General's findings about Tether Inc. and Bitfinex's conduct nor the fine imposed led to a market sell-off of Tether tokens. In fact, as shown in the figure below, Tether issuance and use continued to surge, more than doubling from US$34.76 billion on 23 February 2021 (i.e. the day the New York Attorney General published a press release on the matter) to US$78.48 billion in the 11 months to 13 January 2022.

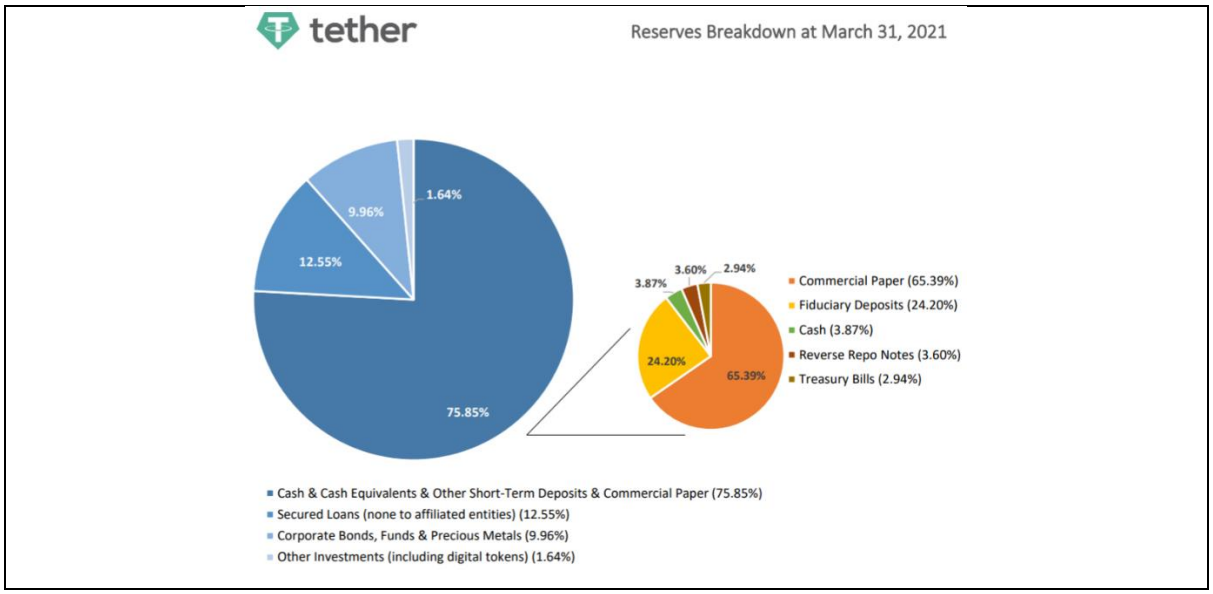
Figure B.1: Market capitalisation of Tether



Source: CoinGecko

In addition, as part of the settlement agreement, Tether Inc. agreed to disclose on a quarterly basis details of the assets backing its tokens (Kelly, 2021). The first such disclosure – for the quarter ended 31 March 2021 – is depicted in the figure below.

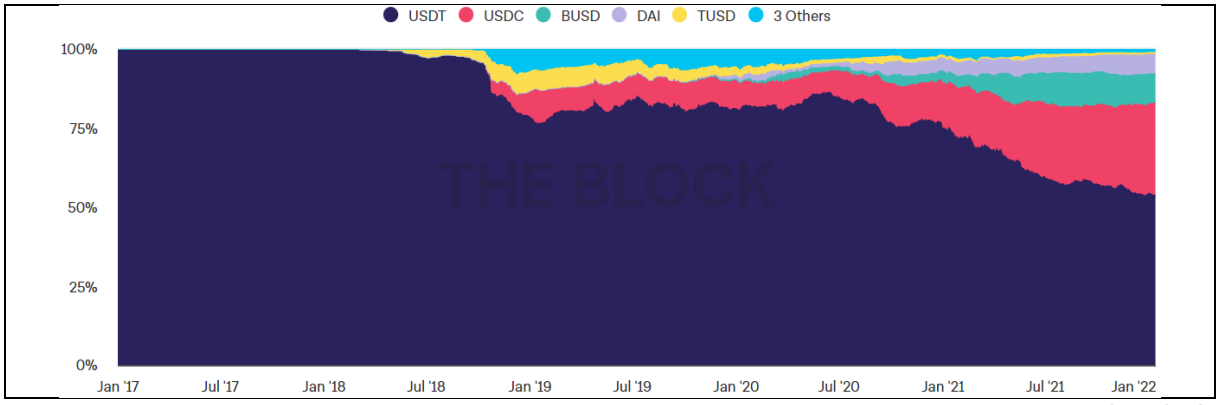
Figure B.2: Breakdown of Tether Inc.'s reserves as at 31 March 2021



Source: Tether

Based on Tether Inc.'s disclosure, actual cash reserves only constitute 3.87% of Tether Inc.'s 'cash and cash equivalents and other short-term deposits and commercial paper', or 2.94% (i.e. 3.87% of 75.85%) of its total reserves. Once again, this disclosure, which was published on 13 May 2021, did nothing to quell the market's appetite for Tether tokens as depicted in Figure B.1 above. What has, however, happened over the last two years is that Tether issuance, while still growing, is losing ground to some newer stablecoins with greater transparency and higher-quality reserves as depicted in the figure below.

Figure B.3: Stablecoin market share as at January 2022



Source: The Block

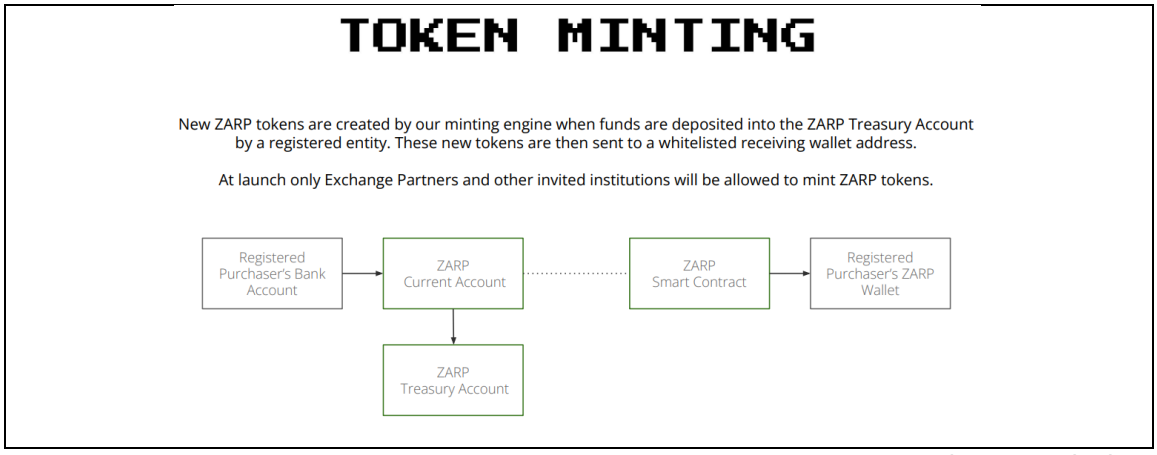
It may therefore be noted that although stablecoin growth is continuing unabated, Tether's market share continues to decline from around 80% at the end of 2018 to approximately 53% as at 13 January 2022.

Annexure C: Case study: ZARP

In mid-November 2021, several South African news articles (see, e.g. Vermeulen, 2021; Businesstech, 2021) reported on the launch of ZARP – a rand-backed stablecoin. Although rand-pegged stablecoins have been around at least since 2018 (when AltCoinTrader launched its rand-pegged stablecoin, xZAR), the operators of ZARP have been significantly more visible and vocal in the local media (see e.g. articles by Moneyweb, 2021, and TechCentral, 2021, on ZARP's launch), and have been at pains to emphasise that all ZARP tokens in issuance are backed at all times on at least a 1-1 basis by rand held in an account with their banking partner (ZARP, 2022). The launch of ZARP has elicited debate on stablecoins in the South African context, particularly around issues such as who has (or should have) the right to issue them, and whether such issuance is, can and/or should be prohibited in law.

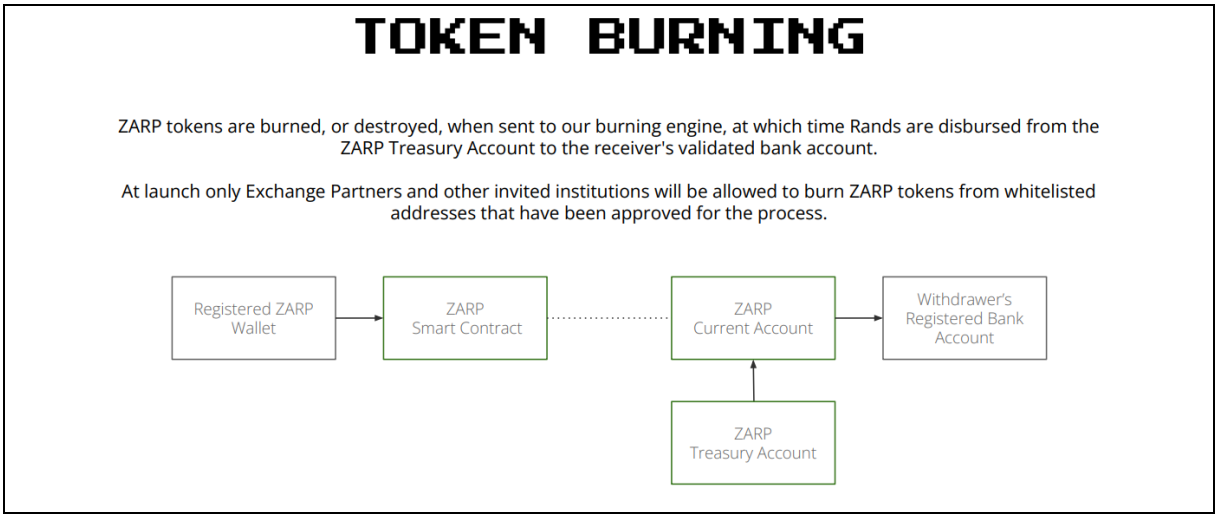
ZARP is currently not directly available to retail customers, and individuals can only acquire ZARP tokens via an authorised ZARP distributor (i.e. a crypto asset trading platform). Although all ZARP tokens in issue are currently fully backed by rands held with a registered South African bank and regularly audited, there are currently no explicit prudential requirements requiring stablecoin issuers to operate their treasury function in this manner. Coupled with the fact that stablecoin issuers currently require no formal authorisation to start operations, there is a risk that rand-pegged stablecoins could be issued domestically without being fully backed by high-quality, highly liquid assets. The ZARP token issuance and redemption processes are depicted below.

Figure C.1: ZARP token issuance (i.e. 'minting')



(Source: Dingle, 2022)

Figure C.2: ZARP token redemption (i.e. 'burning')



(Source: Dingle, 2022)

Annexure D: Case study: Terra USD

The Terra USD stablecoin (UST) is an algorithmic stablecoin issued by Terraform Labs (Terra). The objective of the UST/Luna project was to promote the adoption of decentralised technologies (DeFi) by incentivising arbitrage opportunities and encouraging platform adoption. To maintain the 1-1 peg to the US dollar, the algorithm underlying the UST token would buy and sell UST's unbacked, unpegged sister tokens (i.e. Luna tokens) in line with demand for UST stablecoins. When the price of Luna increased, causing the UST to increase above US$1, the protocol would mint more Luna to reduce their price, causing the price of UST to decline. The opposite would happen to maintain the peg when the price of Luna declined (Freeman, 2022). Over time, numerous projects employed the Terra protocol for development, and the accompanying UST token, leading to a surge in UST issuance and exponential growth in the value of the Luna token from below US$1 in early 2021 to US$116 in April 2021 (Yaffe-Bellany and Griffith, 2022).

Common to other financial instability episodes, the events in May 2022 were triggered by a shock. The demand for Luna was driven by a product that Terra developed, namely Anchor – a savings protocol on the Terra blockchain that pays depositors a stable interest rate by 'staking' their owners, thereby providing liquidity. In the days leading up to Terra's crash, UST issuance surged, causing UST's 1-1 peg to the US dollar to break. Initially the peg broke only to just below US$0.99, but it prompted more than US$2 billion worth of withdrawals from the Anchor savings protocol (Lin, 2022). This led to a further loss of confidence in the ability of UST to maintain its 1-1 peg to the USD. As a result, more unbacked Luna tokens were minted, causing an ongoing spiral of decline in the value of Luna (or 'death spiral'), ultimately leading to the complete collapse of the UST peg.