# *Monitoring Financial Stability Risks of South African Collective Investment Schemes*

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**FACULTY OF COMMERCE – SCHOOL OF ECONOMICS**

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*Declaration*

I, *Kirstin Detering*, hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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***Abstract***

Financial stability and systemic risk have been central to macroeconomic policy since the Global Financial Crisis (GFC) of 2007/2008. Whereas the regulatory focus previous to the crisis was on micro-prudential risk management of the formal banking sector, policymakers and supervisors realized that macro-prudential oversight of the financial system, including Non-Bank Financial Intermediaries, is key to maintaining financial stability. Since Collective Investment Schemes (CISs) present a large component of South African Non-Bank Financial Intermediation (NBFI), this paper proposes measures to monitor risks within this sector based on the indicators applied by the Financial Stability Board (FSB) in its *Global Monitoring Report on Non-Bank Financial Intermediation* as well as other financial stability reports. All measures are calculated on a quarterly basis and we find that the results for the FSB indicators are comparable to the findings in the *Global Monitoring Report on Non-Bank Financial Intermediation.* This implies that the levels of *Liquidity Transformation* (*LT*) are in the upper bound, which is characteristic of EMEs. For Money Market Funds, the levels of *LT* seem to be slightly problematic as their Weighted Average Maturity surpasses the regulatory threshold of 130 days in all but two quarters which raises concerns about the liquidity status of these funds and how they would fair in circumstances of economic distress.

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## Introduction

High levels of risk in the non-banking sector in the period leading up to the Global Financial Crisis (GFC) has been identified as a major contributing factor to the resulting financial turmoil and global recession (Altunbas et al., 2018:203). Since then, reducing financial stability risks in the non-banking sector and transforming Non-Bank Financial Intermediation (NBFI) into resilient market-based finance has been a core objective for the Financial Stability Board (FSB). Practically this has resulted in the evaluation of bank-like risks using four financial stability risk metrics (credit intermediation, liquidity and maturity transformation, and leverage) to inform the regulation of NBFI. Credit intermediation evaluates the range of assets managed by a fund, whereas liquidity transformation determines the ratio of liquid assets to illiquid assets. In addition, maturity transformation estimates the underlying maturity mismatches from such intermediation, whereas leverage relates a fund's total assets to its equity. Determining the levels of credit intermediation, liquidity and maturity transformation, as well as leverage, provides a basic understanding of the main activities that constitute NBFI and thereby a "systemic risk map" can be developed to identify which activities, if any, are presenting systemic risk (Kodres, 2013:42 and FSB, 2019:45). The main contribution of this paper, lies in the application and augmentation of this risk-evaluation framework by adding two other risk indicators, namely Weighted Average Maturity (WAM) and Foreign Currency Exposure (FCE).

This research aims to take a first step towards measuring risks and better understanding South African Non-Bank Financial Intermediation to inform more appropriate risk management practices. Given that South African Collective Investment Schemes represent a large constituent of NBFI, this study specifically focuses on the financial stability risks originating in this sector. Furthermore, the argument is put forth that the monitoring of financial stability risks needs to be central to the bi-annual Financial Stability Review published by the South African Reserve Bank. The reason for this is that financial stability does not only depend on the soundness of the regulated banking sector and the risks associated with its operations, but also on the risk profile of Non-Bank Financial Intermediaries. Due to interconnections between these financial sectors, the contagion of risk and sectoral spill-overs present a major threat to financial stability. As such, the limitations of this research are manifested in the particular focus on financial stability risks of South African CISs whereby financial stability risks of other financial institutions besides CISs, as well as direct and indirect interconnectedness, are not considered.

Understanding Non-Bank Financial Intermediation and the associated concerns and benefits are essential for the analysis of non-bank financial intermediaries and their risk profile. Although non-bank financial intermediaries perform bank-like activities such as credit intermediation, they are nevertheless distinct from regular banks based on their operational and structural features. Whereby credit intermediation in the regular banking sector occurs within one institution, credit intermediation within the NBFI sector generally consists of an intermediation chain involving one or more financial institutions. Furthermore, the particular regulatory environment of these financial sectors leaves Non-Bank Financial Intermediation with less stringent regulatory requirements but also no access to public backstops, liquidity sources or tail risk insurance (Adrian & Ashcraft, 2012:6 and Kemp, 2017:19). As the events of the GFC illustrated, this has implications for the propagation of systemic risk, and thus the monitoring of NBFI has shifted into the focus of policymakers. The risks associated with this sector are a challenge for regulatory authorities and policymakers as policy changes can lead to unintended spill-overs and limit the benefits associated with NBFI. Therefore, it is also important to understand the financial stability risks of non-bank financial intermediaries in the context of their interconnectedness with other financial intermediaries and how this has changed over time. The two channels of risk transmission discussed in the literature are the market and the counterparty channel. Having this theoretical understanding of risk contagion is important for analysing the implication of risks in NBFI/CISs on financial stability and the wider South African economy. As stated by the South African Reserve Bank (2017:2), financial stability is a precondition for sustained economic growth but the reverse is also true. And as noted before, the evaluation of financial stability needs to consider sectors of the financial system, including the one of Non-Bank Financial Intermediation.

To establish a foundation for the risk monitoring of South African Collective Investment Schemes, this study makes use of quarterly CISs statistical reports published by the Association of Savings and Investment South Africa (ASISA) and quarterly portfolio-holdings data published by Morningstar. Using the ASISA data, the risk indicators as proposed by the FSB are evaluated for South African Collective Schemes, differentiating between the various fund types. As such, measures of credit intermediation, maturity and liquidity transformation, as well as leverage, are applied for Money Market Funds (MMFs), Fixed Income Funds (FIFs), Multi-Asset Funds (MAFs), and Real Estate Funds. The main contribution of the paper,

however, lies in the application of two additional risk indicators that are not applied by the FSB, namely Weighted Average Maturity (WAM) and Foreign Currency Exposure (FCE). The calculation of WAM also uses ASISA data and focuses exclusively on Money Market Funds and Fixed Income Funds as this is common practice (see BIS, 2021:25 and ESRB, 2020:69). For the evaluation of Foreign Currency Exposure, this study used the quarterly Morningstar datasets and merged them into a panel, covering March 2016 to September 2020. This indicator assesses the percentage of portfolio holdings that are denominated in foreign currency and also presents the exact composition of the portfolio holding's currencies.

As the research of South African Non-Bank Financial Intermediation is still in its beginning stages, the available data proved to have accuracy shortcomings but also misses valuable information about off-balance sheet activities and liability transactions that are needed for the estimation of some FSB financial stability risk indicators. Therefore, the application of the FSB risk indicators is constrained by data limitations and resulted in missing results for certain indicators. Although this study is limited by the quality of the available data, it should not be taken as implicating the quality of this research, but rather as a necessary step in a process that informs the data collection of ASISA and Morningstar. In addition, the discussion of the results aims to be explicit about the extent to which the empirical analysis is constrained to guide future research.

This research finds that the results of Credit Intermediation, Maturity and Liquidity Transformation are comparable to the most recent results published in the FSB *Global Monitoring Report on Non-Bank Financial Intermediation* (FSB, 2020:38-44). Whereas the levels of Credit Intermediation and Maturity Transformation are within a reasonable threshold, the levels of Liquidity Transformation for all fund types are especially high. Although this is common for Emerging Market Economies, the results of Weighted Average Maturity indicate that for Money Market Funds, in particular, their liquidity status might be somewhat compromised. This is true because the effective maturities of the underlying assets surpass the prescribe the threshold of 130 days and thus they are not necessary highly liquid (FSB Template). Regulation determines that the portfolio of Money Market Funds may not have a WAM larger than 130 days, however, for all but two quarters this threshold is exceeded

(ASISA, 2018:6).[1] This finding needs to be further investigated to determine the concrete implications for systemic risk but also if and how regulatory authorities should respond to this. Lastly, the analysis of Foreign Currency Exposure shows no indicative correlations to other portfolio variables and thus should be approached differently in terms of methodology.

To provide a better understanding of the Non-Bank Financial Intermediation in general, Section 1 of this paper outlines a definition of NBFI as proposed by the FSB and its associated concerns and benefits. Section 2 discusses the context of the financial system in which NBFI takes place and as such explains the operational and structural differences between regular banks and non-bank financial intermediaries. Furthermore, it describes how risks can be transmitted from one sector to the other through the market and counterparty channel and the implications that risks in NBFI have on financial stability and the real economy. Thereafter, Section 3 summarizes the key aspects of the ASISA and Morningstar data and provides general trends and developments of South African Collective Investment from March 2015 to December 2020. Lastly, Section 3 furthermore reviews the data limitations encountered during this research and proposes ways to overcome these shortcomings. Section 4 outlines the applied methodology whereas Section 5 presents the empirical findings. The key takeaways are briefly summarized in Section 6 and Section 7 concludes.

## 1. Understanding the global sector of Non-Bank Financial Intermediation

Since the Global Financial Crisis, researchers and policymakers focused their attention on the understanding and management of financial stability to avoid the detrimental consequences of a distressed financial system. The absence of financial sector stability in 2007-2009 causing one of the longest and severe recessions seen in decades, led policymakers to realize the flaws inherent to financial sector regulation and the minimal attention that was paid to the systemic nature of risk originating from the sector of Non-Bank Financial Intermediation. Before the crisis, central banks' main concern regarded the micro-prudential supervision of risks within the traditional banking sector and the maintenance of price stability (Altunbas, Binci, & Gambacorta, 2019:203 and Hollander & Van Lill, 2019:22). However, the unexpected severity of the crisis compelled policymakers to consider not only the regulated banking sector but also the sector of NBFI when formulating policy for the protection of financial stability. The pre-

[1] It is important to note that this result may be due to mistakes in the data. Further research will confirm whether this holds.

crisis limitations that applied to a policy in general, are also true for the South African context. As such, the South African Reserve Bank is challenged with expanding its focus on other parts of the financial system that were previously neglected. The following aims to outline a general definition of Non-Bank Financial Intermediaries and their associated benefits and dangers to the wider financial system. A better understanding of these institutions illustrates their importance to the financial system as well as the wider economy and thus, why NBFI is a necessary consideration for a sound and holistic regulatory framework.

### *i. Defining Non-Bank Financial Intermediation and its Intermediaries*

Because the propagation of systemic risk within the sector of Non-Bank Financial Intermediation leading up to the GFC went mostly unnoticed, experts coined the term "shadow banking" to describe intermediaries and activities unfamiliar to the general public (Luck, 2014:1). The meaning of this term, however, is ambiguous and projects a pejorative quality on this system of credit intermediation and thus the use of "Non-Bank Financial Intermediation" is deemed more appropriate and will be applied for the remainder of this paper. Although there is a multitude of definitions for NBFI, the one proposed by the Financial Stability Board (FSB) describes it as "the system of credit intermediation involving entities and activities outside of the regular banking system." (FSB, 2017:6). The system of Non-Bank Financial Intermediaries separates credit intermediation into a sequence of discrete operations that involves either a single entity or multiple entities forming an intermediation chain (Ghosh, Gonzalez del Mazo & Ötker-Robe, 2012:2 and Adrian, 2014:2). Similar to the process in the traditional banking sector, the credit intermediation activities performed by money market, investment and exchange trading funds involve maturity and liquidity transformation as well as leverage and credit risk transfer (Abad, D'Errico, Killeen, Luz, Peltonen, Portes, Urbano, 2017:6).[2] Nevertheless, NBFI is differentiated from the regular banking sector by regulation and does not have the same insurances. As such, the operations of NBFI raise certain concerns and the potential of systemic risks that this represents, needs to be well-understood to avoid a major crisis like the one in 2007.

[2] Other Non-Bank Financial Intermediaries include conduits, securitization vehicles, finance, insurance, and leasing companies as well as credit hedge, real-estate, fixed-income funds and broker-dealers (Kemp, 2017:11 and Ghosh *et al*., 2012:2).

*ii. Key concerns*

One of the key concerns of NBFI relates to the funding profile of intermediaries as fund shares are typically redeemable at request. This opens the possibility for immense withdrawals – known as "runs" – making the sector vulnerable to variability in investor confidence. On the one hand, historically stable yields have created an expectation of safety and as a result, tend to attract risk-averse investors who are more prone to withdraw funds in times of financial distress. Moreover, these circumstances create first-mover advantages when fund prices and the fund's underlying assets do not reflect the actual market value (Gehrend &Weber, 2020:144). To avoid major losses, investors need to withdraw funds early to circumvent being left with lower-quality assets and exploit the higher repayments reflecting the inflated market value. On the other hand, asymmetric information among investors might create the perception of widespread financial distress when only one fund experiences trouble (Bengtsson, 2016:66). Since financial interconnectedness is a feature of any integrated financial system, the implications of runs in the NBFI sector necessarily have consequences for the wider financial system and the real economy. Interconnections between Non-Bank Financial Intermediaries present various channels of contagion and thus are crucial in the evaluation of systemic risk. Whereby direct interconnectedness refers to the investment in the shares of one financial institution in another, indirect interconnectedness follows when various institutions are exposed to the same market price shocks through common asset holdings (Deutsche Bundesbank, 2017:97). The problems associated with interconnectedness and the channels of contagion that this represents are further exacerbated by the lack of last resort funding and minimal regulatory attention being paid to the sector of NBFI (Kemp, 2019:19 and Adrian, 2014:4). Therefore, policymakers are faced with the challenge of maximizing the benefits of NBFI while minimizing the systemic risk it might pose to financial stability (Ilesanmi, Tewari 2019:6).

*iii. The benefits of NBFI*

Although the risks associated with NBFI present a major challenge to the financial system, regulatory bodies and policymakers, the potential benefits of Non-Bank Financial Intermediation are undeniable (Bengtsson, 2016:61). In many jurisdictions, the total assets held by Non-Bank Financial Intermediaries have been increasing at a faster rate relative to regular banks as well as pension and insurance funds. As such, NBFI continues to grow in size and importance to the financial system overall. One beneficial attribute of NBFI is the alternative

funding it presents for a large number of investors and the increased access to capital for the broader public (Meade, Biddle, Merrit, 2012:1). NBFI, therefore, increases competition with banks which diversifies channels of credit and, *ceteris paribus*, decreases the cost of credit. As a consequence, the system of non-bank financial intermediaries provides cheaper financial services and presents an additional channel of funding to the real economy which in turn incentivizes economic growth (Ilesanmi & Tewari, 2019:2). Another benefit associated with NBFI is the delivery of financial products and services being more efficient due to specialization within the sector. The expertise of Non-Bank Financial Intermediaries allows them to channel resources according to the investor demands more proficiently and as such contribute to the growth of financial markets (Ghosh *et al*., 2012:2). Non-Bank Financial Intermediaries are thus well-equipped to serve the particular needs of investors and increase competition with the regular banking sector. As such, the NBFI sector does not only entail financial services that are not necessarily offered by traditional banks but also incentivize financial innovation (ESRB, 2014:4). Lastly, the segmentation of credit intermediation and the multitude of market participants within the sector of NBFI presents a potential source of risk diversification. As more financial institutions are involved in the process of credit intermediation, pricing and the allocation of risks is diversified and supported by a range of tools for liquidity, maturity and credit risk management (Price & Schwartz, 2015:69, Meade *et al*., 2012:1 and Bengtsson, 2016:60).

## 2. Non-bank financial institutions, the financial system, and the real economy

As the previous section pointed out, Non-Bank Financial Intermediation is part of a wider financial system and the real economy. Interconnections between Non-Bank Financial Intermediaries and traditional banks are characteristic of any financial system and present possible channels of financial contagion that are important to consider when evaluating financial stability. As this research solely focuses on the financial stability risks within South African Collective Schemes, this section aims to highlight the importance of understanding NBFI in the context of a larger (financial) system. No evaluation of financial stability can be based on only one sector of the financial system and thus it is essential to point out that the results of this research need not only be considered on their own merit, but also in the context of interconnectedness. The following expands on the overview provided in Section 1 and presents a more comprehensive summary of the differences and interconnections between traditional banks and Non-Bank Financial Intermediaries as well as a contextualization of financial stability and the implications for the real economy in the subject matter.

*i. Operational differences between banks and Non-Bank Financial Intermediaries*

Although both banks and Non-Bank Financial Intermediaries engage in credit intermediation which involves maturity and liquidity transformation, as well as leverage and credit risk transfer, these two kinds of institutions are distinct based on operational and structural characteristics. As commonly known, regular commercial banks accept deposits from their customers, offer them redemption at par and bear all risks associated with the management of these assets. Non-Bank Financial Intermediaries, however, and specifically CISs, raise funds mainly through investments from savers (Kemp, 2017:30). Although investors' funds are also redeemable at demand, the risks of investment losses are solely carried by the investor and not by the financial intermediary (Price & Schwartz, 2015:69). In other words, investors are exposed to risks directly and bear a higher probability of investment losses (Lowe, 2015:2). Another feature that distinguishes commercial banks from Non-Bank Financial Intermediaries relates to the process of credit intermediation. Whereby the intermediation between savers and borrowers in the regular banking sector typically takes place through one institution, Non-Bank Financial Intermediaries are involved in an intermediation chain that often comprises more financial institutions (Adrian & Ashcraft, 2012:16 and Ghosh *et al*., 2012:2). This structural difference in itself is not problematic, but since Non-Bank Financial Intermediaries operate without the insurance of public sources of liquidity and might be subject to less stringent regulatory policies, their activities are inherently riskier. Less stringent regulation is associated with lower operational costs, motivating and creating the potential for the restructuring of banks' financial activity into the sector of Non-Bank Financial Intermediaries (Adrian, 2014:3). This is true in general but also for the South African context, where, for example, South African CIS under the Collective Investment Schemes Control Act 45 of 2002 (CISCA) are prescribed the asset holdings according to their fund type. Whereas this protects the interests of South African investors by limiting investor risk to a certain degree, investments are not guaranteed and are still subject to market losses (Kemp, 2017:30). As a result, interconnections between banks and Non-Bank Financial Intermediaries form, which open channels of contagion and a greater risk to financial stability. Consequently, although credit intermediation on the balance sheet of commercial banks usually does not involve Non-Bank Financial Intermediaries and these two kinds of institutions are distinct from a structural and operational perspective, the incentives set out by regulatory arbitrage and specialization of NBFI create interconnections between them.

*ii. Interconnections and the transmission of risk between the NBFI and banking sector*

Non-Bank Financial Intermediaries and the sector in which they operate were not regarded as systemically important before the GFC 2007-2009. Since then, experts acknowledged that the continued growth of Non-Bank Financial Intermediation implies a more important role for the financial system but also stronger interconnections with other financial intermediaries (Ilesanmi & Tewari, 2019:7 and Grill *et al*., 2020). Although the majority of NBFI occurs outside the regular banking system, some activities involve bank holding or insurance companies as well as commercial banks. These interlinkages are a potential source of systemic risk for the financial system at large because of the inherent fragility of the NBFI sector (Adrian & Ashcraft, 2012:10).

Although there is a multitude of reasons for the development of systemic risk, the literature on Non-Bank Financial Intermediation channels through which risks in the NBFI sector transmits to the rest of the financial system of which this research identified the two most common ones. When a loss of investor confidence forces Non-Bank Financial Intermediaries to liquidate assets to meet their redemption demands, the consequences are destabilizing fluctuations in asset prices. In such an event, financial distress is said to be transmitted through the market channel. Depending on a fund's liquidity status, large withdrawals from a fund can cause run-like conditions leading to fire-asset sales and through interconnections, the financial distress can spread to other financial institutions that hold these assets (Price & Schwartz, 2017:72). Another channel for risk transmission is the counterparty channel. Non-Bank Financial Intermediaries have direct linkages with other financial intermediaries because of derivative contracts that make them counterparties, portfolio investments or because of the provision of other financial services. In many cases, banks provide credit to funds that return collateral to the bank. "Leverage-like collateral chains" (Price & Schwartz, 2017:72) may then develop when the bank re-uses this collateral for its purposes. This, in turn, may lead to the expansion of the intermediation chain which makes the revelation of counterparty risk more obscure. Systemic risk arises, when funds seek to recall those assets and they experience liquidity shortages because the banks fail to issue the equivalent amount of securities (Singh, 2011:9 and Price & Schwartz, 2017:72).

In the South African context, where interconnectedness among Non-Bank Financial Intermediaries and regular banks is high relative to other jurisdictions, the awareness of these risk channels is essential for the monitoring of systemic risk (Kemp, 2017:7). As such, financial system interconnectedness can have implications for financial stability and the real economy if the development of systemic risk which can transmit through these channels, goes unnoticed.

### *iii. Financial Stability and implications for the real economy*

Interconnectedness and network structures determine the extent of financial contagion and thus are an essential consideration for the monitoring of systemic risk as well as policy formulation (Acemoglu *et al*., 2015:564). Since the financial system is part of the real economy and strong interconnections persist, central banks understand that financial stability is a precondition for sustainable economic growth and the creation of employment. Nevertheless, it is also true that developments within the real economy also have implications for financial stability. On the one hand, financial stability is directly impacted by low levels of economic growth due to higher rates of unemployment and the limited ability of households to service their debt. On the other hand, the social hardships that are associated with low economic growth can have negative consequences for political stability and a country's sovereign credit rating (SARB, 2017:2). Both low economic growth and credit downgrades are characteristics of South Africa's economic landscape and thus put certain pressures on financial stability. Therefore, regulatory bodies and the South African Central Bank must support a financial system that is resilient to financial shocks and facilitates efficient financial intermediation to maintain confidence in the system (Ilesanmi & Tewari, 2019:3). Furthermore relating it to the context of this particular study, the Financial Sector Conduct Authority (FSCA) who regulates South African CISs in terms of the Collective Investment Schemes Control Act 45 of 2002 (CISCA) is challenged to take on the monitoring of financial stability risks within this sector as this poses systemic risks and as such implications for financial stability (Kemp, 2017:30).

## 3. Data

Although South Africa has been participating in the annual Financial Stability Board's global monitoring exercise since its establishment, no additional efforts have been implemented for the monitoring of financial stability risks originating from NBFI in South Africa. As such, the goal of this research is to focus on South African NBFI and more specifically the CIS sector as it amounts to a large portion of the NBFI measure (Kemp, 2017:17). Furthermore, the contribution of this paper lies in its analysis of quarterly data whereas the FSB monitoring

exercise only considers annual data covering either one or two years. Given its size, Collective Investment Schemes may be a major source of systemic risk and thus needs to form a central role in any financial stability review. This analysis makes use of the quarterly Association for Savings and Investment South Africa's (ASISA) statistical reports from March 2015 to December 2020 and the quarterly Morningstar portfolio data reports from March 2016 to September 2020. Since the research of NBFI in South Africa is limited, however, the shortcomings of the various data sources are also not very well documented. The following provides a brief description for both datasets and uses the ASISA reports to illustrate the trends and developments of CIS from March 2015 to December 2016. Lastly, the limitations of the data are outlined which provides context for the interpretations of the results in Section 5. Understanding the data and its limitation is important for future research as inadequate data limits the ability to identify the size, activities and risks within South Africa's CIS sector but also wider Non-Bank Financial Intermediation. This, in turn, could lead to systemic risk propagating unnoticed (Kemp, 2017:8)

The quarterly ASISA reports are publicly available on ASISA's website and offer statistics for the South African Collective Investment Schemes (CISs) sector. Each statistical report includes 57 individual sheets which organize the information about the sector according to two classifications, namely the first and the second tier. Whereby the first tier of classification refers to the geographical foci of a particular fund type, the second classification indicates whether a fund is classified as Equity, Multi-Asset, Fixed Income or Real Estate Fund (ASISA, 2018:2). The computation of the risk indicators as proposed by the FSB only requires the second tier of classification, and thus the results in Section 6 are given for the various fund types. For the estimation of Weighted Average Maturity, the focus is limited to only Money Market and Fixed Income Funds, as this is common practice for most Financial Stability Reports (see for example the *BIS Quarterly Report* (BIS, 2021) and *EU Non-Bank Financial Intermediation Risk Monitor 2020* (ESRB, 2020)). A detailed account of the use of the ASISA statistical reports is provided in Appendix A for the interested reader.

For the calculation of Foreign Currency Exposure, this research makes use of the Morningstar portfolio data as it includes more granular information in terms of listing the individual holdings of portfolios and their currency denomination. Unlike the ASISA reports, the Morningstar holdings data is not publicly available and can only be accessed through a

subscription. The South African Reserve Bank has this subscription and provided the quarterly reports in Excel format from March 2016 to September 2020. Each quarterly data set includes 16 variables and the number of observations differs between the various quarters from 64 957 (March 2016 having the smallest number of observations) to 88 542 (December 2019 having the largest number of observations). The size of the individual datasets represented itself as impractical for performing the empirical analysis in Excel and thus the different reports were merged into one big data set in Stata with a total of 1,506,227 observations. To maintain consistency between the quarterly data sets, the format for the quarters March 2016 – June 2018 was adjusted according to the structure of the subsequent reports by removing variables and rearranging their order. This step was necessary to merge the individual datasets into one, but it needs to be noted that no important information for this analysis was lost in the process. Since the total number of portfolios within the dataset is 27,560 (which includes the multiple occurrences of one particular portfolio across the quarters) and thus too large for a concise and indicative analysis, I focus on only 13 portfolios. The reason for this potentially arbitrary number comes from filtering portfolios in terms of their market value in March 2016 (first period) as well as September 2020 (final period). As a result, the largest 10 portfolios of the respective periods were identified and of these 20 observations, 14 are identical (i.e. there are 7 portfolios which were the largest in March 2016 and September 2020) and the other six differed across the two periods. A description of the other variables within this dataset is included in Appendix B and the list of the individual portfolios that form the focus of this analysis is given and further discussed in Section 6.

*i. Trends and Developments in the South African CIS sector*

Collective Investment Schemes are categorized as Economic Function 1 (EF1) entities by the Financial Stability Board (FSB) for their yearly *Global Monitoring Report on Non-Bank Financial Intermediation*. By definition, the CIS sector comprises various entity types (Fixed Income Funds (FIFs), Multi-Asset Funds (MAFs), Money Market Funds (MMFs), Hedge Funds, Real Estate Funds (REF) and Equity Funds) which have features that make them susceptible to runs (FSB, 2020:30). In the South African context, CISs play an important role in non-bank financial intermediation as they comprise the majority of activities within this sector (Kemp, 2017:17 and SARB, 2017:11). Consequently, the monitoring of risks within this sector is crucial when it comes to assessing systemic risk in the financial system and the implication this has for financial stability. Firstly, it is important to understand the structural

features of the sector such as growth in terms of assets and composition in terms of fund types according to the first and second tiers of classification. Similar to the Financial Stability Review published by the South African Reserve Bank this section provides an overview of the different components of the South African CIS sector as well as trends and developments over the past 5 years. This provides a foundational understanding of the South African CIS sector which is indispensable for measuring and interpreting its risks.

*Figure 1.1* displays the trend of total Assets Under Management (AUM) of the South African CIS sector from Q1 2015 to Q4 2020. Over the last five years, the sector experienced its largest increase in December 2017, where total assets increased by 12.33% relative to December 2016. This can be ascribed to strong economic growth – whereby growth was projected at 0.6% (a revision and adjustment from 0.5%) it manifested at 1.7% for 2017 (SARB, 2017:3 and SARB, 2018:4). In December 2020 the Collective Investment Schemes grew by 9.91%, from R2.48 trillion to R2.73 trillion in total assets which are 0.92 percentage points less compared to the previous year. Over the period of analysis, the average annual growth rate of total assets held by CISs is 6.94%. Net inflows (shown in *Figure 1.2*) improved throughout 2020, with the first quarter recording net inflows of R22.93 billion, a record high of R88.07 billion in the second quarter and ending the year with net inflows of R44.4 billion. The high in Net Inflows comes from investors directly that despite market uncertainty allocated their funds to South African Fixed Income Funds and the perceived safety that this offers (ASISA, 2020). This development is reassuring for the South African CIS sector in the context of the Covid-19 pandemic which raised concerns about liquidity shortages due to significant outflows experienced in other jurisdictions at the beginning of 2020 (SARB, 2020:69 and BIS, 2021:18).

For a better understanding of CIS risk indicators, it is also important to identify the sectoral composition in terms of the two tiers of classifications of South African CISs as proposed by ASISA. The first tier of classification denotes the geographical investment focus of a fund and as such distinguishes between South African, Regional, Global and Worldwide Funds. The second tier of classification comprises various entity types such as Equity, Multi-Asset Funds (MAFs), Fixed Income Funds (FIFs), and Real Estate Funds (REFs) (ASISA, 2018:1-11). From 2019, all funds according to the first classification grew in terms of total assets with the largest increase in Global Funds (27.72%), followed by Worldwide Funds which grew by 23.84%. Nevertheless, the majority of total assets within the sector at the end of 2020 were held in South

African Funds (85.77%) whereas the least amount of assets were held in Regional Funds (0.82%). The composition of the sector has remained relatively stable over the past five years where 88.21% of total CIS assets are held in South African Funds, 8.98% in Global funds, 2% in Worldwide Funds, and 0.84% in Regional Funds (five-year average).[3]

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**Figure 1** Total assets growth trend and quarterly variations of Net Inflows for the South African CIS sector from Q1 2015 to Q4 2020

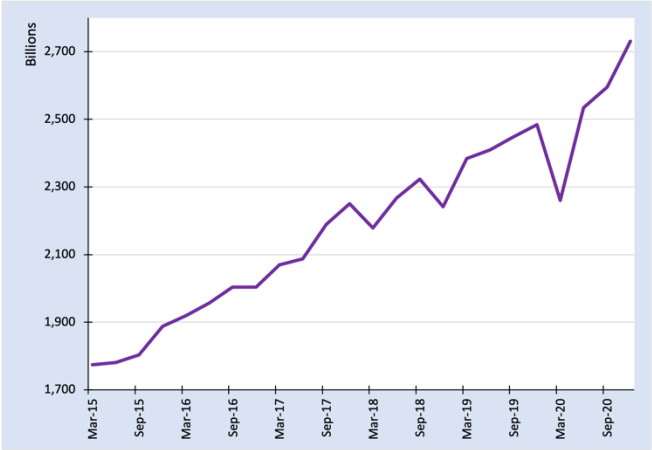


*Figure 1.1* CIS total assets annual growth rate from Q1 2015 to Q4 2020). Source: ASISA. Authors own calculations.

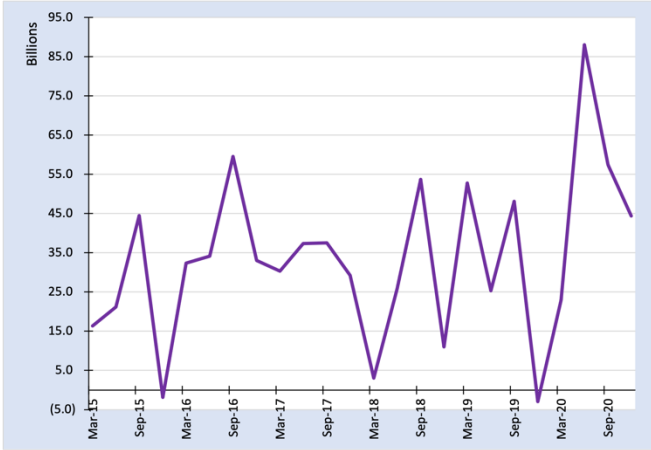


*Figure 1.2* Variations in CISs Net Inflows (Q1 2015 – Q4 2020). Source: ASISA. Authors own calculations.

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In terms of the second tier of classification, the largest shares of CIS assets are held in Multi-Asset Funds (MAFs) (45.46%) and Fixed Income Funds (30.33%) as of December 2020. Within Fixed Income Funds (FIFs), Money Market Funds hold the majority of FIF assets with 54.79% over the past five years (ASISA, 2018:2). More generally, the asset allocation between the different types remained relatively constant from March 2015 to December 2020 with MAFs being the largest (48.79%), followed by FIFs (24.38%), Equity (23.56%), and lastly Real Estate Funds (3.33%). Whereas the asset allocation did not change significantly over the years, the growth from the first quarter of 2015 to the last quarter of 2020 differs greatly between the fund types. Where Equity and Multi-Asset Funds grew by 38.91% and 44.15%, respectively, and Fixed Income Funds more than doubled in total assets with a growth rate of 108.75%, Real Estate Funds are the only fund type which total asset holdings decreased, namely by 38.15%.

[3] The numbers in parentheses are the five-year average calculated with the quarterly ASISA data. Authors Own Calculations.

**Figure 2** Quarterly growth rates and total asset composition of the South African CIS sector according to ASISA's second tier of classification from Q1 2015 to Q4 2020

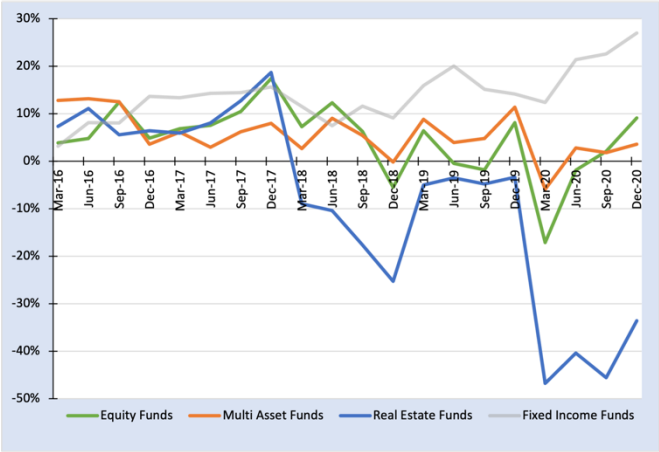


*Figure 2.1* Quarter on quarter growth rates by the second tier of classification (Q1 2015 – Q4 2020). Source: ASISA. Authors own calculations.

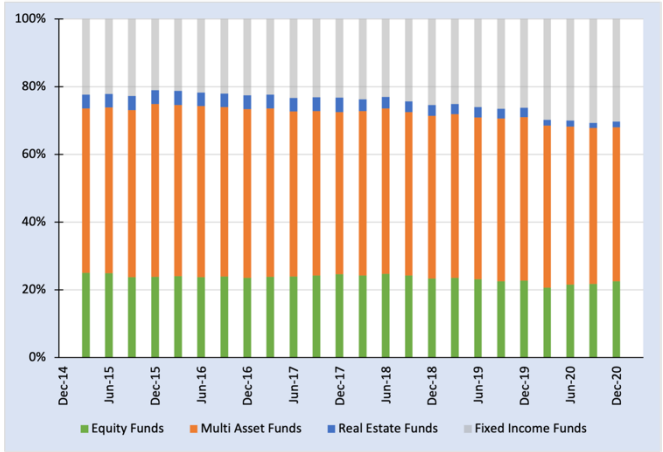


*Figure 2.2* Composition of CIS Total Assets by the second tier of classifications (Q1 2015 – Q4 2020). Source: ASISA. Authors own calculations.

*ii. Data Limitations*

Kemp (2017:24) notes that the largest concern regarding the study of the Non-Bank Financial Intermediation sector and more specifically Collective Investment Schemes in South Africa relates to the lacking availability of comprehensive data that includes information about off-balance sheet activities and fund's liabilities as well as detailed maturity breakdowns for portfolio holdings. This still presents the greatest challenge to the study of this sector and therefore the empirical results of this research need to be interpreted in the context of the data limitations (see Section 5). Identifying the limitations of the quarterly ASISA reports and the Morningstar portfolio data is vital for future research of the South African NBFI sector and should not be taken as implicating the quality of this study but rather as the first step of overcome the limitations of the results. Consequently, the following section aims to not only identify the data limitations but also explain how they impact the results of the study in detail and propose how this can be addressed.

a. <u>The limitations of ASISA data</u>

One area of concern is missing information of some fund types in several quarterly reports. For example, the information for Real Estate funds was taken from three different sheets, namely *EQAA – All DC removed* (South African funds), *REGSUM – All DC removed* (Regional Funds)

as well as *FORSUM – All DC removed* (Global Funds) and for December 2015, December 2016 and September 2017 to December 2020 the summary of Global Real Estate Funds on the *FORSUM – All DC removed* sheet is missing completely. The only data available for Global Real Estate Funds for these quarters are available on the sheet *Glb_Real_Gen* with double counting. Another example is Worldwide Multi-Asset Funds which comprise Flexible Funds and Income Funds as specified on the *WWSUM – All DC removed* sheet. Although the sheet distinguishes the two fund types of Worldwide MAFs, the table for Income Funds notes zero for all categories. Unlike the first example, the missing information for these Income Funds is not available on a sheet with double counting. This is insofar problematic as the total assets that are reported for Worldwide MAFs on the summary sheet *SUMM4 – All DC removed* are higher than the total assets for Flexible Funds reported on the *WWSUM – All DC removed* for all quarters. As a result, it seems that Income Funds do hold assets under management but that ASISA fails to include them in any statistic report for any quarter.

Another inconsistency present in the ASISA reports became apparent for the calculation for WAM. The maturity breakdowns from the *All DC removed* sheets is listed under the heading **Capital & Money Market Instruments** and the **Total** under this heading refers back to the total assets invested in Money Market Instruments which is given at the top of every sheet. To understand why there is an inconsistency, it needs to be noted that Money Market Instruments have a maturity that range from one day to one year, however, the maturity breakdown that is provided in the ASISA reports ranges from 30 days to greater than 12 years. As such, **Total Money Market instruments** is a misleading heading as it seems to include assets that are not only invested in Money Markets but also other Capital Markets. Furthermore, since ASISA fails to provide maturities for the remaining assets of the various funds – namely **Total Real Estate, Total assets held in other CIS,** and **Total Other assets** – one cannot infer the results for Weighted Average Maturity for the entire fund or fund type. The only exception is Money Market Funds, seeing that 100% of their assets are invested in Money Market instruments.

The lack of consistency throughout the different quarterly reports from 2015 to 2020 that the missing information and discrepancy between headings represent, raises concerns about the accuracy of the data as well as this analysis. Beyond this research, it is unclear if these limitations are taken into consideration for the annual submission of the South African non-banking sector for the FSB global monitoring report or the documentation of NBFI overview in the SARB's Financial Stability Review.

The second area of concern is the lacking explanation of variables and structural peculiarities found in the ASISA data. Although this point relates to the previous one, its implications for this study are slightly different and can be overcome more easily. The most general example of this data issue is the missing definition of the category **Total Other assets** which are present in every sheet that contains detailed breakdowns of the various CISs entities. When completing the FSB template for the calculation of the four risk indicators this presented a challenge as the maturity of these assets are unknown and thus it is unclear whether these fall under credit assets or not. A prudential approach was taken in allocating **Total Other assets** to the different categories in the FSB template and thus this category was ascribed to short term assets with a maturity of less or equal to 12 months as well as credit assets.

A second example that relates to this area of concern was detected on the *FIXINT – All DC removed* sheet for Money Market Funds. For some quarters, **Total assets held in other CIS** and **Total Other Assets** denoted zero assets but when clicking on this cell large negative amount was displayed in the formula bar. This was detected for a multitude of quarters and as ASISA does not explain this peculiarity and although this might only be a formatting mistake, these negative numbers are excluded from the analysis.

Both cases have implications for the calculations of the risk indicators and as such how the risks within the South African NBFI sector can be understood. On the one hand, it is vital to know the maturity for **Total Other assets** as this sheds light on the liquidity position of a fund. More assets with long term maturities become problematic in a time of financial distress when shareholders want to withdraw their funds but cannot because they are not redeemable on short notice. On the other hand, if funds have liabilities, they should be designated as such since this indicates leverage. High levels of leverage become problematic in periods of financial instability or can even be a cause thereof if leverage is undetected. As far as I am aware, comprehensive data that documents the liabilities of funds or off-balance sheet activities is not available in South Africa and consequently, it is unclear if leverage is a high risk within the non-banking sector (Kemp, 2017:16).

Whereas the first area of concern requires improved data collection from ASISA and third parties, the second area of concern necessitates a written report published by ASISA with every quarterly release of CIS statistics. The collection of more comprehensive data may be subject

to institutional constraints that arise in the collaboration between ASISA and third parties and consequently represent a greater challenge to overcome. In contrast, the compilation of an explanatory report or data guide formulated by ASISA and third parties may be completed more easily as it requires already present expertise from the organizations that compile the data set as well as their time. More comprehensive data is desirable for almost every area of research as it allows for a more thorough analysis of the research question. As mentioned previously, research of the South African NBFI sector is limited and the limitations of available data are one of the biggest constraints for future research. Consequently, the identification of weaknesses within the ASISA data needs to be taken up by the organization itself as well as the South African Reserve Bank seeing that the analysis of risk associated with NBFI ensures the maintenance of financial stability which lies within the general interest and the mandate of the SARB.[4]

b. The limitations of Morningstar data

Although the Morningstar portfolio panel was used less extensively compared to the ASISA dataset and applied only for the analysis of Foreign Currency Exposure, it is a valuable dataset that should be foundational to future research. Therefore, it is indispensable to outline the shortcomings of this dataset as well so that successive researchers are aware of its limitations and the challenges it poses for empirical analysis.

The first hurdle that needs to be overcome when working with Morningstar portfolio data, is accessing it. As noted before, this data is only available with a subscription to Morningstar. Although this poses a large challenge to future research, the alternative to circumvent this shortcoming is by purchasing the data directly. The second challenge relates to the format of the quarterly sheets and this became apparent during the merging of the individual quarters. From March 2016 to June 2018, the sheets include 19 variables whereas from June 2018 the sheets only include 16 variables. It is not clear why the number of variables differs between these two subsets and if the change occurred on the side of the SARB, but to continue with the merging of the master panel set, the format for the March 2016 – June 2018 sheets had to be changed (see Section *Morningstar Data*). The third challenge that this data set poses regards the lacking definitions of the given variables. As noted in the variable list in Appendix A, the

[4] As this research serves the SARB and their work on financial stability work, the data gaps present in the ASISA reports are taken up officially by the SARB and not myself.

description of the variables provided are from my interpretations and are not Morningstar's official definitions. The lacking information did not present a challenge to the practical analysis per se but might have implications for the interpretations of the result. In other words, one variable of interest for the computation of Foreign Currency Exposure is the currency denomination of a particular portfolio holding but there are two currency variables in the Morningstar dataset, namely *CurrencyId* and *LocalCurrencyCode.* Given the lacking explanation of the difference between these two variables, I decided to use *LocalCurrencyCode* because the variable had values for all observations.

Unlike the limitations associated with the ASISA dataset, the ones related to the Morningstar panel are less significant for the interpretation of the results of this study. Nevertheless, it needs to be noted that this section is not an exhaustive outline of all the shortcomings associated with the Morningstar dataset and suggested that future research needs continue identifying its weaknesses. The first step of surpassing these data limitations is recognizing them.

## 4. Applying risk indicators to South African Collective Investment Schemes and discussing the findings

The detrimental economic events of the GFC illustrated the harm that a lacking understanding of the financial system, and more specifically NBFI, can cause. The main argument of this research is that more attention needs to be dedicated to the South African NBFI sector to avoid the propagation of systemic risk, but also to establish toolkits that can be applied in times of financial distress and avoid greater economic damage. Although the FSB developed a framework to assess potential financial stability risks within NBFI and South Africa partakes in the global monitoring exercise, the published results in the annual Global Monitoring Report on Non-Bank Financial Intermediation are aggregated on the global level and provide little insights into the particular risk profile of South African CISs. Therefore, this section outlines the risk indicators applied in this research and includes a discussion on the empirical findings for each respective metric.

### *i. Credit Intermediation (CI)*

Credit intermediation, as a risk indicator, compares credit assets to Assets Under Management (AUM) and as such evaluates the range of assets that are managed by a fund (FSB, 2019:49). The formulae used for this study are Credit Intermediation 1 and 3. As CI3 includes off-balance

sheet exposure in its calculations and these are not recorded by ASISA, the results for CI1 and CI3 are identical.

Results of the computation fall between 0 and 1, where values closer to 1 indicate high involvements of credit intermediation and values closer or equal to 1 indicate little or no crediti intermediation (FSB, 2019:44). A large amount of credit assets relative to AUM indicates high levels of credit intermediation which can be a sign of lacking structural constraints and high-risk appetite of an institution. As a result thereof, the underwriting standard of credit might be diminishing which could lead to increased investor uncertainty that might induce bank-like runs (Patalano & Roulet, 2020:24).

**Formulae for Credit Intermediation**

$$\text{CI1} = \frac{\text{credit assets}}{\text{AUM}}$$

*Equation CI1* compares the number of credit assets to the assets under management. Source: FSB, 2019:44 and FSB reporting templates. Source: FSB, 2019:44.

$$\text{CI3} = \frac{\begin{array}{c}\text{credit assets} + \\ \text{credit off} \\ \text{balance sheet exposure}\end{array}}{\begin{array}{c}\text{AUM} + \\ \text{total off balance} \\ \text{sheet exposure}\end{array}}$$

*Equation CI3* compares the number of credit assets and credit off-balance sheet exposure to the assets under management and total off-balance sheet exposure. Source: FSB, 2019:44.

The high levels of credit intermediation of FIF and MMFs suggest a high risk appetite and a small range of assets (FSB, 2019:49). Nevertheless these levels of credit intermediation are similar to those observed by the FSB and consequently need not be taken as concerning for the South African financial system. What is important to understand, however, is that lacking diversification of portfolios promise higher capital gains and simultaneously make funds more vulnerable to volatility in their investments. South African Money Market Funds, for example, invest close to 100% of their assets in Money Market Instruments, making them especially susceptible to fluctuations within this market. Hanson et al. (2015:991) note that riskier portfolio holdings that are associated with higher returns, tend to attract inflows from investors. The problem with portfolio concentration of funds and such investor behaviour is that investors believe that they can redeem their shares before bearing any losses due to risk-taking. Large investment losses could thus trigger a run of investors on a fund and this sort of financial

distress can spill over to other funds, the broader financial system and the real economy (Hanson, Scharfstein & Sunderam, 2015:984 and ESRB, 2020:29-30). As South African MMFs are highly interconnected with South African banks and present an important source of short-term liquidity, it is important to monitor credit intermediation to appropriately react to high levels of risk.

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**Figure 3** Credit Intermediation in the South African CIS sector from March 2015 to December 2020

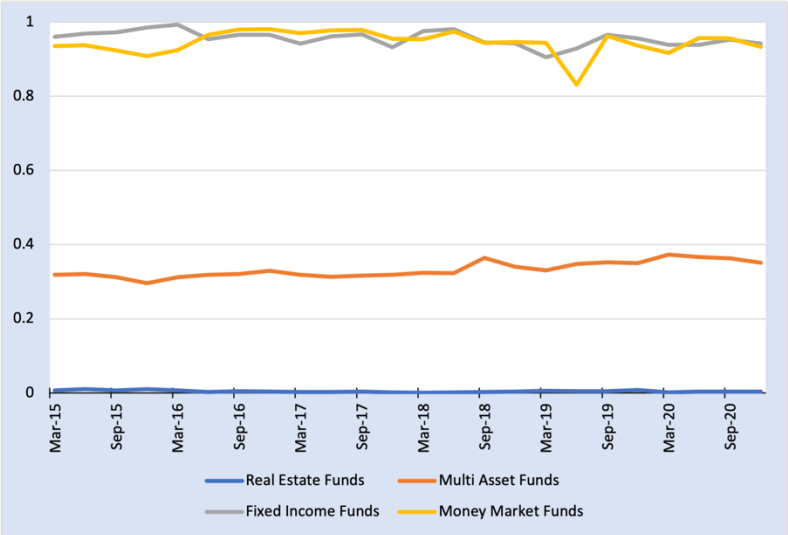


*Figure 3.1 Credit Intermediation 1* for Real Estate, Multi Asset, Fixed Income and Money Market Funds from March 2015 to December 2020. Source: ASISA. Authors own calculations.

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*ii. Liquidity Transformation (LT)*

Liquidity transformation refers to the use of highly liquid assets for the purchase of illiquid assets such as loans (Kodres, 2013:42). Stated differently, fund shares are redeemable at short notice and if underlying assets are highly illiquid, the fund might not be able to serve redemption demands. As such, high levels of liquidity transformation can implicate an institutions' liquidity status if the levels of liquidity mismatch limit the ability to sell those assets quickly (Grillet-Aubert, Haquin, Jackson, Killeen, Weistroffer 2016:15; Chen, Goldstein, Huang, Vashishtha, 2021:1 and Grill, O'Sullivan, Wedow, Weistroffer, 2020). If funds do not hold sufficient amounts of liquid assets, they could fail to meet the redemption demands of the investors which could lead to bank-like runs on the fund due to first-mover advantage. Despite the associated risks, however, liquidity transformation fulfils an important role within the economy as it satisfies the demand for cash-like assets by investors, allows for

the investment in long-term assets (which are less liquid), and both banks and non-banks implement it (Chernenko & Sunderam, 2016:2).

The two risk indicator formulas applied to measure funds' liquidity transformation are Liquidity Transformation 1 (LT1) and Liquidity Transformation 2 (LT2). These metrics relate the levels of liquid assets – narrow and broad[5], respectively –, short-term liabilities and redeemable equity to the AUM of a fund. The AUM in the denominator ensures interpretable results which lie between 1 and 2, where the liquidity transformation equal to 1 indicates no liquidity transformation and liquidity transformation equal to 2 that the illiquid assets of the fund are fully funded by short-term liabilities as well as redeemable equity (FSB, 2019:44).

**Formulae for Liquidity Transformation**

$$LT1 = \frac{(\text{AUM} - (\text{narrow) liquid assets} + \text{short term liabilities} + \text{redeemable equity})}{\text{AUM}}$$

*Equation LT1* measures the amount of less liquid assets according to the narrow definition that is funded by short term liabilities and redeemable equity with a maturity of ≤30 days.

$$LT2 = \frac{(\text{AUM} - (\text{broad) liquid assets} + \text{short term liabilities} + \text{redeemable equity})}{\text{AUM}}$$

*Equation LT2* measures the amount of less liquid assets according to the broad definition that is funded by short term liabilities and redeemable equity with a maturity of ≤30 days

Source: FSB, 2019:45 and FSB reporting template.

LT1 for all funds were continuously high from March 2015 – December 2020, with an average value of 1.95 for REFs, FIFs, and MMFs and 1.69 for MAFs (Figure 5.1). Since liabilities are not available, LT1 calculates the ratio of less-liquid assets to the total AUM of fund and as such, the results seem to suggest that all funds have little cash or cash-equivalents at hand relative to their total AUM. As explained, this becomes problematic if a large number of investors want to redeem their fund at short notice and the fund needs to sell its assets to meet these demands (Grillet-Aubert et al., 2016:15). The results taken from Figure 5.1 are contrasted with the results shown in Figure 5.2 that display the trends of LT2 for all funds over the same

[5] The narrow definition of liquid assets includes cash and cash equivalents, whereas the broad definition includes cash/cash equivalents as well as short-term investments, and government securities (FSB Template).

time. For Money Market and Fixed Income Funds LT2 indicates no liquidity transformation. The reason for this outcome is that the AUM of these funds are set equal to the liquid assets that they hold (according to the broad definition) as well as the shareholder's equity with a maturity of less or equal to 30 days in the reporting template. It needs to be noted, that this particular categorization might not be accurate and should be interpreted with reservations. Real Estate Funds, in contrast, perform high levels of liquidity transformation irrespective of the measure which is to be expected seeing that a majority of assets are held in long-term assets (ASISA, 2018:6).

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**Figure 4** Liquidity Transformation in the South African CIS sector from March 2015 to December 2020

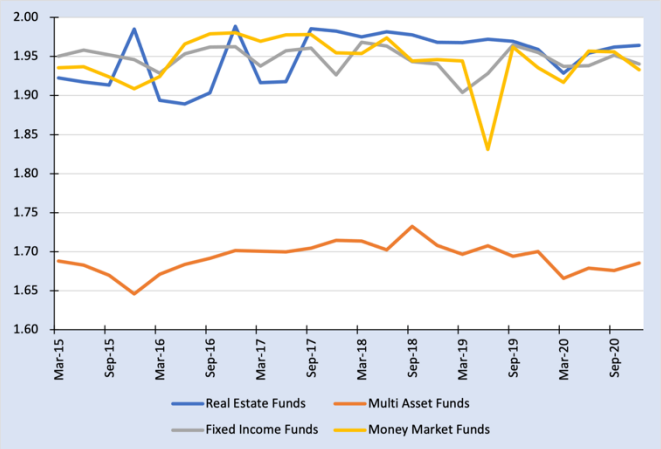


*Figure 5.1* Liquidity Transformation 1 results for Real Estate, Multi Asset, Fixed Income and Money Market Funds. Source: ASISA. Authors own calculations.

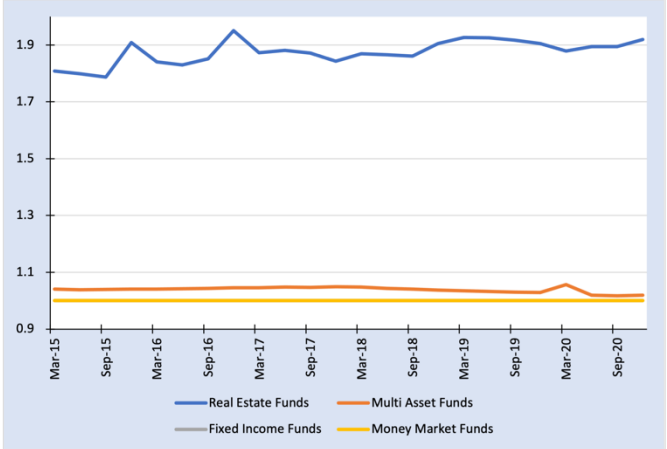


*Figure 5.2* Liquidity Transformation 2 results for Real Estate, Multi Asset, Fixed Income and Money Market Funds. Source: ASISA. Authors own calculations. *Note:* MMFs and FIFs have the same value for *LT2*.

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### *iii. Maturity Transformation (MT)*

Liquidity transformation and maturity transformation are concepts that are closely related yet different in terms of the risks they entail and thus the metrics they require for monitoring (Grillet-Aubert et al., 2016:15). MT refers to the investment in long-term assets from obtaining short-term funds and as such relates to the maturity mismatch that such intermediation entails.[6] Whereas maturity mismatches are sensitive to interest rate risk, LT and thus liquidity

[6] For example, fund shares of open-ended funds are redeemable at short notice and thus a fund engages in maturity transformation when their daily redeemable funds are invested in financial instruments with longer tenure (Kodres, 2013:42 and Bengtsson, 2016:62).

mismatches emphasize the difficulty of selling these longer-term assets. Since Non-Bank Financial Intermediaries are not responsible to repay an investor's funds in full, high exposure to interest rate risk necessarily falls on the investor and implies a high probability of investments losses. When a multitude of investors deem this risk too high and seek to withdraw their funds to avoid further losses, the fund may be forced to liquefy its assets, leading to a further decline in its financial standing with systemic implications. High level of maturity and liquidity transformation thus have the same or similar implications for financial stability, yet the development of risk is different and needs to be recognized as such.

The three risk indicators applied for maturity transformation are *MT1, MT2*, and *MT3* which consider different asset and liabilities categories involved in the maturity transformation of a fund. Results for *MT1* lie between -1 and +1 whereas zero means that a fund does not have any underlying maturity mismatches, +1 indicates that all long-term assets are funded by short-term liabilities, and -1 implies that short-term assets are funded by long-term liabilities (FSB, 2019:44). Results for *MT2* from 0 to 1 indicate negative maturity transformation, a value of 1 mean that short-term liabilities are fully funded by short-term assets and results greater than 1 imply that a fund is dependent on short-term funding for the issuance of short-term liabilities. The difference between *MT2* and *MT3* are the maturities of assets and liabilities.[7]

---

**Formulae for Maturity Transformation**

$$\mathrm{MT1} = \frac{\begin{array}{c}(\text{long term assets} - \\ \text{long term liabilities} - \\ \text{nonredeemable equity})\end{array}}{\text{AUM}}$$

*Equation MT1* calculates the portion of long-term assets [>12 months] that are funded by short-term liabilities [≤30 days]. Source: FSB, 2019:45 and FSB reporting template.

$$\mathrm{MT2} = \frac{\begin{array}{c}(\text{short term liabilities} + \\ \text{redeemable equity})\end{array}}{\text{short term assets}}$$

*Equation MT2* calculates the number of short term liabilities [≤12 months] and redeemable equity [≤ 12 months] that are covered by short-term assets [≤ 12 months]. Source: FSB, 2019:45 and FSB reporting template.

$$\mathrm{MT3} = \frac{\begin{array}{c}(\text{short term liabilities} + \\ \text{redeemable equity})\end{array}}{\text{short term assets}}$$

*Equation MT3* calculates the number of short term liabilities [≤30 days] and redeemable equity [≤30 days] that are covered by short-term assets [≤ 3 months]. Source: FSB, 2019:45 and FSB reporting template.

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[7] Results for *MT3* are not reported as they are also omitted from the FSB monitoring report and thus there is no basis for comparison.

As shown in *Figure 4*, all funds except for MMFS perform some degree of maturity transformation and these levels remained relatively constant over time for FIFs and MAFs. The values for *MT1* remain the lowest for MMFs and MAFs which is in contrast FIFs and REFs that have an average *MT1* value of 0.73 and 0.88, respectively (*Figure 4.1*). REFs tend to invest in assets that have longer tenure, i.e. most of their AUM comprise long-term assets, whereas MMFs invest predominantly in short-term assets (ASISA, 2018:6).[8] Since funds' liabilities are not recorded by ASISA, the results are not directly comparable to those given by the FSB seeing as some jurisdictions do have liabilities data. Within the South African context, *MT1* is the ratio of long-term assets to AUM and *MT2* is the ratio of short-term assets to shareholder equity both with a maturity of less or equal to 12 months.

**Figure 5** Maturity Transformation in the South African CIS sector from March 2015 to December 2020

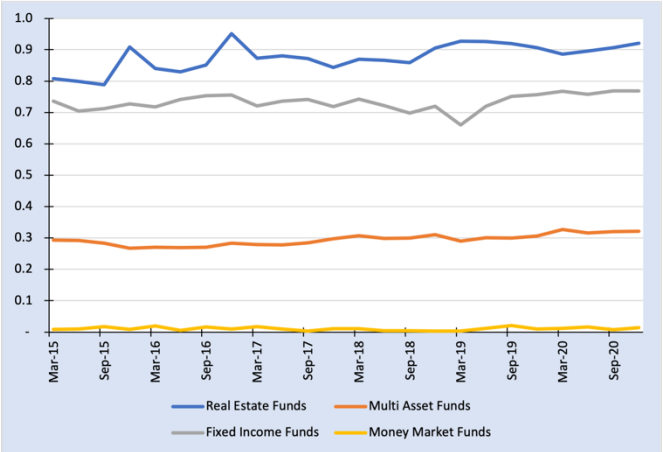


*Figure 4.1* Maturity Transformation 1 results for Real Estate, Multi Asset, Fixed Income and Money Market Funds. Source: ASISA. Authors own calculations.

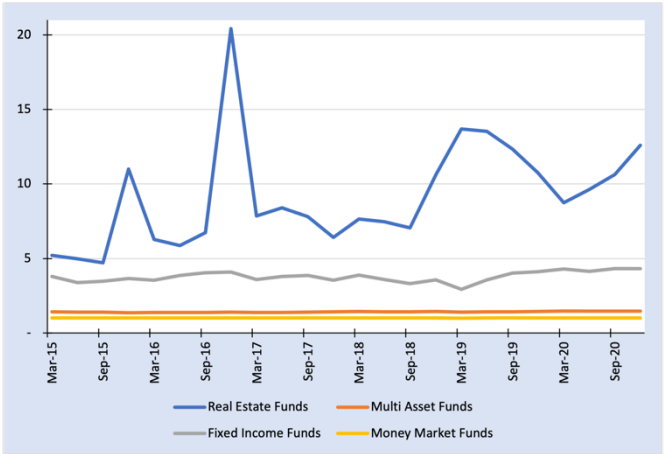


*Figure 4.2* Maturity Transformation 2 results for Real Estate, Multi Asset, Fixed Income and Money Market Funds. Source: ASISA. Authors own calculations.

As such, these results cannot necessarily be interpreted as liabilities that are used to fund assets seeing that information about the former is not available. Rather these ratios should be taken as short-term funds (provided by the investor) that are invested in (longer-term) assets by the

[8] These results are coherent with regulation that prescribes Real Estate Funds to invest 80% in the FTSE/ JSE Real Estate Industry or a similar foreign sector and Money Market Funds to invest in money market instruments with a maturity of fewer than 13 months (ASISA, 2018:6).

fund in the South African context (Kodres, 2013:42). In addition, The results for REFs presented in Figure 4.2 need to be interpreted with caution, especially given the inconsistency of reported data (see *Data Limitations*). Nevertheless, the spike around December 2016 illustrates a great decrease in short-term assets relative to shareholders equity which was offset by an increase in short-term assets in the following period. As expected, *MT2* for MMFs, MAFs and FIFs is low given that they invest mostly in short-term, highly liquid vehicles.

*iv. Leverage (L)*

The last risk indicator as proposed by the FSB risk monitoring framework are measures of leverage that relate a fund's total financial assets to its equity. A fund has leverage when it takes on liabilities to fund assets that could potentially amplify the gains for losses on such an investment (Kodres, 2013:42). *LT* and *MT* are forms of leverage whereby the maturity of assets and liabilities are imperfectly matched. When no liquidity and maturity transformation occurs, a fund matches the maturity of assets and liabilities perfectly and as such the underlying risk is the intermediaries' inability to pay out investors should the investment default (Patalano & Roulet, 2020:24). It is important to note that the metrics applied in this study are not risk-based as they do not take into account the leveraging or de-leveraging that is created synthetically through the use of derivatives or other off-balance sheet transactions (ESRB, 2020:20). Rather, they need to be understood as an equity multiplier or financial leverage ratio (FSB, 2019:44).

---

**Formulae for Leverage**

$$L1 = \frac{AUM}{NAV}$$

*Equation L1* calculates the ratio of Assets under Management (AUM) to Net Asset Value (NAV). Source: FSB reporting template.

$$L2 = \frac{(AUM + \text{total off balance sheet exposure})}{NAV}$$

*Equation L2* is the ratio of AUM plus total-off balance sheet exposure to Net Asset Value (NAV). Source: FSB reporting template.

$$L3 = \frac{GNE}{NAV}$$

*Equation L3* calculates the ratio of Gross Notional Exposure (GNE) to Net Asset Value (NAV). Source: FSB reporting template.

---

The results for the three different leverage calculations are all equal to one since Net Asset Value (NAV), Assets Under Management (AUM), and Gross Notional Exposure (GNE) have the same value. While the ASISA statistical reports do not provide differentiated information

for these variables, South African Collective Investment Schemes are also are not leveraged generally (Kemp, 2017:17).[9]

*v. Weighted Average Maturity (WAM)*

Weighted Average Maturity (WAM) is a measure of portfolio liquidity that is used in the *EU Non-bank Financial Intermediation Risk Monitor 2020* published by the European Systemic Risk Board (ESRB, 2020) as well as the *BIS Quarterly Review* published by the Bank for International Settlement in March 2021 (BIS, 2021). This metric is calculated from the number of months it takes for various holdings within a portfolio to mature and as the name suggests, assets are weighted proportionately more if they have higher portfolio holdings (BIS, 2021:25). More specifically, for the estimation of WAM, the weight of each portfolio holding is multiplied by the holding's maturity. The longer a portfolio's weighted average maturity, the more illiquid are the portfolio's holding on average. Similar to maturity and liquidity transformation, the holding of high amounts of illiquid assets could be a source of financial stress if a fund is unable to meet the investors' redemption demands (Grillet-Aubert *et al*., 2016:15). The particular equation that is applied for the calculation of WAM in this study is the summation of *n* number of holding's weighted maturity *i*, where n denotes the number of holdings in a portfolio and *i* the particular holding's maturity and portfolio weight.

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**Formula for Weighted Average Maturity**

$$\text{WAM} = \sum_{i=1}^{n} (\text{maturity}_i \times \text{weight}_i)$$

*Equation WAM* is the sum of each holding's weight and maturity within a portfolio. Source: BIS, 2021:25.

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South African Fixed Income Variable Term Funds have the highest WAM across time with an average value of 3010 days followed by South African Fixed Income Short Term Funds (937 days). In contrast to this, the trends for Regional and Global FIFs are characterized by high variability. Looking more closely at the data, there are no peculiar sources for these irregularities, i.e. the number of portfolios and the AUM over time are relatively consistent. As such, the decrease of WAM from 600 days in September 2017 to 0.13 days in December for Regional FIFs and the spike in March 2018 to 176 days of WAM only to return to a WAM of

[9] The formulae for *Leverage* are reported in Appendix XX for the interest reader.

close to 0 days in December 2018 might be attributed to the inaccuracy of data collection. This is insofar problematic, as the application of this risk indicator with low-quality data raises concerns about the accuracy of the results and more importantly fails to indicate the risk level of these Non-Bank Financial Intermediaries.

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**Figure 6** Weighted Average Maturity Trends in the variables portfolio types of Fixed Income Funds from March 2015 to December 2020

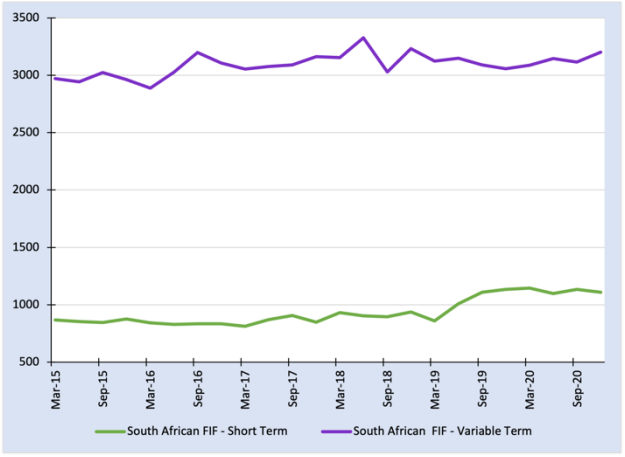


*Figure 6.1* Weighted Average Maturity for South African Fixed Income Funds – Short Term and Variable Term. Source: ASISA. Authors own calculations.

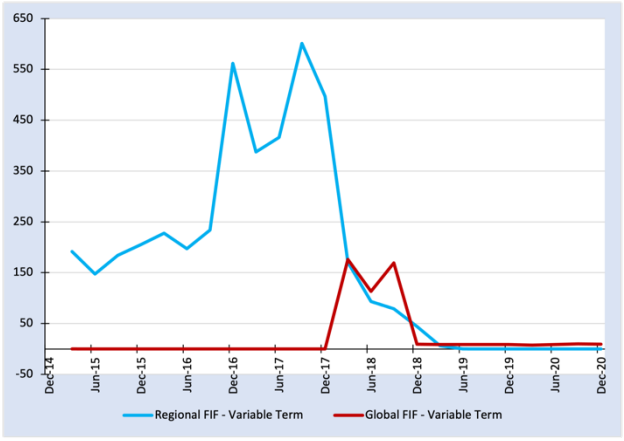


*Figure 6.2*. Weighted Average Maturity for Regional and Global Fixed Income Funds – Short Term. Source: ASISA. Authors own calculations.

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From the graphical comparison of WAM and AUM (Figure 7) there seems to be no concrete relationship between these two variables for South African Variable Funds, but for South African Short Term FIFs, a growth of total financial assets is accompanied by an increase in WAM. The average growth rate for the Weighted Average Maturity and AUM of South African Short Term FIFs shows a somewhat parallel trend with 1.23% (standard deviation of 5.71) and 4.82% (standard deviation of 4.2), respectively.[10] Although this analysis does not shed light on possible causation, the trends of South African Short Term FIF might suggest that a search for yield in these funds attracted investor inflows which as a result increased total financial assets (BIS, 2021:26).

[10] This compares to South African Variable FIF that have an average growth rate for WAM and AUM of 0.38% (standard deviation of 3.44) and 3.12% (standard deviation of 8.56), respectively, indicating greater variability in the growth of AUM than that of WAM.

**Figure 7** The relationship between Weighted Average Maturity and Asset Under Management in the variable portfolio types of Fixed Income Funds from March 2015 to December 2020

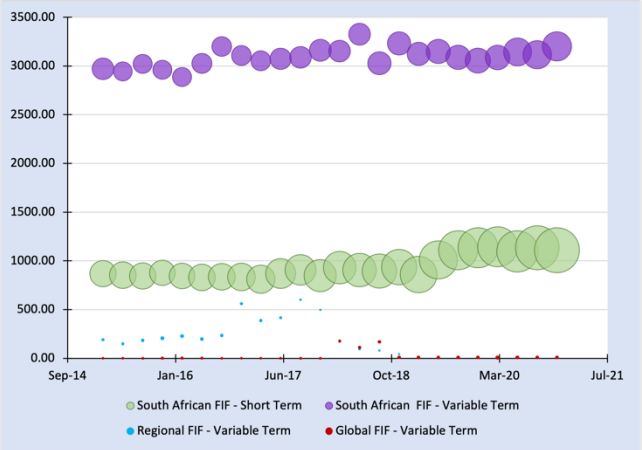


*Figure 7.1* Relating Weighted Average Maturity to AUM for South African, Regional and Global Fixed Income Funds. Source: ASISA. Authors own calculations.

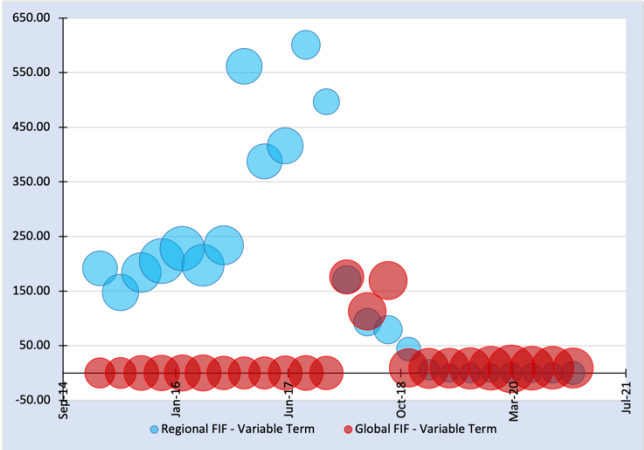


*Figure 7.2*. Rescaled relationship of Weighted Average Maturity and for Regional and Global Fixed Income Funds. Source: ASISA. Authors own calculations.

When focusing on the relationship between WAM and AUM for MMFs more closely, a similar trend is observed whereby WAM increased from 133 days (March 2015) to 149 days (December 2020). At the same time, the total AUM for MMFs increased by 83.2%.[11] Whereas the average quarterly growth rate for WAM is 0.7% over this period with a standard deviation of 6.72, the average quarterly growth rate for AUM is 2.74 with a standard deviation of 3.84. Figure 6.2 confirms these findings visually whereas the quarterly percentage change for Weighted Average Maturity has a greater variation than the percentage change for MMFs' Assets Under Management. Generally, the fluctuations of the two trends align for the respective quarters which indicates a correlation between the two variables. As mentioned previously, however, this study does not investigate this correlation further nor does it aim to determine if there is causation.

[11] From R238.9 billion in March 2015 to R437.7 billion in December 2020.

**Figure 8** Weighted Average Maturity in all South African Money Market Funds related to fund-size over time, from March 2015 to December 2020

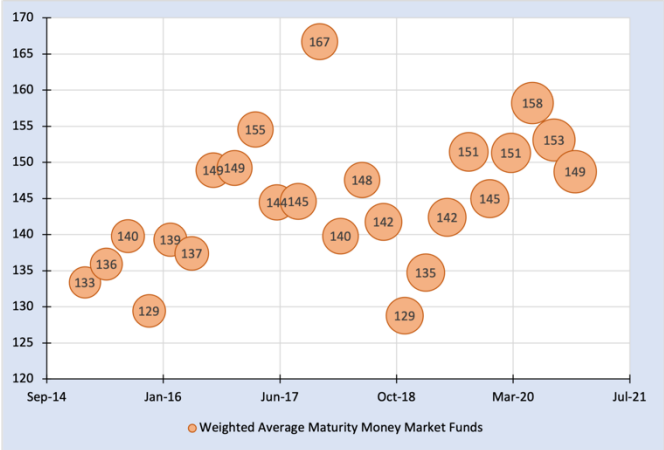


*Figure 8.1* Weighted Average Maturity (in days) and the size of South African Money Market Funds in terms of AUM. Source: ASISA. Authors own calculations. *Note*: these are all MMFs grouped over time.

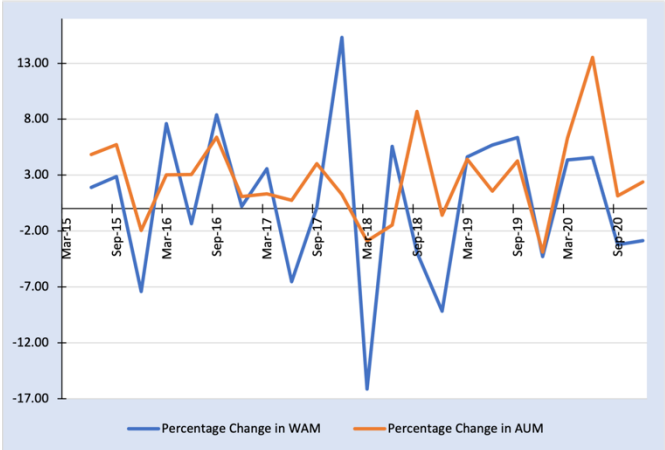


*Figure 8.2*. Relating the quarterly percentage change of Weighted Average Maturity (%) to AUM (%) for South African Money Market Funds. Source: ASISA. Authors own calculations.

The key takeaway from the analysis presented in Figure 8 is that the WAM of MMFs is higher than 130 days as set out by regulation – the average WAM is 144 days. As shown in Figure 8.1, the threshold of 130 days is surpassed in all quarters and indicates that South African Money Market Funds invest in longer-term assets which in turn has implications for their liquidity status. Especially interpreting these findings in the context of the values of Liquidity Transformation *LT1* for MMFs, the liquidity status of these funds raises concerns. Given the size of these funds and the role they play in the financial system and the real economy, the findings need to be investigated further and appropriate measures need to be taken to limit the propagation of funds' vulnerability and to protect financial stability.

### *vi. Foreign Currency Exposure (FCE)*

The last risk indicator applied for this empirical analysis is Foreign Currency Exposure (FCE). Exchange rate volatility can become a source of risk for a bank or bank-like institutions as they can induce liquidity shortfalls (Muller & Verschoor, 2005:386). Losses that are incurred due to foreign exchange volatility can be a large financial burden but in the worst case, could even lead to the failure of financial institutions (Wong, Wong & Leung, 2009:174). The estimation of foreign exchange risk usually includes the use of Value-at-Risk models but due to data

limitations, this cannot be applied in this study. To find an intermediate compromise, this study looks at the foreign currency exposure of funds by calculating the ratio of holdings that are denominated in a foreign currency relative to holdings that are denominated in South African Rands. Furthermore, the number of different foreign currency denominated holdings is documented for the 10 largest portfolios from March 2016 and September 2020 to provide insights into how many exchange rate fluctuations one particular entity type/ portfolio is exposed to.

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**Figure 9** Foreign Currency Exposure in % for the biggest portfolios by market value (March 2016 - September 2020)

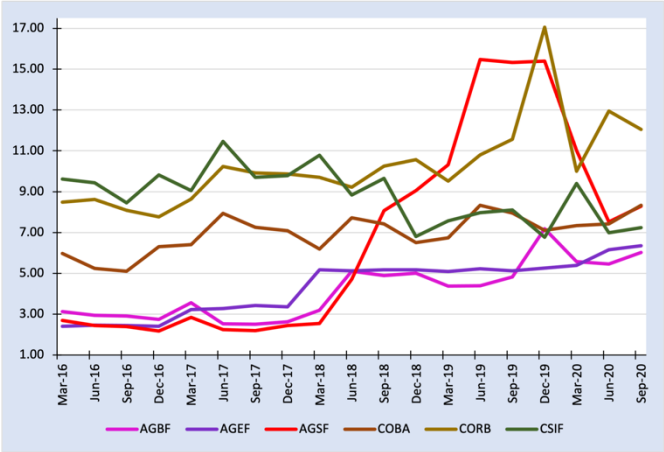


*Figure 9.1* Trends in Foreign Currency Exposure (%) for the respective portfolios. Source: Morningstar. Authors own calculations.

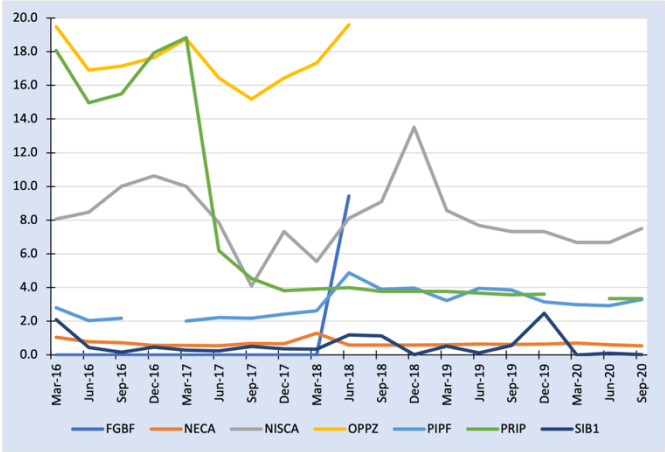


*Figure 9.2*. Trends in Foreign Currency Exposure (%) for the respective portfolios. Source: Morningstar. Authors own calculations.

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Within the Morningstar panel, there is a total of 68 currencies whereby South African Rand (ZAR), US Dollar (USD), British Pound (GBP), and Euro (EURO) make up 94.79% of all portfolio denominations and 2.55% of information missing. Over the period of analysis FCE fluctuates for all 13 portfolios (Figure 9 and Table 1). As per Figure 9.1, all portfolios besides CSIF experienced an increase in their foreign currency exposure. In contrast, the average growth rate for OPPZ, PIPF and PRIP (shown in Figure 9.2) indicates downward trends in foreign currency exposure throughout the analysis. The exposure to foreign currency for NISCA varied greatly over this period (standard deviation of 30.80) but in September 2020 almost returned to the original level from March 2016. Furthermore, one would have perhaps expected portfolios with a greater average FCE to have greater variability in their average growth rate, but Table 1 shows that this is not necessarily the case. On the contrary, there seems

to be no concrete correlation between average FCE, the portfolio's FCE average growth rate or its standard deviation considered all portfolios.

**Table 1** Average Growth Rate and Standard Deviation of Growth Rate for the 13 largest portfolios. Average taken over June 2016 to September 2020. Source: Morningstar. Authors own calculations.

| | **AGBF** | **AGEF** | **AGSF** | **COBA** | **CORB** | **CSIF** | **FGBF** | **NECA** | **NISCA** | **OPPZ** | **PIPF** | **PRIP** | **SIB1** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Average FCE* | 4.16 | 4.33 | 6.69 | 6.97 | 10.28 | 8.81 | *No currency observations* | 0.68 | 8.13 | 17.49 | 3.03 | 7.59 | 0.58 |
| *FCE Average Growth Rate* | 5.77 | 6.34 | 10.28 | 2.66 | 3.58 | -0.08 | | 0.00 | 3.76 | -9.58 | -2.22 | -12.24 | 307.88 |
| *Standard Deviation of Average growth rate* | 22.48 | 14.63 | 31.65 | 13.36 | 18.28 | 17.78 | | 29.48 | 30.80 | 32.98 | 35.35 | 29.13 | 801.28 |

To gain further insights into the characteristics of the 13 largest portfolios, Table 2 relates the portfolios' fund types to their average FCE.[12] Nine of the 13 portfolios are South African Multi-Asset Funds, 3 are South African Fixed Income Funds, and 1 is a South African Equity Fund. Consequently, it cannot be concluded that one fund type tends to have a higher or lower average FCE. Of course, these findings are not representative over the entire sample, but for this subsample, there seems to be no correlation between the fund type and Foreign Currency Exposure of a portfolio.

**Table 2** The respective fund type of the 13 largest portfolios with the Average FCE. Source: Morningstar and ASISA. Authors own calculations.

| **Fund Name** | **Fund Type** | **Average FCE (%)** |
|---|---|---|
| *Allan Gray Balanced Fund (AGBF)* | SA MAF | 4.16 |
| *Allan Gray Equity Fund (AGEF)* | SA EQ | 4.33 |
| *Allan Gray Stable Fund (AGSF)* | SA MAF | 6.69 |
| *Coronation Balanced Defensive Fund (COBA)* | SA MAF | 6.97 |
| *Coronation Balanced Plus Fund (CORB)* | SA MAF | 10.28 |
| *Coronation Strategic Income Fund (CSIF)* | SA FIF | 8.81 |
| *Foord Balanced Fund (FGBF)* | SA MAF | 0.94 |
| *Nedgroup Investments Core Income (NECA)* | SA FIF | 0.68 |
| *Nedgroup Investments Stable Fund (NISCA)* | SA MAF | 8.13 |
| *Investec Opportunity Fund (OPPZ)* | SA MAF | 17.49 |
| *Prescient Income Provider Fund (PIPF)* | SA MAF | 3.03 |
| *Prudential Inflation Plus Fund (PRIP)* | SA MAF | 7.59 |
| *Stanlib Income Fund (SIB1)* | SA FIF | 0.58 |

[12] This table combines information from ASISA and Morningstar, whereby the Fund Name was taken from Morningstar and matched with the ASISA classification from the March 2016 reports.

Lastly, Table 3 shows the 10 portfolios of the respective quarters as well as their market value, number of holdings and the currency denomination of the holdings, the percentage of foreign currency exposure, as well as the composition of the holding's foreign currency denominations. The largest portfolio in the first and last quarter is the *Allan Gray Balanced Fund* (*AGBF*) which increased by 14.4% in market value while its foreign currency exposure increased by 2.89 percentage points. The funds with the largest FCE in March 2016, are the *Investec Opportunity Fund* (*OPPZ*) and the *Prudential Inflation Plus Fund* (*PRIP*) with 19.48% and 18.07% of their portfolio holdings being denominated in a foreign currency. In September 2020 with the largest FCE, the *Investec Opportunity Fund* (*OPPZ*) and the *Coronation Balanced Fund* (*CORB*) are the two portfolios with the largest FCE.

The key takeaway from Table 3 is that there are no clear correlations between the variables shown. As mentioned before, one would perhaps expect the largest portfolios (in terms of market value) to have a higher foreign currency exposure or even those portfolios with a larger number of holdings. Nevertheless, as the results in Table 3 show, neither of those relationships can be confirmed. Overall, the analysis of FCE does not reveal any correlations between different portfolio variables and their exposure to foreign currency. Nevertheless, it is clear that due to their size, their Foreign Currency Exposure is an important indicator to consider for systemic risk. Therefore, the analysis of FCE should be at the centre of future research as it might present another channel of contagion and thus an additional threat to South African financial stability.

## 5. Key Takeaways

Amongst other things, this study reveals the importance of monitoring the financial stability risks of South African Collective Investment Schemes and supports the argument that this needs to be central to the bi-annual financial stability review of the SARB. As Kemp (2017:17) notes, CISs amount to the majority of the NBFI measurement and given their size, present a major source of systemic risk if the development of sector vulnerabilities are not supervised and managed properly. According to the FSB classification, CISs are entities of EF1 and as such the study neglects other financial institutions that are part of Non-Bank Financial Intermediation (EF2 – EF5) (FSB, 2019:37). Therefore, one goal of future research should be the analysis of these intermediaries' risk profiles to provide a broader overview of risk dynamics and financial operations in the sector of Non-Bank Financial Intermediation.

**Table 3** – Foreign Currency Exposure and Currency Composition for 10 largest portfolios in March 2016 and September 2020. Source: Morningstar. Authors own calculations.

| | Market Value | Number of Holdings in Portfolio | Number of Holdings denominated in ZAR | Number of Holdings denominated in foreign currency | Percentage of foreign currency exposure | AUD | BRL | EURO | GBP | JPY | MXN | NOK | SEK | SGD | TRY | USD | Missing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***March 2016 – 10 biggest portfolios in terms of market size*** | | | | | | | | | | | | | | | | | |
| *AGBF* | 115,388,000,000.00 | 319 | 309 | 10 | 3.13 | - | - | 1 | - | 1 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| *AGEF* | 39,672,500,000.00 | 125 | 122 | 3 | 2.40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| *AGSF* | 38,095,200,000.00 | 223 | 217 | 6 | 2.69 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| *COBA* | 39,316,000,000.00 | 268 | 252 | 16 | 5.97 | 4 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 |
| *CORB* | 84,172,000,000.00 | 212 | 194 | 18 | 8.49 | 2 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 7 | 3 |
| *CSIF* | 22,439,900,000.00 | 208 | 188 | 20 | 9.62 | 4 | 2 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 |
| *FGBF* | 49,437,300,000.00 | 67 | *No currency observations* | | | | | | | | | | | | | | 67 |
| *NISCA* | 34,349,500,000.00 | 62 | 57 | 5 | 8.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| *OPPZ* | 40,266,700,000.00 | 77 | 67 | 15 | 19.48 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 12 | 0 |
| *PRIP* | 38,322,200,000.00 | 166 | 136 | 30 | 18.07 | 0 | 1 | 4 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| ***September 2020 – 10 biggest portfolios in terms of market size*** | | | | | | | | | | | | | | | | | |
| *AGBF* | 132,000,000,000.00 | 249 | 234 | 15 | 6.02 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| *AGEF* | 31,200,000,000.00 | 126 | 118 | 8 | 6.35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| *AGSF* | 44,000,000,000.00 | 205 | 188 | 17 | 8.29 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 2 |
| *COBA* | 28,000,000,000.00 | 168 | 154 | 14 | 8.33 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| *CORB* | 80,500,000,000.00 | 166 | 146 | 20 | 12.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 5 |
| *CSIF* | 46,800,000,000.00 | 221 | 205 | 16 | 7.24 | 0 | 0 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| *NECA* | 64,100,000,000.00 | 187 | 186 | 1 | 0.53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| *OPPZ* | 52,100,000,000.00 | 51 | 41 | 10 | 19.61 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 8 | 0 |
| *PIPF* | 35,900,000,000.00 | 183 | 177 | 6 | 3.28 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| *SIB1* | 50,300,000,000.00 | 217 | 217 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

As NBFI is growing and becoming more important to the South African financial system and the real economy, regulatory bodies and policymakers are challenged to progress supervision and regulation according to sectoral developments. This will be essential for the maintenance of financial sector stability and the containment of systemic risk.

Another central finding and theme which this study discusses is the limitation of the data used. Both the ASISA statistical reports and the Morningstar portfolio panel exhibit inconsistencies which in turn raises concerns about the accuracy of the empirical findings of this study. The unexplained data irregularities of certain fund type constrain the interpretation of the results and position them to be unrepresentative. In addition, because certain risk indicators could not be calculated, the monitoring framework as set out by the FSB could not be fully employed for South African CISs This is insofar problematic, as emerging risks within these funds might remain undetected which provokes policy inaction.

Lastly, the focus of this study is the financial stability risks of South African CISs and thus leaves room for the direct and indirect interconnectedness to be explored further. Although Kemp (2017) analyses interconnectedness between South African Non-Bank Financial Intermediaries and other financial institutions, this research is not done continuously and thus new developments of interconnectedness in South Africa remain to be investigated. Understanding direct and indirect interconnectedness within the financial system is indispensable for the identification of possible channels of contagion and as such the management of systemic risk. Similar to this study, research in the South African context should be based on work done in other jurisdictions (like the FSB, ESRB, Deutsche Bundesbank and other central banks) as this provides a foundation for credible methodology as well as an insightful base for comparison. In addition, this study does not investigate foreign exchange risk using Value-at-Risk models as commonly used (Muller & Verschoor, 2005:386). Given the interconnections of the global financial system, a more thorough analysis of Foreign Currency Exposure and Foreign Exchange Risk within the sector of Non-Bank Financial Intermediation should therefore be taken up by future research as well.

## 6. Conclusion

Before the GFC, central banks and policymakers focused on the micro-prudential supervision and regulation of risks within the financial system to ensure the stability of individual financial intermediaries. As the events of the crisis highlighted, however, this approach was flawed as

experts failed to consider the stability of the financial system as a whole and how systemic risk might impact this. Since then, Central Banks and academics have realized the importance of managing the development of systemic risk to avoid the contagion of financial distress seeing that this could jeopardise the functioning of the financial system and the real economy. Sources of systemic risk, when considering Non-Bank Financial Intermediation specifically, can be broadly categorized into two types: One the one hand, systemic risk develops when multiple market participants are exposed to the same or similar risks, and on the other hand, systemic risk might cultivate when one financial intermediary is closely interlinked with many other market participants and it is deemed "too-large-to-fail."

This research aims to focus on the risks inherent to South African Collective Investment Schemes as these comprise the majority of the NBFI measure (Kemp, 2017:17). The main contribution of this research lies in the application of risk indicators that are proposed by the Financial Stability Board and two additional risk indicators that are applied in other monitoring exercises. As such, this study develops a risk-evaluation framework for South African CISs but can and should also be applied to other Non-Bank Financial Intermediaries in the South African financial system. Furthermore, the results of this research support the argument that these risk-evaluation methodologies need to be included in the bi-annual financial stability review which is published by the South African Reserve Bank. This monitoring exercise captures the risk profiles of Non-Bank Financial Intermediaries with its limitations and aims to inform the regulatory decisions made by the Financial Service Board. Nevertheless, data limitations constrained the applications of all risk indicators and several data inaccuracies deem some results as unrepresentative. To overcome these shortcomings, this research should be taken as the first step taken in the right direction and not as an exhaustive analysis of financial stability risks of South African Investment Schemes.

Lastly, this study does not explore direct and indirect interconnectedness of NBFI and proposes that future research should be motivated to build on the work of Kemp (2017). Research of South African NBFI is scarce but understanding this sector better requires not only to look at it from a micro- but also from a macro-perspective. Furthermore, high levels of interconnectedness are characteristic of the South African financial sector and thus it is important to research changes and developments of these financial interlinkages for a comprehensive picture of financial stability.

## References


Acemoglu, D., Ozdaglar, A., Tahbaz-Salehi, A. 2015. Systemic Risk and Stability in Financial Networks. *The American Economic Review*, 105(2):564-608.

Adrian, T., Ashcraft A. 2012. *Shadow banking: A review of the literature*. Staff Report No. 580. New York, NY, USA: Federal Reserve Bank of New York.

Adrian, T. 2014. *Financial stability policies for shadow banking*. Staff Report No. 644. New York, NY, USA: Federal Reserve Bank of New York.

Abad, J., D'Errico, M., Killeen, N., Luz, V., Peltonen, T., Portes, R., Urbano, T. 2017. *Mapping the interconnectedness between EU Banks and Shadow Banking Entities*. NBER Working Paper No. 23280. Cambridge, MA, USA: National Bureau of Economic Research.

Altunbas, Y., Binci, M., Gambacorta, L. 2018. Macroprudential policy and bank risk. *Journal of International Money and Finance*. 81:203-220.

ASISA. 2018. *ASISA Standard on Fund Classification for South African Regulated Investment Scheme Portfolios* [Online]. Available: https://www.asisa.org.za/media/1wddvh4g/asisa-fund-classification-standard-effective-30-october-2018.pdf. [2021, 8 April].

ASISA. 2020. *Record Net Inflows for the local CIS industry despite Covid-19 woes* [Online]. Available: https://www.asisa.org.za/media-releases/record-net-inflows-for-the-local-cis-industry-despite-covid-19-woes/ [2021, May 6].

ASISA. 2021. *Statistics* [Online]. Available: https://www.asisa.org.za/statistics/. [2021, April 6].

Bank of International Settlement (BIS). 2021. *BIS Quarterly Review: International banking and financial market developments*. [Basel]: Bank of International Settlement.

Bologna, P. 2020. *Banks' maturity transformation: risk, reward, and policy*. ESRB Working Paper Series No. 63. Frankfurt am Main, Germany: European Systemic Risk Board.

Chen, Q., Goldstein, I., Huang, Z., Vashishtha, R. 2021. *Liquidity Transformation and Fragility in the US Banking Sector*. NBER Working Paper No. 27815. Cambridge, MA, USA: National Bureau of Economic Research.

Chernenko, S., Sunderam, A. 2016. *Liquidity Transformation in Asset Management: Evidence from Cash Holdings of Mutual Funds*. Working Paper 2016-01. Cambridge, MA, USA: Harvard Business School.

Deutsche Bundesbank. 2017. *Financial Stability Review 2017*. [Frankfurt am Main]"

ESRB. 2020. *EU Non-Bank Financial Intermediation Risk Monitor 2020*. [Frankfurt am Main]: European Systemic Risk Board.

Financial Stability Board. 2017. *Assessment of shadow banking activities, risks and the adequacy of post-crisis policy tools to address financial stability concerns*. [Basel]: Financial Stability Board.

Financial Stability Board. 2019. *Global Monitoring Report on Non-Bank Financial Intermediation 2019*. [Basel]: Financial Stability Board.

Financial Stability Board. 2020. *Global Monitoring Report on Non-Bank Financial Intermediation 2020*. [Basel]: Financial Stability Board.

Gehrend, M., Weber, F. 2020. *Monitoring Risks in the Luxembourg Non-Bank Financial Sector*. [Luxembourg City]:Central Bank of Luxembourg.

Ghosh, S., Gonzalez del Mazo, I., Ötker-Robe, I. 2012. Chasing the Shadows: How Significant Is Shadow Banking in Emerging Markets?. *The World Bank - Economic Premise*. 88:1-7.

Grillet-Aubert, L., Haquin, JB., Jackson, C., Killeen, N., Weistroffer, C. 2016. *Assessing shadow banking – non-bank financial intermediation in Europe*. [Frankfurt am Main]: European Systemic Risk Board.

Grill, M., O'Sullivan, S., Wedow, M., Weistroffer, C. 2020. *Liquidity transformation by investment funds: structural fault line or desirable financial transformation? A systemic perspective* [Online]. Available: https://www.ecb.europa.eu/pub/financial-stability/macroprudential-bulletin/html/ecb.mpbu202104_1~70b30f25c9.en.html. [2021, April 17].

Hanson, S., Scharfstein, D., Sunderam, A. 2015. Policy Corner: An Evaluation of Money Market Reform Proposals. *IMF Economic Review*, 63(4):984-1023.

Hollander, H., Van Lill, D. 2019. *A Review of the South African Reserve Bank's Financial Stability Policies*. Stellenbosch Economic Working Paper No. 11. https://www.ekon.sun.ac.za/wpapers.

Ilesanmi, K.D., Tewari, D.D. 2019. Management of shadow banks for economic and financial stability in South Africa. *Cogent Economics & Finance*. 7:1-13.

Kemp, E. 2017. *Measuring shadow banking activities and exploring its interconnectedness with banks in South Africa*. South African Reserve Bank Occasional Paper Series. Pretoria, South Africa: South African Reserve Bank.

Kodres, L.2013. What is Shadow Banking?. *Finance & Development*, June:42-43.

Lowe, P. 2015. *The transformation in maturity transformation*, 27 May, Sydney [Online] Available: https://www.bis.org/review/r150529c.pdf. [2021, April 14].

Meade, D., Biddle, L., Merrit, H. 2012. Shadow Banking: The Growing Sector of Non-bank Credit Activity. *Business Law Today*. October:1-6

Muller, A., Verschoor, W. 2005. Foreign exchange risk exposure: Survey and suggestions. *Journal of Multinational Financial Management*. 16:385-410.

National Treasury. 2011. A safer financial sector to serve South Africa better. [Pretoria]: National Treasury.

Price, F., Schwartz, C. 2015. *Recent Developments in Asset Management*. RBA Bulletin. Sydney, Australia: Reserve Bank of Australia.

Singh, M. 2011. *Velocity of Pledged Collateral: Analysis and Implications*. IMF Working Paper No 256. Washington D.C, United States of America: International Monetary Fund.

South African Reserve Bank. 2017. *Financial Stability Review – Second edition*. [Pretoria]: South African Reserve Bank.

South African Reserve Bank. 2018. *Financial Stability Review – First edition*. [Pretoria]: South African Reserve Bank.

South African Reserve Bank. 2020. *Financial Stability Review – Second edition*. [Pretoria]: South African Reserve Bank.

**Appendix A**

A detailed account of the ASISA data used in this study

The Association for Savings and Investment South Africa (ASISA) collates portfolio data with the assistance of third parties and offers statistics for Collective Investment Schemes (CIS) which are published every quarter and are available for download in excel format on the ASISA website (ASISA, 2021). This CIS series dates back to March 2000 and at the time of writing includes the latest quarter for 2020 (December 2020). Since ASISA only formed in 2008 and started documenting the real-time data for the CIS statistics in 2015, the data for the period 2000 to 2014 is historical. While similar to the 2015 - 2020 reports, the format and the portfolio breakdown for the different fund types in the historical reports for 2000 to 2014 are different and less extensive and thus were not used for this analysis.

Each statistical report contains 57 sheets, where one sheet contains information about one of 4 fund types - South African Funds, Worldwide Funds, Global Funds, and Regional Funds where the geographical denotation refers to the investment focus of the fund (first tier of classification).[13] The first four sheets provide general statistics of the South African Collective Investment Scheme Industry such as Total Assets, Sales, Repurchases, Net Inflow, Number of Accounts, and Number of Funds. Thereafter, the sheets are structured according to the geographical investment focus of the fund and include the breakdown for the various fund categories, namely Multi-Asset Funds, Equity Funds, Interest Bearing Funds, Real Estate Funds, and Money Market Funds (second tier of classification). The data for the calculation of the FSB risk indicators are taken from the sheets with *All DC removed* in their description, as these contain the statistics of the fund types with double-counting removed and as such are the most accurate numbers in comparison to the sheets that do not have the double-counting removed. More specifically, the data for the computation of the FSB risk indicators and Weighted Average Maturity (WAM) is taken from *EQAA - All DC removed*, *FIXINT - All DC removed*, *WWSUM - All DC removed*, *REGSUM - All DC removed*, and *FORSUM - All DC removed*. For South African Funds, *EQAA - All DC removed* includes information for Equity,

[13] South African Funds have to invest in at least 60% of their assets in South African investment markets, 30% in any global investment market and 10% within Africa. Worldwide Funds invest in South African and global markets without limits whereas Global Funds invest 80% of their assets outside of South African and have no geographical restriction in terms of investing the other 20%. Lastly, Regional Funds invest a minimum of 80% of their assets in a particular country or region outside of South Africa (ASISA, 2018:2).

Multi-Asset and Real Estate Funds whereas *FIXINT - All DC removed* covers Money Market Funds (MMFs), and Interest Bearing Funds. As there are no worldwide Real Estate or Money Market Funds, *WWSUM - All DC removed* only comprises the portfolio breakdown for Worldwide Equity, Multi-Asset, and Interest Bearing funds. The data for Regional Funds are taken from *REGSUM - All DC removed* which contains statistics for Multi-Asset Funds, Equity Funds, Real Estate Funds, and Interest Bearing Funds. Lastly, *FORSUM - All DC removed* holds data for Global Multi-Asset Funds, Equity and Real Estate Funds, as well as Interest Bearing Funds.

The NBFI Reporting Templates constructed by the FSB set out the off- and on-balance sheet items that are required to calculate credit intermediation, maturity and liquidity transformation and leverage for the four fund categories. Sheet 9 in the FSB Reporting Templates contains the definition of these balance sheet times which guide the process of transferring the appropriate portfolio data from the ASISA sheets. To compute the risk indicators on a quarterly basis from 2015 to 2020, the original template is copied four times to create a separate sheet for each fund category and adjust the cells and formulas to fit the quarterly data. The results of the computation are included in Appendix C. For the descriptive statistics and the visualization of the results, the information from the ASISA reports is used to create a new dataset also in Excel format which comprises variables for Asset Under Management (AUM), Net Inflow, Asset Allocation between the fund categories and the results of the risk indicator computation. A list of these variables and their description is included in Appendix A. Lastly, the calculation of Weighted Average Maturity (WAM) for Fixed Income Funds and Money Market Funds is taken from the respective *All DC removed sheets* and the sheets with double counting as these breakdown the individual portfolios that belong to a particular fund type.

**Appendix B**

List of Variables taken from ASISA for Descriptive Statistics and Visualization of FSB risk indicator results.

*Quarter_Year* – Month and year of observation

*Total Assets SA Funds* – Total assets held by South African Funds

*TA_SA_Growth* – Growth rate of total assets held by South African Funds

*Total Assets WW Funds* - Total assets held by Worldwide Funds

*TA_WW_Growth* – Growth rate of total assets held by Worldwide Funds

*Total Assets RE Funds* – Total Assets held by Regional Funds

*TA_RE_Growth* – Growth rate of total assets held by Regional Funds

*Total Assets GL Funds* – Total Assets held by Global Funds

*TA_GL_Growth* – Growth rate of total assets held by Global Funds

*Total Assets Fund of Funds* – Total Assets held by Fund of Funds

*Comp_SA_Funds* – Percentage of assets held by South African Funds of total CIS assets

*Comp_WW_Funds* - Percentage of assets held by Worldwide Funds of total CIS assets

*Comp_RE_Funds* - Percentage of assets held by Regional Funds of total CIS assets

*Comp_GL_Funds* - Percentage of assets held by Global Funds of total CIS assets

*Comp_FOF* - Percentage of assets held by Fund of Funds of total CIS assets

*Total_Type_Assets* – Total assets held in CIS sector

*TA_Q_Growthrate* – Quarterly growth rate of total assets held in CIS sector

*TA_YR_Growthrate* - Yearly growth rate of total assets held in CIS sector

*Net Inflow SA Funds* – Net Inflows into South African Funds

*Net Inflow WW Funds* - Net Inflows into Worldwide Funds

*Net Inflow RE Funds* - Net Inflows into Regional Funds

*Net Inflow GL Funds* - Net Inflows into Global Funds

*Net Inflow Fund of Funds* - Net Inflows into Fund of Funds

*Total Net Inflows* - Net Inflows into CIS sector

*SA Equity Total Assets* – Total assets held by South African Equity Funds

*SA MAF Total Assets* - Total assets held by South African Multi Asset Funds

*SA RE Total Assets* Total assets held by South African Real Estate Funds

*SA FIF Total Assets* - Total assets held by South African Fixed Income Funds

*WW Equity Total Assets* - Total assets held by Worldwide Equity Funds

*WW MAF Total Assets* - Total assets held by Worldwide Multi Asset Funds

*RE Equity Total Assets* - Total assets held by Regional Equity Funds

*RE MAF Total Assets* - Total assets held by Regional Multi Asset Funds

*RE REAL Total Assets* - Total assets held by Regional Real Estate Funds

*RE FIF Total Assets* - Total assets held by Regional Fixed Income Funds

*GL Equity Total Assets* - Total assets held by Global Equity Funds

*GL MAF Total Assets*- Total assets held by Global Multi Asset Funds

*GL REAL Total Assets* - Total assets held by Global Real Estate Funds

*GL FIF Total Assets* - Total assets held by Global Fixed Income Funds

*TA_Equity* – Total assets held in all Equity Funds

*TA_MAF* – Total assets held in all Multi Asset Funds

*TA_REF* – Total assets held in all Real Estate Funds

*TA_FIF* – Total assets held in all Fixed Income Funds

*Comp_Equity* – Percentage of assets held by Equity Funds

*Comp_MAF*– Percentage of assets held by Multi Asset Funds

*Comp_REF* – Percentage of assets held by Real Estate Funds

*Comp_FIF* – Percentage of assets held by Fixed Income Funds

*EQ_YR_Growthrate* – Yearly growth rate for Equity Funds

*MAF_YR_Growthrate* – Yearly growth rate for Multi Asset Funds

*REF_YR_Growthrate* – Yearly growth rate for Multi Asset Funds

*FIF_YR_Growthrate* – Yearly growth rate for Fixed Income Funds

*TA_MMF* – Total Assets held by Money Market Funds

*Comp_MMF* – Percentage Money Market Funds of Fixed Income Funds

*MMF Net Inflow* – Total Net Inflows into Money Market Funds

*REIT CI 1* – Credit Intermediation 1 results for Real Estate Funds

*REIT CI 2* – Credit Intermediation 2 results for Real Estate Funds

*REIT CI 3* – Credit Intermediation 3 results for Real Estate Funds

*REIT MT 1* – Maturity Transformation 1 results for Real Estate Funds

*REIT MT 2* – Maturity Transformation 2 results for Real Estate Funds

*REIT MT 3* – Maturity Transformation 3 results for Real Estate Funds

*REIT LT 1* – Liquidity Transformation 1 results for Real Estate Funds

*REIT LT 2* – Liquidity Transformation 2 results for Real Estate Funds

*REIT L1* – Leverage 1 results for Real Estate Funds

*REIT L2* – Leverage 2 results for Real Estate Funds

*REIT L3* – Leverage 3 results for Real Estate Funds

*MAF CI 1* – Credit Intermediation 1 results for Multi Asset Funds

*MAF CI 2* – Credit Intermediation 2 results for Multi Asset Funds

*MAF CI 3* – Credit Intermediation 3 results for Multi Asset Funds

*MAF MT 1* – Maturity Transformation 1 results for Multi Asset Funds

*MAF MT 2* – Maturity Transformation 2 results for Multi Asset Funds

*MAF MT 3* – Maturity Transformation 3 results for Multi Asset Funds

*MAF LT 1* – Liquidity Transformation 1 results for Multi Asset Funds

*MAF LT 2* – Liquidity Transformation 2 results for Multi Asset Funds

*MAF L1* – Leverage 1 results for Multi Asset Funds

*MAF L2* – Leverage 2 results for Multi Asset Funds

*MAF L3* – Leverage 3 results for Multi Asset Funds

*FIF CI 1* – Credit Intermediation 1 results for Fixed Income Funds

*FIF CI 2* – Credit Intermediation 2 results for Fixed Income Funds

*FIF CI 3* – Credit Intermediation 3 results for Fixed Income Funds

*FIF MT 1* – Maturity Transformation 1 results for Fixed Income Funds

*FIF MT 2* – Maturity Transformation 2 results for Fixed Income Funds

*FIF MT 3* – Maturity Transformation 3 results for Fixed Income Funds

*FIF LT 1* – Liquidity Transformation 1 results for Fixed Income Funds

*FIF LT 2* – Liquidity Transformation 2 results for Fixed Income Funds

*FIF L1* – Leverage 1 results for Fixed Income Funds

*FIF L2* – Leverage 2 results for Fixed Income Funds

*FIF L3* – Leverage 3 results for Fixed Income Funds

*MMF CI 1* – Credit Intermediation 1 results for Money Market Funds

*MMF CI 2* – Credit Intermediation 2 results for Money Market Funds

*MMF CI 3* – Credit Intermediation 3 results for Money Market Funds

*MMF MT 1* – Maturity Transformation 1 results for Money Market Funds

*MMF MT 2* – Maturity Transformation 2 results for Money Market Funds

*MMF MT 3* – Maturity Transformation 3 results for Money Market Funds

*MMF LT 1* – Liquidity Transformation 1 results for Money Market Funds

*MMF LT 2* – Liquidity Transformation 2 results for Money Market Funds

*MMF L1* – Leverage 1 results for Money Market Funds

*MMF L2* – Leverage 2 results for Money Market Funds

*MMF L3* – Leverage 3 results for Money Market Funds

*AUM REAL* – Assets Under Management of Real Estate Funds

*AUM_Real_Growth* – Yearly growth rate for Assets Under Management of Real Estate Funds

*AUM MAF* – Assets Under Management of Multi Asset Funds

*AUM_MAF_Growth* – Yearly growth rate for Assets Under Management of Multi Asset Funds

*AUM FIF* – Assets Under Management of Fixed Income Funds

*AUM_FIF_Growth* – Yearly growth rate for Assets Under Management of Fixed Income Funds

*AUM MMF* – Assets Under Management of Money Market Funds

*AUM_MMF_Growth* – Yearly growth rate for Assets Under Management of Money Market Funds

List of Variables taken from Morningstar for the computation of Foreign Currency Exposure

*fundexternalid* – External Fund ID

*MMF Indicator* – Indicator if Holding belongs to Money Market Fund

*LegalName* – Legal Name of the Portfolio

*PortfolioDate* – Date of data collection

*ExternalId* – External ID of portfolio holding

*ExternalName* – External Name of portfolio holding

*CountryId* – Country ID of portfolio holding

*ISIN* – International Securities Identification Number

*CurrencyId* – Currency denomination of portfolio holding

*SecurityName* – Security Name of portfolio holding

*Previous Quarter NumberOfShare* – Number of shares of particular portfolio holding from the previous quarter

*NumberOfShare* – Number of shares of particular portfolio holding

*Previous Quarter Weighting* – Weighting of holding within the portfolio from the previous quarter

*Weighting* – Weighting of holding within the portfolio

*Weighting In Relevant Index*

*MarketValue* – Market value of particular portfolio holding

*LocalCurrencyCode* – Local Currency Code of data entry

*Currency* - Cleaned variable for *LocalCurrencyCode* formatted as string value

*currency* – same as *Currency* but formatted as numeric value

*count_holdings* – Number of holdings within a portfolio

*count_ZAR* – Number of holdings within a portfolio that are denominated in South African Rand (ZAR)

*forex_exp* – Number of holdings within a portfolio that are denominated in a foreign currency

*perc_forex_exp* – percentage of holdings that are denominated in a foreign currency within a particular portfolio

*total_mv* – Total market value of a portfolio calculated from summing the market value of each holding

## Appendix C

| Total Assets Growth Rate (%) | 2016 | 2017 | 2018 | 2019 | 2020 | Average | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Total CIS Sector | | | | | | | |
| *March* | (0.81) | 17.59 | 5.25 | 9.44 | (5.22) | 26.25 | 8.24 |
| *June* | 9.85 | 6.68 | 8.62 | 6.28 | 5.20 | 36.62 | 1.88 |
| *September* | 11.17 | 9.25 | 6.08 | 5.39 | 6.01 | 37.90 | 2.51 |
| *December* | 6.11 | 12.33 | (0.41) | 10.83 | 9.91 | 38.78 | 5.11 |
| First Tier of Classification | | | | | | | |
| *South African Funds March* | 6.55 | 7.60 | 5.52 | 8.31 | (7.08) | 4.18 | 5.96 |
| *South African Funds June* | 8.48 | 6.21 | 8.14 | 6.49 | 3.25 | 6.51 | 2.08 |
| *South African Funds September* | 9.93 | 8.53 | 6.06 | 4.71 | 4.19 | 6.68 | 2.47 |
| *South African Funds December* | 7.66 | 12.06 | (0.67) | 9.61 | 7.64 | 7.26 | 4.79 |
| *Worldwide Funds March* | 20.62 | 13.27 | (4.10) | 24.97 | 10.02 | 12.96 | 11.34 |
| *Worldwide Funds June* | 12.72 | 11.47 | 2.17 | 19.69 | 22.05 | 13.62 | 7.82 |
| *Worldwide Funds September* | 9.32 | 15.58 | (4.34) | 32.90 | 16.66 | 14.03 | 13.46 |
| *Worldwide Funds December* | (16.51) | 10.91 | 5.89 | 24.01 | 23.84 | 9.63 | 16.64 |
| *Regional Funds March* | (10.51) | (1.82) | (2.56) | 17.46 | (11.39) | (1.76) | 10.41 |
| *Regional Funds June* | (7.21) | (14.24) | 30.34 | 2.87 | (1.34) | 2.10 | 17.04 |
| *Regional Funds September* | (12.89) | 3.12 | 17.25 | 7.21 | 5.13 | 3.96 | 10.87 |
| *Regional Funds December* | (31.26) | 10.40 | 18.09 | 7.98 | 10.92 | 3.23 | 19.64 |
| *Global Funds March* | 29.13 | 10.19 | 5.35 | 17.29 | 9.96 | 14.38 | 10.17 |
| *Global Funds June* | 28.55 | 12.72 | 13.05 | 1.98 | 21.26 | 15.51 | 10.00 |
| *Global Funds September* | 29.84 | 15.93 | 7.50 | 6.46 | 20.50 | 16.05 | 9.68 |
| *Global Funds December* | 1.44 | 15.76 | (0.64) | 20.63 | 27.72 | 12.98 | 12.27 |
| Second Tier of Classification | | | | | | | |
| *Equity Funds March* | 3.85 | 6.82 | 7.23 | 6.42 | (17.16) | 1.43 | 9.39 |
| *Equity Funds June* | 4.74 | 7.51 | 12.27 | (0.52) | (1.94) | 4.41 | 5.83 |
| *Equity Funds September* | 12.39 | 10.41 | 6.22 | (1.84) | 2.08 | 5.85 | 5.85 |
| *Equity Funds December* | 4.84 | 17.38 | (5.54) | 8.10 | 9.07 | 6.77 | 8.29 |
| *Multi Asset Funds March* | 12.75 | 6.14 | 2.66 | 8.82 | (5.93) | 4.89 | 6.65 |
| *Multi Asset Funds June* | 13.14 | 2.90 | 8.99 | 3.90 | 2.75 | 6.34 | 4.58 |
| *Multi Asset Funds September* | 12.50 | 6.15 | 5.38 | 4.76 | 1.77 | 6.11 | 3.94 |
| *Multi Asset Funds December* | 3.58 | 7.96 | (0.21) | 11.35 | 3.53 | 5.24 | 4.48 |
| *Real Estate Funds March* | 7.32 | 5.89 | (9.01) | (4.99) | (46.79) | (9.52) | 20.03 |
| *Real Estate Funds June* | 11.04 | 8.00 | (10.41) | (3.52) | (40.38) | (7.05) | 20.55 |
| *Real Estate Funds September* | 5.56 | 12.69 | (17.68) | (4.78) | (45.58) | (9.96) | 22.96 |
| *Real Estate Funds December* | 6.40 | 18.69 | (25.33) | (3.40) | (33.58) | (7.44) | 21.76 |
| *Fixed Income Funds March* | 3.17 | 13.37 | 11.48 | 15.91 | 12.36 | 11.26 | 6.30 |
| *Fixed Income Funds June* | 8.07 | 14.26 | 7.44 | 19.99 | 21.33 | 14.22 | 6.47 |
| *Fixed Income Funds September* | 8.02 | 14.43 | 11.59 | 15.14 | 22.54 | 14.34 | 5.37 |
| *Fixed Income Funds December* | 13.62 | 15.61 | 9.11 | 14.11 | 26.94 | 15.88 | 6.64 |

*Table A.1* Quarter to quarter growth rate, Five-year average and standard deviation. Source: ASISA. Authors own calculations.

## Appendix D

| Money Market Funds | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Mar-15* | *Jun-15* | *Sep-15* | *Dec-15* | *Mar-16* | *Jun-16* | *Sep-16* | *Dec-16* | *Mar-17* | *Jun-17* | *Sep-17* | *Dec-17* | *Mar-18* | *Jun-18* | *Sep-18* | *Dec-18* | *Mar-19* | *Jun-19* | *Sep-19* | *Dec-19* | *Mar-20* | *Jun-20* | *Sep-20* | *Dec-20* |
| **Credit Intermediation (CI)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(CI1)* | 0.936 | 0.937 | 0.924 | 0.908 | 0.924 | 0.966 | 0.979 | 0.980 | 0.970 | 0.978 | 0.978 | 0.955 | 0.954 | 0.974 | 0.944 | 0.946 | 0.944 | 0.831 | 0.962 | 0.936 | 0.917 | 0.957 | 0.956 | 0.933 |
| *(CI2)* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *(CI3)* | 0.936 | 0.937 | 0.924 | 0.908 | 0.924 | 0.966 | 0.979 | 0.980 | 0.970 | 0.978 | 0.978 | 0.955 | 0.954 | 0.974 | 0.944 | 0.946 | 0.944 | 0.831 | 0.962 | 0.936 | 0.917 | 0.957 | 0.956 | 0.933 |
| **Maturity Transformation (MT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(MT1)* | 0.009 | 0.010 | 0.017 | 0.009 | 0.019 | 0.005 | 0.016 | 0.010 | 0.017 | 0.010 | 0.003 | 0.011 | 0.010 | 0.004 | 0.004 | 0.004 | 0.003 | 0.012 | 0.021 | 0.009 | 0.011 | 0.017 | 0.007 | 0.013 |
| *(MT2)* | 1.01 | 1.01 | 1.02 | 1.01 | 1.02 | 1.01 | 1.02 | 1.01 | 1.02 | 1.01 | 1.00 | 1.01 | 1.01 | 1.00 | 1.00 | 1.00 | 1.00 | 1.01 | 1.02 | 1.01 | 1.01 | 1.02 | 1.01 | 1.01 |
| (*MT3)* | 1.84 | 1.85 | 1.76 | 1.71 | 1.74 | 1.79 | 1.83 | 1.84 | 1.91 | 1.75 | 1.91 | 1.78 | 1.85 | 1.87 | 1.88 | 1.72 | 1.77 | 1.69 | 2.05 | 1.77 | 1.85 | 1.94 | 1.98 | 1.79 |
| **Liquidity Transformation (LT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(LT1)* | 1.94 | 1.94 | 1.92 | 1.91 | 1.92 | 1.97 | 1.98 | 1.98 | 1.97 | 1.98 | 1.98 | 1.95 | 1.95 | 1.97 | 1.94 | 1.95 | 1.94 | 1.83 | 1.96 | 1.94 | 1.92 | 1.96 | 1.96 | 1.93 |
| *(LT2)* | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **Credit Risk Transfer (CRT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(CRT1)* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Leverage (L)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(L1)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *(L2)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *(L3)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Fixed Income Funds | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Mar-15* | *Jun-15* | *Sep-15* | *Dec-15* | *Mar-16* | *Jun-16* | *Sep-16* | *Dec-16* | *Mar-17* | *Jun-17* | *Sep-17* | *Dec-17* | *Mar-18* | *Jun-18* | *Sep-18* | *Dec-18* | *Mar-19* | *Jun-19* | *Sep-19* | *Dec-19* | *Mar-20* | *Jun-20* | *Sep-20* | *Dec-20* |
| **Credit Intermediation (CI)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(CI1)* | 0.960 | 0.969 | 0.972 | 0.985 | 0.993 | 0.953 | 0.966 | 0.966 | 0.941 | 0.961 | 0.967 | 0.932 | 0.975 | 0.981 | 0.945 | 0.942 | 0.905 | 0.929 | 0.965 | 0.956 | 0.938 | 0.938 | 0.952 | 0.942 |
| *(CI2)* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *(CI3)* | 0.960 | 0.969 | 0.972 | 0.985 | 0.993 | 0.953 | 0.966 | 0.966 | 0.941 | 0.961 | 0.967 | 0.932 | 0.975 | 0.981 | 0.945 | 0.942 | 0.905 | 0.929 | 0.965 | 0.956 | 0.938 | 0.938 | 0.952 | 0.942 |
| **Maturity Transformation (MT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(MT1)* | 0.736 | 0.705 | 0.712 | 0.727 | 0.717 | 0.741 | 0.753 | 0.756 | 0.721 | 0.736 | 0.742 | 0.718 | 0.743 | 0.722 | 0.698 | 0.720 | 0.660 | 0.720 | 0.751 | 0.757 | 0.768 | 0.758 | 0.768 | 0.768 |
| *(MT2)* | 3.79 | 3.39 | 3.48 | 3.67 | 3.54 | 3.87 | 4.05 | 4.10 | 3.58 | 3.78 | 3.87 | 3.55 | 3.89 | 3.59 | 3.31 | 3.57 | 2.94 | 3.57 | 4.02 | 4.12 | 4.31 | 4.13 | 4.32 | 4.32 |
| *(MT3)* | 6.079 | 6.423 | 6.098 | 6.437 | 5.323 | 7.812 | 8.596 | 7.992 | 6.098 | 7.097 | 7.591 | 5.977 | 7.389 | 6.952 | 6.608 | 6.799 | 4.948 | 5.670 | 7.803 | 7.249 | 7.547 | 7.309 | 8.254 | 7.336 |
| **Liquidity Transformation (LT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(LT1)* | 1.95 | 1.96 | 1.95 | 1.95 | 1.93 | 1.95 | 1.96 | 1.96 | 1.94 | 1.96 | 1.96 | 1.93 | 1.97 | 1.96 | 1.94 | 1.94 | 1.90 | 1.93 | 1.96 | 1.96 | 1.94 | 1.94 | 1.95 | 1.94 |
| *(LT2)* | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **Credit Risk Transfer (CRT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| (*CRT1)* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Leverage (L)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(L1)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *(L2)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *(L3)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Multi-Assets Funds | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Mar-15* | *Jun-15* | *Sep-15* | *Dec-15* | *Mar-16* | *Jun-16* | *Sep-16* | *Dec-16* | *Mar-17* | *Jun-17* | *Sep-17* | *Dec-17* | *Mar-18* | *Jun-18* | *Sep-18* | *Dec-18* | *Mar-19* | *Jun-19* | *Sep-19* | *Dec-19* | *Mar-20* | *Jun-20* | *Sep-20* | *Dec-20* |
| **Credit Intermediation (CI)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(CI1)* | 0.318 | 0.320 | 0.312 | 0.296 | 0.312 | 0.318 | 0.320 | 0.329 | 0.318 | 0.313 | 0.316 | 0.319 | 0.324 | 0.323 | 0.364 | 0.340 | 0.330 | 0.347 | 0.352 | 0.350 | 0.373 | 0.366 | 0.362 | 0.351 |
| *(CI2)* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *(CI3)* | 0.318 | 0.320 | 0.312 | 0.296 | 0.312 | 0.318 | 0.320 | 0.329 | 0.318 | 0.313 | 0.316 | 0.319 | 0.324 | 0.323 | 0.364 | 0.340 | 0.330 | 0.347 | 0.352 | 0.350 | 0.373 | 0.366 | 0.362 | 0.351 |
| **Maturity Transformation (MT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(MT1)* | 0.293 | 0.292 | 0.283 | 0.267 | 0.271 | 0.269 | 0.270 | 0.283 | 0.279 | 0.278 | 0.284 | 0.298 | 0.308 | 0.298 | 0.299 | 0.310 | 0.290 | 0.300 | 0.300 | 0.306 | 0.327 | 0.316 | 0.320 | 0.321 |
| *(MT2)* | 1.42 | 1.41 | 1.39 | 1.36 | 1.37 | 1.37 | 1.37 | 1.40 | 1.39 | 1.39 | 1.40 | 1.42 | 1.44 | 1.42 | 1.43 | 1.45 | 1.41 | 1.43 | 1.43 | 1.44 | 1.48 | 1.46 | 1.47 | 1.47 |
| *(MT3)* | 1.51 | 1.50 | 1.48 | 1.46 | 1.48 | 1.50 | 1.50 | 28.82 | 1.49 | 1.72 | 1.50 | 1.52 | 1.54 | 1.53 | 1.50 | 1.55 | 1.52 | 1.59 | 1.56 | 1.56 | 1.69 | 1.57 | 1.56 | 1.54 |
| **Liquidity Transformation (LT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(LT1)* | 1.69 | 1.68 | 1.67 | 1.65 | 1.67 | 1.68 | 1.69 | 1.70 | 1.70 | 1.70 | 1.70 | 1.71 | 1.71 | 1.70 | 1.73 | 1.71 | 1.70 | 1.71 | 1.69 | 1.70 | 1.67 | 1.68 | 1.68 | 1.69 |
| *(LT2)* | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.04 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.04 | 1.04 | 1.04 | 1.03 | 1.03 | 1.03 | 1.03 | 1.06 | 1.02 | 1.02 | 1.02 |
| **Credit Risk Transfer (CRT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(CRT1)* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Leverage (L)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(L1)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *(L2)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *(L3)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Real Estate Funds | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Mar-15* | *Jun-15* | *Sep-15* | *Dec-15* | *Mar-16* | *Jun-16* | *Sep-16* | *Dec-16* | *Mar-17* | *Jun-17* | *Sep-17* | *Dec-17* | *Mar-18* | *Jun-18* | *Sep-18* | *Dec-18* | *Mar-19* | *Jun-19* | *Sep-19* | *Dec-19* | *Mar-20* | *Jun-20* | *Sep-20* | *Dec-20* |
| **Credit Intermediation (CI)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(CI1)* | 0.007 | 0.010 | 0.007 | 0.010 | 0.006 | 0.002 | 0.005 | 0.004 | 0.002 | 0.003 | 0.003 | 0.001 | 0.001 | 0.001 | 0.002 | 0.003 | 0.006 | 0.005 | 0.005 | 0.008 | 0.002 | 0.003 | 0.003 | 0.004 |
| *(CI2)* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *(CI3)* | 0.007 | 0.010 | 0.007 | 0.010 | 0.006 | 0.002 | 0.005 | 0.004 | 0.002 | 0.003 | 0.003 | 0.001 | 0.001 | 0.001 | 0.002 | 0.003 | 0.006 | 0.005 | 0.005 | 0.008 | 0.002 | 0.003 | 0.003 | 0.004 |
| **Maturity Transformation (MT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(MT1)* | 0.81 | 0.80 | 0.79 | 0.91 | 0.84 | 0.83 | 0.85 | 0.95 | 0.87 | 0.88 | 0.87 | 0.84 | 0.87 | 0.87 | 0.86 | 0.91 | 0.93 | 0.93 | 0.92 | 0.91 | 0.89 | 0.90 | 0.91 | 0.92 |
| *(MT2)* | 5.21 | 4.98 | 4.71 | 11.01 | 6.28 | 5.87 | 6.73 | 20.43 | 7.86 | 8.40 | 7.81 | 6.41 | 7.64 | 7.47 | 7.06 | 10.62 | 13.70 | 13.54 | 12.35 | 10.76 | 8.74 | 9.63 | 10.64 | 12.60 |
| *(MT3)* | 11.91 | 11.71 | 10.67 | 41.03 | 8.92 | 8.90 | 9.89 | 66.53 | 11.69 | 11.79 | 57.98 | 54.02 | 39.94 | 53.54 | 41.23 | 29.00 | 28.65 | 31.73 | 27.79 | 22.39 | 14.86 | 21.21 | 28.88 | 26.25 |
| **Liquidity Transformation (LT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(LT1)* | 1.92 | 1.92 | 1.91 | 1.99 | 1.89 | 1.89 | 1.90 | 1.99 | 1.92 | 1.92 | 1.99 | 1.98 | 1.98 | 1.98 | 1.98 | 1.97 | 1.97 | 1.97 | 1.97 | 1.96 | 1.93 | 1.95 | 1.96 | 1.96 |
| *(LT2)* | 0.89 | 1.81 | 1.80 | 1.79 | 1.91 | 1.84 | 1.83 | 1.85 | 1.95 | 1.87 | 1.88 | 1.87 | 1.84 | 1.87 | 1.87 | 1.86 | 1.91 | 1.93 | 1.93 | 1.92 | 1.91 | 1.88 | 1.89 | 1.89 |
| **Credit Risk Transfer (CRT)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(CRT1)* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Leverage (L)** | | | | | | | | | | | | | | | | | | | | | | | | |
| *(L1)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *(L2)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| *(L3)* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |