Research Document
Working Paper

Stress Testing and the Securities Market

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Policy Research and Planning

Mr. Sugrim Mungal

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LIST OF ACRONYMS

Meanings	Acronyms
Collective Investment Scheme	CIS
Micro and Macro Prudential Reporting Framework	MMRF
Mutual Fund Association of Trinidad and Tobago	MFATT
Net Asset Value	NAV
Operations Working Group	OWG
Other Financial Institutions	OFIs
Over the Counter	OTC
Repurchase Agreement	Repo
Securities Act, 2012	SA 2012
Securities Dealers Association of Trinidad and Tobago	SDATT
Technical Assistance	TA
Transition Working Group	TWG
Trinidad and Tobago Securities and Exchange Commission	The Commission

INTRODUCTION

The mandate of the Trinidad and Tobago Securities and Exchange Commission ("the Commission") is to protect investors, promote and enable growth and development of the securities market. To this end, its major objectives include investor protection, fostering a fair and efficient securities market, building confidence in the securities industry and mitigating systemic risk.

The securities market in Trinidad and Tobago is one of the largest in the Caribbean based on measures such as market capitalisation, trading activity and participation of investors. There is also a broad spectrum of products which include equities, retail repurchase agreements, government bonds, corporate bonds, mutual funds and securitised instruments.

This document describes a potential approach to stress testing, which is the application of numerical techniques to simulate specific hypothetical but potential scenarios so as to gauge vulnerabilities to those scenarios. Stress testing can be applied to portfolios, significant activities, companies or even an entire financial sector. The selected scenarios typically represent extreme but plausible unfavorable events, so as to be able to assess resilience in the face of the most serve pressures that are likely to occur.

Stress testing has gained greater importance as a micro-prudential tool for firms and supervisors and as a macro-prudential tool for regulators with systemic responsibilities. The 2008/09 global financial crisis in particular increased the emphasis on stress testing as a risk management and prudential regulatory tool. As a result, stress tests now play an important role in the following:

1) Individual firm supervision by the regulator to identify weaknesses in the health of firms and to formulate appropriate firm-level responses.
2) Sector wide analysis of risks, vulnerabilities and dependencies by the regulator.
3) Crisis management exercises by national authorities.

BACKGROUND

To date, stress testing is widely used within the banking sector and was carefully developed to address banking risks. However, it has not yet been developed specifically for the risks faced by securities market intermediaries. As a result, stress tests for securities intermediaries have often been developed on a relatively ad-hoc basis utilising either bank-type stress tests or simple sensitivity analyses. There is also an additional risk that these ad-hoc stress tests could generate misleading conclusions.

Therefore, it is important for these tests to include characteristics and risks specifically associated with securities markets that are built upon a rapid flow of transactions as well as on the holding of investments. This focus on rapid transactions leads to significant interconnections between participants and significant common risks. This in turn creates a greater risk of contagion through elements of the system that accumulate, amplify or transmit stresses onward.

Stress Testing - Banks vs Securities Industry

The following are some of the differences between the focus of stress tests for banks and the securities market:

1) Second round – while all financial intermediaries including banks will feel indirect impacts on their liquidity, the generally short term nature of the financing of most securities market intermediaries makes them particularly vulnerable to indirect impacts on their liquidity/financing. Thus, while stress test second round and feedback effects are useful for all financial intermediaries, their incorporation should be mandatory for securities markets intermediaries. The results of the first round will be included in the triggers and impacts of the second round.

2) Time horizon/profitability – due to the significance of short-term shocks and the transmission of liquidity stresses, the stress tests for securities market will have a stronger focus on short-term and balance sheet impacts rather than on income impacts.

3) Contingency funding plans – given the nature of the shocks (sudden hits on capital and liquidity), a firm's contingent funding plans will need to be considered when looking at whether a firm can survive stresses.

4) Credit risks – Securities market intermediaries are mainly exposed to counterparty credit risk, which will be channeled through securities pricing. General credit conditions are therefore less significant than the impact on prices and on counterparties which will emerge through the second round.

STRESS TESTING FRAMEWORK

The Commission will utilise a conceptual framework to conduct its stress testing of the securities industry. The stress testing framework will comprise of the following twelve steps:

Step 1: Defining the institutional capture

Step 2: Identifying the key trigger events

Step 3: Translating the key trigger events into tangible impacts

Step 4: Identifying all relevant transmission channels and linkages

Step 5: Defining and quantifying the stress test scenarios

Step 6: Obtaining relevant data

Step 7: Performing the stress test (First Round)

Step 8: Assessing the results of the stress test and reviewing assumptions

Step 9: Performing the stress test (Second Round)

Step 10: Communicating the stress test results

Step 11: Following up

Step 12: Institutionalising the tests

Step 1: Defining the institutional capture

Defining which entities are to be included in a macro-prudential stress test depends primarily on whether individual firms may have a significant role in triggering or amplifying problems within other participants. To determine which firms to include will require a good understanding of the size, nature and complexity of its activities and its market interconnectedness.

Stress tests will be conducted on all registrants registered under Sections 36 and 51(1) of the SA 2012 i.e. self-regulatory organisations, broker-dealers, investment advisers and underwriters. The following table displays a range of activities conducted by the Commission's registrants.

Registrant Type	**Possible Significant Activities**
Broker-Dealer	• CIS manager • Repo seller • Asset/Investment manager (discretionary/non-discretionary) • Proprietary trading • Trading as agent • Investment advice
Investment Adviser	• Investment advice • Asset/Investment manager (non-discretionary)
Underwriter	• Proprietary trading • Trading as agent • Distribution of securities
Self-Regulatory Organisation	• Securities exchange • Depository/Custodial services

While a Collective Investment Scheme ("CIS") is not considered a registrant of the Commission it is registered as a security pursuant to Section 62 of the SA 2012. Each CIS is treated as a separate entity with financial statements that are detached from the Broker-Dealer that manages it. CIS's registered with the Commission will also be subject to stress testing.

Step 2: Identifying the key trigger events

For the purposes of stress testing, a trigger is an event that causes circumstances to alter such as to make it difficult for registrants of the Commission to continue their operations. Appropriate triggers would be events that could arise independently of other stresses in the securities industry. These triggers need to be directly related to the specific stress to qualify as triggers instead of only as transmission channels.

For stress tests to be meaningful they will need to be anchored in trigger events that are both plausible and relevant to the securities industry of Trinidad and Tobago. Some potential triggers include:

1) **Currency devaluation** – this can potentially arise from changes in inflows or outflows of foreign currency. This could impact the valuation of investments and liabilities. It may also lead to changes in interest rates in order to defend the exchange rate.
2) **Interest rate changes** – this can lead to a number of outcomes, such as: a fall in the valuation of fixed income securities, increase cost of capital to firms, higher cost to repo sellers, relative attractiveness of bank deposits over CISs and increasing bond yields. These impacts may lead to the need to find additional capital or liquidity. This would also affect some elements of the income and expenditures of registrants and therefore the reserves on their balance sheets.
3) **Migration of clients** – this includes the migration of clients between substitutable products. For example a migration from retail repo and mutual funds towards bank deposits. This would require firms to find funding to repay the departing clients.
4) **Tightening of bank credit** – removal or tightening of bank credit to the securities sector will make it difficult for registrants to find short term funding to operate.
5) **Regulatory Requirements** – substantial adjustments in regulatory requirements will have significant impacts on registrants. Some example may include the following:
    a. Increasing the amount of collateral for retail repos,
    b. Introduction of strict new risk-based capital requirements,
    c. Ending the distribution of fixed NAV CISs.

Most of the triggers discussed above will require registrants to source additional capital or liquidity. The options available will be relatively similar for all intermediaries and may include the following:

- Attempting to attract new clients (offer higher returns).
- Sell repos to other parts of the financial sector.
- Sale of assets underlying the retail repos.
- Accessing internal reserves.
- Attempting to attract new capital.
- Accessing contingent funding sources.

The triggers discussed in this section are subject to change based on the requirements of the Commission to ensure the risks associated with the securities industry are mitigated.

Step 3: Translating the key trigger events into tangible impacts

When the triggers are identified, they will need to be simplified and converted into the tangible impacts that will be experienced directly at the level of individual participation. There may be a number of potential outcomes from particular events, but specific ones must be identified in order to take the test forward. This means identifying the following:

1) The financial prices, rates, spreads, etc. that will be assumed to be affected.
2) Any likely change in the behaviour of the firm, market counterparties, creditors and other parties with whom the firm deals and clients.

The magnitude of the impacts and changes in behaviour are not estimated until the test scenario has been decided. These may include, for example, valuations, interest rates, credit spreads, bond yields, demands for higher collateral, redemption of funds, changes in over the counter ("OTC") liquidity and delays in settlement.

The time period of the impact must be determined; whether short term (up to a month) or long term (a year or more). Longer term stress tests are particularly relevant where profit impairment may be relevant to the conclusions to be drawn from the tests. The stress tests question is more focused on the short term survival of big shocks and their indirect impacts. Therefore, the medium and longer term time horizons are not sufficiently relevant.

It was determined that impacts will be applied to the data as follows:

- A top down test approach will be adopted and applied to the data collected by the Commission from its registrants.
- The stress tests will be applied to balance sheet data, notwithstanding the fact that the impact may be based on income and expenditure data or on portfolio data.
- The impacts would be applied in a logical order – a cascade would therefore be an integral part of the tools to be created for the tests (See step 7 and 9 below).

A number of Financial Soundness Indicators ("FSIs") will be utilised to understand the risks associated with the securities industry, These FSIs are categorised as follows:

- Liquidity
- Size
- Concentration
- Interconnections
- Substitutability
- Transparency
- Prudential Analysis

See Appendix I for a detailed analysis of the FSIs.

Step 4: Identifying all relevant transmission channels and linkages

Although a registrant may easily withstand the direct stresses of a particular scenario, they may feel very acutely, albeit indirectly, the effects created by the impacts of those stresses on other registrants. These indirect stresses can be transmitted through various channels and may be passed on (and even potentially amplified) to other participants. These are the channels through which firms that are impacted by the trigger feel additional indirect stresses which amplify the stresses already experienced.

In constructing a stress test for the securities industry, it will therefore be important to consider the potential for rapid transmission of the following stresses:

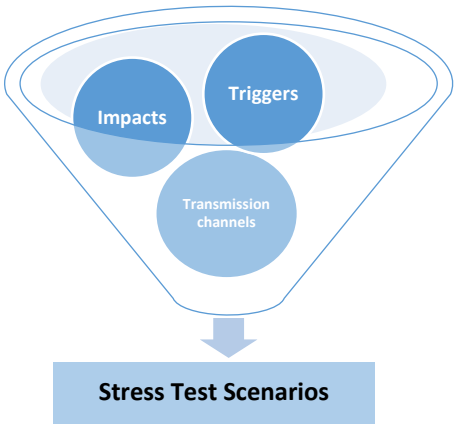
- **Funding Stresses** – caused by the need to find liquid assets to fill gaps caused by the stresses and the perception of greater risk in lending to registrants. A capital or liquidity crisis at one firm is almost certain to lead to uncertainty about the liquidity or capital of other registrants.
- **Market Stresses** – caused by the impact of stresses on the trading and valuation of securities.
- **Client responses to stresses** – this includes a flight to safety caused by a reduction in client confidence.

- **Regulatory responses to stresses** – caused by actions intended to protect the securities industry and customers.
- **Direct Stresses** – caused by direct exposure to a failing registrant.

Step 5: Defining and quantifying the stress test scenarios

Working from the list of potential triggers, impacts and transmission channels as discussed above, the overarching stress scenarios are then formulated as seen in the diagram below.

Figure 1 Stress Test Scenarios



A stress scenario will consist of triggers, impacts and channels consistent with a plausible situation that markets might face.

Stress testing scenarios will evolve over time; however, the Commission will establish an initial suite of scenarios . These scenarios were created to dovetail with stress tests conducted by the CBTT and include both single factor sensitivity tests and multivariable scenarios. The single factor tests are aimed at understanding and calibrating the vulnerability of the markets to particular stresses and will assess the sensitivity of markets to each type of impact. The multivariable tests are classic stress tests aimed at understanding how real world crises might impact the markets, its participants and other parts of the financial sector.

Single factor scenarios

Interest rate increase (1)	an increase in general interest rates of 500bps (short, medium and long term), accompanied by price movements of 20% for equities; 10% for short-to medium term securities; and 30% for long-term securities;

Interest rate increase (2)	an increase in general interest rates of 700bps, accompanied by price movements of 25% for equities; 15% for short to medium term securities; and 40% for long term securities;
FX devaluation (1)	an increase in the TT$/US$ exchange rate of 50%, that is, for example, a movement from 6TT$ to 9TT$ per US$;
FX devaluation (2)	an increase in the TT$/US$ exchange rate of 40%, that is, for example, a movement from 6TT$ to 8.4TT$ per US$ (i.e., the same movement as utilised in the CBTT stress tests);
Extreme client exit	the exit of (a) 40% of investments in Mutual Funds; (b) 30% of investments in Retail Repos; and (c) 10% of investments in securities; and
Significant client exit	the exit of (a) 20% of investments in Mutual Funds; (b) 15% of investments in Retail Repos; and (c) 5% of investments in securities.

Multivariable scenarios can include the following:

- **Removal of Interest Guaranteed Products –** for instance, the sudden end to fixed NAV mutual funds – with no incentive being offered to stay in the floating NAV funds.
- **Removal of Interest Guaranteed Products –** for instance, the Sudden end to fixed NAV mutual funds – with the fund managers offering an incentive to clients to stay in floating NAV funds for next 15 months, equivalent to two years' extra interest funded from reserves of the funds.
- **Energy prices fall significantly** – no response from monetary authorities.
- **Energy prices fall significantly** – monetary authorities intervene to mitigate the interest rate rise.
- **International isolation of the markets -** This results from fall in confidence.
- **Sudden return of activity and growth in the markets**.

The creation and establishment of all future scenarios will need to include a determination of the potential triggers, impacts and transmission channels which need to be severe but plausible in order for any conclusions to be credible.

Step 6: Obtaining relevant data

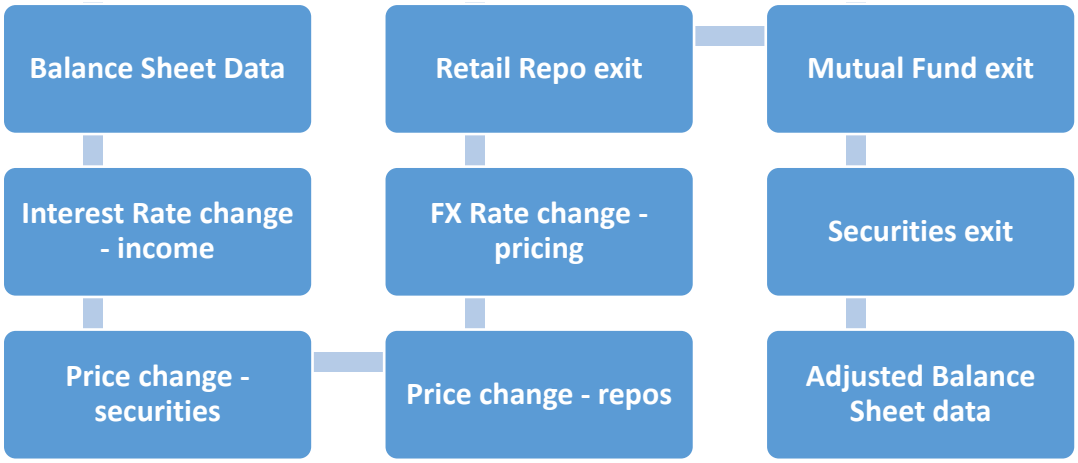
The Commission established the Micro and Macro-Prudential Reporting Framework ("MMRF") which currently captures financial and statistical data from registrants through the use of electronic forms. The data collected allows the Commission to analyse and evaluate the health, soundness, and potential vulnerabilities of the securities industry. The data also informs key micro and macro, prudential and financial soundness indicators, for all segments of the securities market (securities, mutual funds, repos, etc.). In the future, further information will have to be collected on SROs to complete stress testing on these registrant types. The following data will be utilised to conduct stress testing on registrants registered under 51(1) of the SA 2012 and CISs:

- Assets and Capital
- Liquid assets
- Portfolio breakdown
- Repo breakdown –liabilities and underlying assets
- Interest related income and expenditure

Step 7: Performing the stress test (First Round)

On specification of the scenario, and when the triggers, impacts and transmissions channels are identified and quantified, can the stress tests and any aggregation be performed. The performance of the stress test will be planned to ensure that the tools used are adequately constructed in advance. Figure 2 below displays the first round cascade.

Figure 2 - First Round



A wide range of tools can be utilised to conduct the stress tests and the Commission will ensure that the appropriate tools are utilised. The application of the stresses will be carried out at the level of individual firms and subsequently aggregated to show segment-wide or market-wide results. The results of each firm will also contemplate the use of the contingency funding sources of registrants, once available.

The Commission's stress testing framework includes both first round and second round tests. In those rounds, the impacts are applied directly to balance sheet data (albeit based on data from other sources as well). Those impacts associated with the first round tests fall into the following order of application (see Table 1)

Table 1: First Round Stress Test

FIRST ROUND STRESS TEST					
START					**END**
Balance Sheet	**Adjustment 1**		**Adjustment 2**	**Adjustment 3**	**Adjusted Balance Sheet**
	Interest Rate Change	**Price Change**	**Forex Change**	**Client Exit**	
Include: - Name of Reporting Entity - Type of Reporting Entity - Relevant date of Test The data will be derived from the MMRF 01 - Balance Sheet and Client Assets Form.	The change to interest rates will impact the repo and non-repo interest expense. The MMRF 02 – Income and Expenditure Form will have to be included on the stress testing sheet.	Price changes will impact securities and repos held by the entity. The MMRF 03/04/05 – Portfolio Forms will have to be included on the stress testing sheet based on the business activity of the registrant. Adjustments will have to be made to the portfolio forms to sort the information into long term, short term and equities and CISs. Adjustments will be made to the Securities line item on the balance sheet and the entities retained earnings.	Forex changes will impact all foreign holdings of the entity (cash and securities). This also includes repo liabilities overseas bank loans and retained earnings. Adjustments will have to be made to the portfolio forms to sort the information into foreign and local.	Client exits will consist of repo clients, CIS clients and investment management clients. All cash, securities and repos will be impacted along with revaluation and retained earnings. The client exit section will include the following: - Cash required - Cash available - Cash shortfall - discount	Subject to the three (3) adjustments the balance sheet will be adjusted and the summary of the first round stress test will indicate whether the entity passed or failed the solvency and liquidity test.

Step 8: Assessing the results of the stress test and reviewing assumptions

The objectives of the stress tests are to assess whether firms are able to continue to operate under the specific conditions of the test scenarios. If not, the scale of the shortfall and the call on banks and others for liquidity and capital must be understood. The stresses will be felt in two main ways – through pressures on the adequacy of capital (solvency test) and determining whether registrants have access to sufficient liquid assets to be able to meet their obligations (liquidity test). Some stress tests also examine the impact on profitability of the firms in order as to gauge whether their long-term sustainability is feasible.

Solvency test

The Commission will utilise a simplified capital adequacy ratio based on data provided on the capital and assets of registrants. The test will be used to determine whether the registrant failed and what capital injection is required if it is to continue its operations.

Solvency questions

a) Did the firm pass or fail the solvency test?
b) If not, could it be rescued by a capital injection?
c) How much was that capital injection?
d) From what sector did that capital injection come?
e) How else might the firm have been assisted?

Liquidity test

This test will determine whether liquid assets are sufficient to meet demands for cash and securities arising from the scenario. This test will be important in calculating the need to sell assets or call for liquidity assistance from owners/banks.

Liquidity questions

(a) Did the firm pass or fail the liquidity test?
(b) If not, could it be rescued by a liquidity injection?
(c) How much was that liquidity injection?

(d) From what sector did that liquidity injection come?
(e) How else might the firm have been assisted?

Sector-wide assessment criteria

For macro-prudential purposes, these tests would often include the calculation of sector wide assessment criteria and will be based on the Financial Stability Indicators ("FSIs").

Sector-wide questions
(a) How many firms are deemed to fail the stress test?
(b) What level of liquidity had to be injected by firms into the mutual funds?
(c) What level of liquidity had to be injected into repo portfolios?
(d) What level of liquidity had to be injected by the banking sector into the firms?
(e) What level of capital was required to keep firm's solvent – for bank and non-bank firms?
(f) If the authorities wanted to intervene to safeguard the sector, what amount of investment might have been required?
(g) What regulatory policy decisions might help to mitigate or prevent failures in these circumstances?

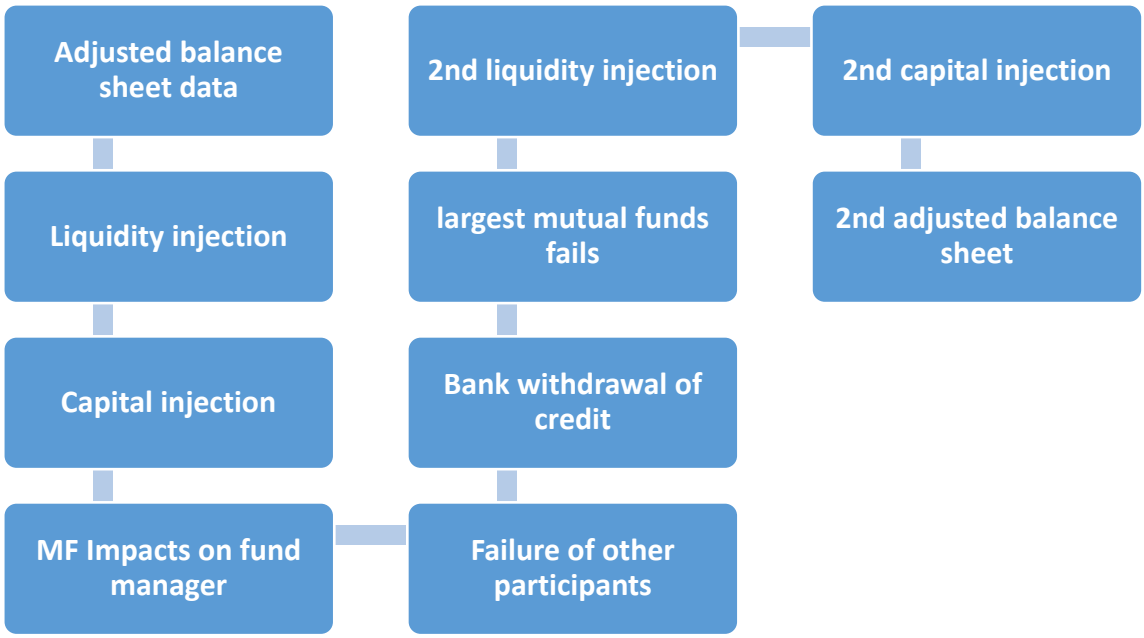
Reviewing assumptions

The practical usefulness of the findings of stress tests conducted on the securities industry in Trinidad and Tobago will be determined by the relevance of the scenarios chosen and the assumptions made along the way. Therefore, the Commission acknowledges that assumptions must be reviewed periodically and if necessary, adjusted. When stress test results are compiled, the assumptions will also be reviewed to ensure they are still reasonable The results will also be reviewed to consider whether registrants could have avoided the result through a management action that was not previously considered. If necessary, the assumptions will be amended and the test re-run, rather than continuing with results that are rendered questionable or unrealistic.

Step 9: Performing the stress test (Second Round)

If the stress test scenario includes the need for a second round, the results of the first round will be considered before the outcomes for the second round are analysed. The second round will follow the cascade as seen in figure 3 below

Figure 3 - Second Round Cascade



The analysis of the adjusted balance sheets will then be focused on the following:

- How many firms are deemed to fail the stress test?
- What level of liquidity had to be injected by the firms into the mutual funds?
- What level of liquidity had to be injected into the repo portfolios?
- What level of liquidity had to be injected by the banks into the firms?
- What level of capital was required to keep firms' solvent – for bank and non-bank firms?

The impacts associated with the second round tests fall into the following order of application (see Table 2).

Table 2: Second Round Stress Test

SECOND ROUND STRESS TEST							
START	→						**END**
1st Round Adjusted Balance Sheet	**Injections Post 1st Round**	**Mutual Fund Injection**	**Other Financial Institutions (OFIs)**	**Bank Reactions**	**Iconic Mutual Funds**	**Injections Post 2nd Round**	**Adjusted Balance Sheet**
The Adjusted Balance Sheet from the first round will be automatically updated into the second round sheet.	Injections will come from the following sources: - Trade Creditors - Cash - Capital Where liquidity injections are made in terms of cash or capital the necessary justifications must be included. Trade creditors will not be paid in the short term as the entity requires cash.	Where the entity is a mutual fund the appropriate injection by the fund manager must be made along with justifications. The information will also display the impact the scenarios have on the fund manager.	This includes the liquidity impact and write offs associated with other financial institutions. Assumptions will be included as follows: - OFIs requiring liquidity - OFIs failing - Securities discount Trade debtors, cash securities and retained earnings will be impacted.	This includes the reaction of banks as follows: - Increasing interest rates - Recalling loans - Securities discount Information will be included for loan recalls based on the cash available.	Impacts of an iconic fund manager will also be included as follows: - Further exit of clients - Impact of CISs - Impact on fund manager Cash, securities, capital and retained earnings of a mutual fund will be impacted.	Any liquidity and capital injections will be included along with proper justifications.	The balance sheet will be adjusted at the end of the second round and the summary will display whether the entity passed or failed the solvency and liquidity test.

Step 10: Communicating the stress test results

The Commission will utilise stress test data to identify potential risks in the securities industry. The Commission will determine to whom and how the results will be communicated to ensure that proper risk mitigation strategies are implemented. Results may be communicated to internal and external stakeholders. Communication will be tailored to ensure stakeholders do not view the triggers and scenarios as forecasts and predictions. The following provides details on the communication options: **Internal decision makers** – summarised information related to the stress tests can be passed to all key decision makers in the Commission. This information would include the objectives, design, triggers etc. as well as the overall conclusions. The communication will include a clear statement that the triggers are not forecasts nor are the results predictions but are rather extreme possible scenarios.

Regulatory authorities –the objectives of the stress tests are to establish the financial stability of the securities industry under stressed conditions, where applicable. As such the Commission intends to share the results with regulators of other entities and other authorities as determined necessary.

Registrants –the Commission will determine if or when the results of the scenarios should be communicated to the associated registrants. Communication of results will be important when considering risk mitigation strategies and implementing decisions based on the results of stress tests. The determination of the triggers and assumptions must be intuitively reasonable to ensure outcomes are sufficiently justified.

The public – in markets where stress tests are very well established and are carried out transparently, it is not unknown for the headline conclusions to be communicated to the public. However, this should only be done well after the tests have become consolidated and well accepted by the regulated community. These tests will be new to the Trinidad and Tobago securities industry, therefore there is a risk that broadcasting the results may lead to confusion and possibly concern. If triggers and scenarios are made public this can be mistaken for a forecast and could become self-fulfilling (e.g. a migration of clients away from securities products to bank deposits). Therefore, the Commission will decide on the best approach to engaging the public with regard to stress testing.

Step 11: Following up

Once the stress tests are consolidated, the Commission will need to, in addition to communicating the results, decide on what actions to take. This is likely to include micro-prudential actions, at the firm level or at the regulatory level (e.g. targeted compliance reviews etc.) and macro-prudential actions. These follow up actions are likely to be categorised into the following areas:

- Macro-prudential follow up – in particular, regulatory policy decisions related to the priorities that emerge from the identification of systemic vulnerabilities.
- Micro-prudential follow up – the two main categories include:
    - ✓ Internal matters - obtaining more data, targeted examinations, closer monitoring;
    - ✓ Firm matters – management actions at the firm, including additional capital, reducing exposures, capping distributions to owners and even resolution plans.

Step 12: Institutionalising the tests

The Commission does not consider stress testing to be a one-off exercise. Continuous refinement and practice will encourage increased utilisation, relevance and application by the Commission and Registrants. The Commission will be considering the following with regard to institutionalising the conduct of stress testing within the securities industry:

- Creating micro-prudential, firm-level stress tests aimed at identifying vulnerabilities at the level of each firm.
- Repeating the stress tests regularly – possibly annually or bi-annually, with the scenarios being refined and improved as necessary.
- Initiating communication of the required plan, objectives and results of the test to the firms.
- Asking firms to conduct their own stress tests, incorporating not only specific market wide scenarios but also idiosyncratic scenarios.

The stress testing tool will consist of Microsoft Excel spreadsheets, comprising some of the following key elements:

- The tests are based on balance sheets, starting with the balance sheet data provided by registrants via the MMRF.

- Each impact is separated in a dedicated column. After each impact column, the tool recalculates the balance sheet and applies a control to check that total assets remain consistent with total liabilities and capital.
- The tool has separate tabs for the First Round and for the Second Round.
- The tool includes a summary page showing the results of the tests after each impact and at the end of each of the two rounds.
- The tool takes cash first when liquidity is required. If cash is not available, the firm sells its securities to produce the cash required. The spreadsheet allows a discount to be included in the sale of the securities.
- Impact parameters that are to be used in the tests are input in highlighted cells at the top of their respective columns.
- The tool calculates after each impact whether or not a firm meets the solvency and liquidity tests and, if not, by what margin.

Limitations of Stress Testing

The following are some limitations the Commission can encounter with regard to stress testing:

- Stress testing of the securities market is not commonplace locally, since financial stability assessments have mostly been the focus of central banks and on the banking sector. This means that there is very little research available in this area as it relates to the securities market. Therefore, ensuring that the areas of focus for the stress tests and the processes undertaken in conducting the tests are appropriate are of critical importance. The lack of a stress testing track record for the securities market will also create initial challenges in designing meaningful scenarios.
- The Commission has recently implemented the MMRF to ensure data is collected to access financial stability for the securities market. Since the framework is fairly new, the Commission is currently in the process of accumulating sufficient time series of data to properly observe patterns and make historically substantiated assessments.
- There is currently no risk based capital adequacy requirements in place for registrants. This will present an immediate challenge when conducting the solvency test since the current minimum capital requirements are not themselves suitable measures of capital adequacy

as they are not properly linked to nor reflective of the size or activity risk profiles of the firms being assessed. The Commission intends to address this issue by developing and issuing risk based capital adequacy requirements in the future.

- Stress Testing is currently envisioned for registrants of the Commissions as seen in Step 1 above. This means that entities registered as reporting issuers will not be captured in the stress testing.

EXPECTED OUTCOMES

Stress testing has increased in importance as a micro-prudential tool for firms and supervisors and as a macro-prudential tool for regulators with systemic responsibilities. The Commission continues to meet its legislative mandate:

- to assess, measure and evaluate risk exposure in the securities industry;
- to monitor the risk exposure of registrants and self-regulatory organisations; and
- to take measures to protect the interest of investors, clients, members and the securities industry.

The following are expected outcomes of the stress testing framework:

- The conduct of periodic stress testing of the securities industry. At a minimum stress testing will be conducted on an annual basis.
- Results will be communicated to management as discussed in Step 10.
- The current tool being used to conduct stress tests is Microsoft Excel. As the tests become more complicated and take into account more scenarios, the tool will be further developed and possibly replaced with more sophisticated software.
- This tool will be used in conjunction with the Commission's Risk Based Supervisory ("RBS") framework and an implementation document to ensure risks of the securities industry are assessed, measured and evaluated.
- In the near future, as we continue to conduct Stress testing it is expected that Staff will become more proficient and will be better equipped to evaluate the Stress Testing Frameworks of our Registrants.

Appendix I – Financial Stability Indicators

Liquidity FSIs

Activity	Collective Investment Schemes
Name of Indicator	CIS Encashments
Description	Review of whether there is greater inflow of outflow of funds in the CIS sector. This indicator is principally for consideration as an aggregate broad index but can be used on an individual registrant level.
Key Risks	• CISs suffer a call on their liquidity that may not be able to meet or which threatens their ability to meet further calls. • CISs are caused to act in a way that creates a firesale of assets. • There is a shift away from (or run on) the CIS product • Funds hold too much cash which they will find hard to invest (without investing in circular flows).
Metadata	$\sum \left[\frac{(S - R)}{AUM} \right]$ S – Subscriptions (including distributions) R – Redemptions (including distributions taken) AUM - AUM at start of period
Limitations	• The indicator shows net inflow and outflow of financial resources to the fund and it is not related to available liquidity • Numbers come in relatively late – possibly 5 months after start of related period. • May need to be used in combination with other indicators if going to be most useful.
Cues for analysis	1. Is the number an outlier across all similar entities for the period? 2. Review the last analysis. Is there a note that needs a follow up review? 3. Is the outflow significant (5% or over), 4. is the net encashment over the last 3 or 4 periods potentially significant? 5. If significant outflow looks at liquid assets – is there much more than necessary to meet any ongoing encashment if it occurs? If not, consider calling firm to discuss how encashments have continued and how they are planning to obtain liquidity. 6. If large positive inflow (more than 10%), confirm calculation and review all elements to ensure the data make sense. 7. Is the pattern of redemptions and subscriptions over the past four quarters unusual? if at all unusual, call firm to establish facts and where planning to invest money.

Activity	Collective Investment Schemes
Name of Indicator	CIS Fixed NAV Encashments
Description	Review of whether there is greater inflow of outflow of funds in the Fixed NAV CIS sector. This indicator is principally for consideration as an aggregate broad index but can be used on an individual registrant level.
Key Risks	• Fixed NAV CISs suffer a call on their liquidity that threatens to erode their value irreversibly. • Administrators of Fixed NAV CISs (and their owners) become liable to cover significant losses. • CISs have to act in a way that creates a firesale of securities. • Public confidence collapses in CISs.
Metadata	$\sum \left[\frac{(S_f - R_f)}{AUM} \right]$ S_f – Fixed NAV Subscriptions (including distributions) R_f – Fixed NAV Redemptions (including distributions taken) AUM - AUM at start of period
Limitations	• Simple inflow and outflow calculation - not related to available liquidity. • Numbers come in relatively late – possibly 5 months after start of related period. May need to be used in combination with other indicators if going to be most useful in a timely way.
Cues for analysis	1. Is there a note from the last reporting date that needs a follow up review? 2. What is the overall Fixed NAV compared to the overall Real NAV? 3. If not insignificant outflow (1% or over), is the net encashment over the last 3 or 4 period potentially significant? What is the trend? 4. Is the outflow particularly significant in any funds? 5. Are there sufficient liquid assets in the hands of the funds suffering the greatest? 6. Is there a threat to the Real NAV of the iconic Fund Manager? 7. If significant outflow (5% or over), calculate cushion of real NAV over Fixed NAV and cushion of liquid assets within AUM. Communicate results to senior management. If there are significant cushions, consider communication with CBTT via finstab process. If no significant cushions, communicate more immediately and discuss response.

Activity	Collective Investment Schemes
Name of Indicator	c
Description	Weighted Average Yield of Floating NAV funds compared to the Weighted Average Yield of Fixed NAV funds. Essentially this is the sum of yield of each floating fund as reported by the manager multiplied by the market share of the fund by AUM in floating funds (LESS) sum of yield of each Fixed NAV fund as reported by the manager multiplied by The market share of the fund by AUM in fixed NAV funds. This is intended to be an industry level indicator.
Key Risks	• In times of stress, Fixed NAV funds carry more risk than floating funds and will be under more pressure to retain and attract clients. This may make the model unsustainable. • If Fixed NAV funds start to lose value, their first reaction may be to try to survive by pulling in more clients to fund outflows. This may be signaled by the interest rate offered before actual outflows.
Metadata	$\sum[Y_{FNAV} \times (Mkts_{FNAV} \times AUM_{FNAV})] - \sum[Y_{FxNAV} \times (Mkts_{FxNAV} \times AUM_{FxNAV})]$ Y_{FNAV} – Yield of Floating NAV fund $Mkts_{FNAV}$ – Market Share of Floating NAV Fund AUM_{FNAV} – AUM of all Floating NAV Funds Y_{FxNAV} – Yield of Fixed NAV fund $Mkts_{FxNAV}$ – Market Share of Fixed NAV Fund AUM_{FxNAV} – AUM of all Fixed NAV Funds
Limitations	• All funds are being combined into single industry figures – as such, any problems will be visible at the level of product only when they are hitting many firms. • There is no preferred level – it will have to be determined by observation over a period of time. Nevertheless, it is expected that the floating yield should always be higher than the distribution rate of the fixed NAV funds given the significantly higher level of associated risk.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. Has there been a significant change in the spread between the two rates? 3. If the change is unusual, check the underlying rates for any unusual component numbers (the MF v CBTT Repo rate indicators will be useful for this purpose) 4. If the number is tightening, this may indicate pressure on the fixed NAV funds. Is there a particular firm that is contributing to this tightening? What is happening to subscriptions and Encashments at that and other funds? 5. If the analysis has revealed significant potential risks, discuss with next line of management. 6. Document the main conclusions of the analysis and the main contents of the call. If any matters discussed in a call need confirmation or are outstanding, agree to follow up the call with a letter to seek that confirmation or outstanding information.

Activity	Collective Investment Schemes
Name of Indicator	Spread: CIS Yield vs. CBTT Repo Rate
Description	Comparing from a registrant and industry level the CIS yield to CBTT repo rate. This indicator compares the yield of each CIS as reported by the manager (LESS) The CBTT repo rate as reported by the CBTT. From an industry perspective yield rate of each CIS as reported by the manager is multiplied by the market share of the fund by AUM (weighted average yield) (LESS) the CBTT repo rate as reported by the CBTT.
Key Risks	• Mutual Funds come under pressure and begin to lift their yield/distributions in order to retain customers, putting their business model under strain before any other signals are given • Mutual funds are performing badly, risking departure from the product back to deposits.
Metadata	$\sum [Y_F - CR]$ Y_F – Yield of fund/CIS CR – CBTT Repo Rate $\sum [[Y_{FNAV\ \&\ FxNAV} \times (Mkts_{FNAV\ \&\ FxNAV} \times AUM_{FNAV\ \&\ FxNAV})] - CR]$ $Y_{FNAV\ \&\ FxNAV}$ – Yield of Each CIS (Floating and Fixed NAV) $Mkts_{FNAV\ \&\ FxNAV}$ – Market Share of Each CIS (Floating and Fixed NAV) $AUM_{FNAV\ \&\ FxNAV}$ – AUM of Each CIS (Floating and Fixed NAV) CR – CBTT Repo Rate
Limitations	• The CBTT Repo rate is being taken as the best and least noisy indicator of the interest rates of the economy. It may however also include signals that the CBTT gives about its forward looking monetary intentions. • There is no preferred level for the spread – the level will reflect investor preferences. This will have to be observed over time. Neverthess, it is understood that the spread should be positive in normal circumstances. • Fund performance will vary over the year, especially over changes in interest rates and especially also for funds with equity components. The best analysis will generally be over longer periods, such as a year. • The overall indicator includes both types of funds – floating and fixed NAVs. These may have different patterns of behaviour.
Cues for analysis	1. Is the number an outlier across all similar entities for the period? Check the data for anomalies (for example, is the reported performance figure for the quarter only or is it annualized?). If the number appears unusual given similar funds, call the firm. 2. Review the last analysis. Is there a note that needs a follow up review? 3. Has there been a significant change in the spread over the year? Is the number consistent with what the fund is telling the clients? 4. (Aggregate number) how is the spread moving from quarter to quarter. Review the numbers of clients and the Encashments to see what is happening in relation to the product as a whole. 5. If the analysis has revealed significant potential risks, discuss with next line of management

Activity	Repurchase Agreements
Name of Indicator	Repurchase Agreements Exit Rate
Description	The indicator shows the rate at which repo liabilities are being encashed rather than being rolled over.
Key Risks	• A registrant is too dependent on new clients for meeting liquidity needs of the repo portfolio • New clients do not come in to replace encashing clients, which leads to a liquidity call that the firm cannot handle or which reduces its capital significantly • The firm comes under pressure to give new clients high repo rates to attract them • A firm has to sell off repo assets to meet liquidity calls and this threatens a shft in market prices. • There is a shift away from (or run on) the mutual fund product • There is a run on the institution or concerns about its stability.
Metadata	$\sum 1 - \frac{RR}{RR + RE}$ RR – Repos Rolled over RE – Repos Encashed
Limitations	• The number is effectively an average for the period • Numbers come in relatively late – possibly 5 months after start of related period. • May need to be used in combination with other indicators if going to be most useful.
Cues for analysis	1. Is the number an outlier (higher) across all similar entities for the period? Why? Review the last analysis. Is there a note that needs a follow up review? 2. The higher the number is the more sensitive the firm is to anything that might prevent new clients coming to the firm. 3. Changes in the number indicate changes to the client base of the firm. It might indicate a change in confidence in the firm or in repos. 4. Are there similar increases at other firms that are significant in repos? 5. If there is a significant jump, call the firm – how did they cope. Where did they find the extra liquidity needed? Any lessons to be learned for other firms?

Activity	Repurchase Agreements
Name of Indicator	Repurchase Agreement Leverage
Description	This indicator will be done individually for the registrants with the largest repo portfolios and also with aggregate data for those firms. The indicator compares the repo liabilities to the capital base of registrants to determine if too much risk is being taken by repo sellers.
Key Risks	• A firm is taking on too many repos for its capital base • Firms with significant repo portfolios are taking on too much risk on the whole and a shift in prices will threaten their capital.
Metadata	$\sum \frac{RL}{CAP - ONDR}$ RL – Repo Liabilities ONDR – Other Non-Distributable Reserves
Limitations	• The ratio is crude and relatively simple: o It does not give different weightings for different types of repo assets and liabilities. For example, it treats (a) short dated repos as equivalent to long dated repos and (b) long dated bonds as equivalent to short dated bonds. o It assumes that the whole of capital is available, when it may be dedicated to other activities. • It is therefore best used as part of a risk based capital framework.
Cues for analysis	1. Is the number an outlier (higher) for the period? Why? 2. Review the last analysis. Is there a note that needs a follow up review? 3. The higher the number, the more the firm is leveraged to repos. A number above 10 indicates that the firm is potentially exposed to a price movement of 10%. 4. If the number is above 10, review the repo assets to liabilities indicator and the repo exit rate. Is there any indication that the firm is experiencing any difficulties with its repo book? 5. Is there a significant change in the number over the past year? If so, check the underlying data for accuracy. If nothing explains the change, call the firm to understand if they have had a change in their business.

Activity	Repurchase Agreements
Name of Indicator	Repo Assets to Repo Liabilities
Description	The indicator shows the gross value of repo assets over repo liabilities – and should always be higher than 100%, by the amount of mandatory and voluntary margin.
Key Risks	• The firms do not have enough margin in their repo portfolio to support changes in prices. • There are not enough assets to support the repo liabilities in case of a default. • There may be operational problems resulting in double use of repo assets (same asset underlying more than one repo) or in incorrect valuations of repos.
Metadata	$\sum \frac{RL}{RA}$ RA – Repo Assets RL – Repo Liabilities

Limitations	• All repos are treated as one.
	  ○ undervaluation in one may be countered by over valuation in another and thus invisible to this indicator.
	  ○ margins under the regulations may vary between 2% and 9%. There is no control for the correct use of margin.

Cues for analysis	1. All numbers should be higher than 102% - preferably much more so. 2. If below 110%, what is the majority composition of the repo asset portfolio? What is the approximate average margin that you would expect? 3. Is there a pattern in the past quarters and does this continue or change? If it changes significantly, especially if it falls to less than 110%, review the details of the last submissions to understand why. If this is not possible, or if there appears to be a change of policy, call the firm to understand the underlying reason. 4. Review the last analysis. Is there a note that needs a follow up review?

Activity	Repurchase Agreements
Name of Indicator	Repo Encashments
Description	The indicator shows net inflow and outflow of financial resources related to the sale of repos by Broker-Dealers.
Key Risks	• Repo portfolios suffer a call on their liquidity that may not be able to meet or which threatens their ability to meet further calls. • Repo Portfolios create a firesale of assets. • There is a shift away from (or run on) Repos. • There is a run on the institution or concerns about its stability. • The Dealer running the repo has to dig into its own capital to support the Repo and this threatens their own sustainability.
Metadata	$\sum \frac{RL(end) - RL(Start)}{RA\ (start)}$ RA – Repo Assets RL – Repo Liabilities
Limitations	• The indicator is not related to available liquidity • The numbers cover a long period – liquidity issues can arise in very short periods • Numbers come in late – estimated 5 months after start of period. • Generally to be used with information on Fixed NAV v Real NAV to be most useful.
Cues for analysis	1. Is the number an outlier across all portfolios for the period? 2. Review the last analysis. Is there a note that needs a follow up review? 3. Is the outflow Significant (2% or over),? a. is the net encashment over the last 3 or 4 period potentially significant? b. Look at liquid assets – is there much more than necessary to meet any ongoing encashment if it continues? If not, consider calling firm to discuss how encashments have continued and how they are planning to obtain liquidity. 4. If more significant outflow (5% or more), call firm to discuss stresses being created and potential solutions. 5. If large positive inflow (more than 10%), a. Confirm calculation b. Review all elements to ensure make sense c. Is the pattern of redemptions and subscriptions over the past four quarters unusual? d. If at all unusual, call firm to establish facts and where planning to invest money. 6. If the analysis has revealed significant potential risks, discuss with next line of management. 7. Document the main conclusions of the analysis and the main contents of the call. If any matters discussed in a call need confirmation or are outstanding, agree to follow up the call with a letter to seek that confirmation or outstanding information.

Size FSIs

Activity	All
Name of Indicator	Total Client Assets
Description	The indicator shows the financial size of the client assets controlled by each Broker-Dealer and by the entire sector relative to the national economy as represented by GDP.
Key Risks	• Size indicators and capital requirements refer generally to the assets within the balance sheets of the firms and funds. • Any problems in the markets may be transmitted to the clients that the firms and funds are working for. It is important to understand the size, distribution and concentration of potential investor this exposure.
Metadata	$\sum \frac{CA}{GDP}$ CA – Client Assets GDP – Gross Domestic Product
Limitations	• The indicator includes all assets, whether domestic or foreign. • There is no natural level for the indicator. The size of the indicator underscores the importance of effective regulation of the securities sector and in particular of the conduct of intermediaries and of their control of third party assets.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. Have any of the numbers changed significantly since the last review? If so, check the underlying data for accuracy. 3. What changes have occurred over the past few years? Which firms are contributing to the change? Have they changed their business model in a significant way? Are they appropriately covered by the compliance and inspection work of the regulator?

Activity	Collective Investment Schemes
Name of Indicator	Fixed and Floating NAV CISs
Description	The ratio shows the size of each domestic fund (in net assets, not total assets) and of the entire funds sector relative to the national economy, as represented by GDP the indicator is broken down into fixed NAV, floating NAV and other.
Key Risks	• CISs as extremely well distributed and carry many risks. • They are regarded by many retail customers as effectively equivalent to deposits. The size and visibility of the market is such that it is already difficult to make significant regulatory changes without impacting on the one hand the confidence of retail investors in the product and on the other the liquidity of the fund managers.
Metadata	$\sum \frac{CISna}{GDP}$ CISna – CIS Net Assets GDP – Gross Domestic Product The indicator will be applied to fixed NAV, floating NAV and other CISs.
Limitations	• The ratio is related to the size of domestic funds only.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. Have any of the numbers changed significantly since the last review? If so, check the underlying data for accuracy. Is the data consistent with the corresponding Deposits Equivalent ratio? 3. Which funds are contributing to the change? Does their funds encashment data tie in with this? Did they have liquidity problems?

Activity	Repurchase Agreements
Name of Indicator	Repo Size
Description	The ratio shows the size of the repo portfolio of each firm and of the sector as a whole relative to the national economy, as represented by GDP
Key Risks	• Repos, which carry large inherent risks given their structure and legal framework, become larger. Significant changes to regulations become difficult given the size of the aggregate portfolio and the liquidity challenges that changes may pose.
Metadata	$\sum \frac{RL}{GDP}$ RL – Repo Liabilities GDP – Gross Domestic Product This is done individually for all firms and also with aggregate data for all those firms.
Limitations	• The ratio is related to the size of repo positions only and does not look at the level of activity, which might be a more natural comparison with GDP (the activity of the economy in the year).
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. Has the number changed significantly since the last review? If so, check the underlying data for accuracy. Is the data consistent with the Deposits Equivalent ratio? 3. Which firms are contributing to the change? Does their repo encashment data tie in with this? Did they have liquidity problems?

Concentration FSIs

Activity	All
Name of Indicator	Market concentration of top 5 groups
Description	The indicator compares the top 5 groups as identified by the percentage held at individual firm level of all client accounts and of all AUM to the market. The top 5 groups were as follows (as at Sept 2016): • FC group • UTC • Republic Group • Scotia Group • RBC Group
Key Risks	• Market power may be over-concentrated in the most powerful groups. • The failure of certain groups may have a disproportionate impact on market confidence and on clients. • Some players may have become too big to be allowed to fail.
Metadata	$\sum \frac{AUMsp + RL + AUMcis}{Total\ AUM + Total\ RL + Total\ AUMcis}$ AUM – Assets Under Management Sp – Securities Portfolio RL – Repo Liabilities Cis – Collective Investment Scheme
Limitations	• The indicator is a crude measure looking only at assets directly controlled. It does not include other aspects of dominance such as client assets controlled, number or type of clients.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. How has the number changed over the period, looking at the trend over the past year? 3. If the number falls – is there another group that is beginning to take a significant position in the market? 4. Does the number reflect the real dominance of these groups in the market? Does this mean that the risks associated with the other firms and funds are almost negligible?

Interconnections FSIs

Activity	Collective Investment Schemes
Name of Indicator	Circular Cash Flows
Description	The indicator is a measure of potentially circular interconnections through mutual funds. It is calculated on an individual and aggregate level.
Key Risks	• Many intermediaries are understood to be concerned that there are too few domestic opportunities for direct investment and are investing in mutual funds and repos. This includes mutual funds and repos themselves. • This creates a partly cyclical flow of funds which may well increase the impact of any contagion if there is damage to any part of the system. • Understanding and monitoring the extent of this circular flow is important if the regulators are to be able to take regulatory action as and where needed.
Metadata	Individual indicator $\sum \frac{Reg/CIS_p}{AUMcis}$ Reg/CIS_p – Registrant/CIS portfolio holdings in CISs and Repos AUM – Assets Under Management Cis – Collective Investment Scheme Aggregate indicator $\sum \frac{TReg/CIS_p}{AUMcis}$ $TReg/CIS_p$ – Total Registrant/CIS portfolio holdings in CISs and Repos AUM – Assets Under Management Cis – Collective Investment Scheme
Limitations	• It does not itself relate to a specific asset and may therefore be difficult to communicate. • There is no preferred level for the indicator – it is an indicator that is important only in the changes that it highlights.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. Has the number changed significantly since the last review? If so, check the underlying data for accuracy. 3. If there has been a notable change in the indicator, what are the main contributors to the change? Is it a fund or investments by securities firms or repo portfolios?

Activity	Collective Investment Schemes
Name of Indicator	Interconnections in CISs
Description	The indicator shows the percentage of funds held not by direct clients but by securities intermediaries and CISs.
Key Risks	• Interconnections between securities intermediaries mean that when there is damage to one part of the sector, that damage may in turn cause harm to other parts of the sector and therefore to the clients of that other part of the sector. • One of the most significant parts of that sector is the mutual funds industry. Damage to the mutual funds industry may spread to the intermediaries invested in funds and then on to their clients. • The significance of such damage will depend on the size of that investment by other financial institutions. This is therefore an indicator of possible contagion through this channel.
Metadata	$\sum \frac{CIS_{units} + SI_{units}}{Total_{units}}$ $\sum \frac{CIS_{value} + SI_{value}}{AUM_{CIS}}$ CIS_{units} – Number of units invested by CISs SI_{units} – Number of units invested by Securities Intermediaries $Total_{units}$ – Total units invested into CIS CIS_{value} – Value of units invested by CISs SI_{value} – Value of units invested by Securities Intermediaries $Total_{CIS}$ – Total Value of units invested into CIS
Limitations	• The ratio shows the percentage of funds held not by direct clients but by intermediaries. • The ratio does not differentiate between fixed NAV and floating NAV funds. • The ratio is only an indicator of the extent to which the failure of a fund may directly hit other intermediaries rather than the investing public.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. Has the number changed significantly since the last review? If so, check the underlying data for accuracy. 3. Which funds are contributing to this change? 4. For funds with the most significant OFI ownership, understand the nature and identity of the institutions. What is the risk to these investors if the fund has problems? What are the risks to this fund that would thus be passed on to other institutions?

Substitutability FSIs

Activity	Collective Investment Schemes
Name of Indicator	CISs relative to all deposit equivalents
Description	The indicator shows the size of all funds relative to all of the products that clients may treat as broadly equivalent.
Key Risks	• Clients view repos, mutual funds and bank deposits as relatively equivalent and can switch between them relatively quickly if there is a change in interest rates or in confidence in products. • A rapid switch can create significant liquidity stresses on the firms affected, which may lead to fire-sales and calls on their owners.
Metadata	$\sum \frac{CIS_{NA}}{DE}$ CIS_{NA} – CIS Net Assets DE – Deposit equivalents (ie. Total [Repo liabilities + CIS Net Assets +Bank Total Deposit Liabilities]) This is done individually for all mutual funds and also with aggregate data for all those funds.
Limitations	• There is no preferred level for the indicator – it is an indicator that is important only in the changes that it highlights.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. Has the number changed significantly since the last review? If so, check the underlying data for accuracy. 3. Which funds are contributing to this change? If the number falls, any fixed NAV funds that are linked to significant individual falls may have experienced liquidity problems. Review the mutual fund encashments data for those funds. Review also the flows between different funds of the same manager. Call the fund to establish how they covered the movement. 4. If there is a change in the aggregate number, look at the equivalent ratio for repos – have the investments passed to repos?

Activity	Repurchase Agreements
Name of Indicator	Repos relative to all deposit equivalents
Description	The indicator shows the size of the repo portfolio relative to all of the products that clients may treat as broadly equivalent.
Key Risks	• Clients view repos, mutual funds and bank deposits as relatively equivalent and can switch between them relatively quickly if there is a change in interest rates or in confidence in products. • A rapid switch can create significant liquidity stresses on the firms affected, which may lead to fire-sales and calls on their owners.
Metadata	$\sum \frac{RL}{DE}$ RL – Repo liabilities DE – Deposit equivalents (ie. Total [Repo liabilities + CIS Net Assets +Bank Total Deposit Liabilities]) This is done individually for all repo portfolios and also with aggregate data for all those firms.
Limitations	• There is no preferred level for the indicator – it is an indicator that is important only in the changes that it highlights.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. Has the number changed significantly since the last review? If so, check the underlying data for accuracy. 3. Which firm is contributing to this change? If the number falls, any firms that are linked to significant individual falls may have experienced liquidity problems. 4. If there is a change, look at the equivalent ration for mutual funds – have the investments passed to funds?

Transparency FSIs

Activity	Over the Counter (OTC)
Name of Indicator	Transparency – OTC Activity
Description	The indicator shows activity on the OTC market divided by GDP in order to give an indication of its size and growth.
Key Risks	• The OTC market may become the principal market for securities transactions, away from the oversight of the exchange or the regulator. • Prices in the OTC market may shift without any similar shift in the formal price and unknown to the exchange or regulator. • Retail investors may become exposed through the OTC market, without appropriate oversight or formation of prices. This may be through securities that are not appropriate for public offer.
Metadata	$\sum \frac{OTC}{GDP}$ OTC – Over the counter activity reported by firms GDP – Gross Domestic Product
Limitations	• The indicator only shows size and does not give any insight into the quality of the trading, the nature of the clients or the quality of the securities being traded. There is no substitute for knowing what exactly is being traded there, by whom and to whom.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. How has the indicator changed since the last review.? (Aggregate level) 3. If there is a significant change, which firms are responsible for this? Are the numbers credible? If not, or if they are clearly outliers? 4. If the numbers are correct, which securities are they trading? 5. Is there a potential problem with the securities being sold to retail investors?

Prudential FSIs

Activity	All
Name of Indicator	Capital to Assets
Description	The indicator shows the size of the losses that can be absorbed before the registrant becomes insolvent.
Key Risks	• The firm is undercapitalized and is carrying balance sheet risks that it cannot absorb if they materialize. • The firm does not have the resources to fund the working capital it needs for its activities. • The firm is overleveraged and is carrying more debt than it can service if it comes under stress.
Metadata	$\sum \frac{CAP\ exl.Rev.and\ NDR}{TA}$ CAP – Capital Rev – Revaluations NDR – Non-Distributable Reserves TA – Total Assets
Limitations	• This indicator is not risk weighted - it assumes that all assets carry the same risk profile and that all elements of capital are equivalent and available for absorbing losses. • The information is out of date – but only by 2 months and the data is relatively stable. • It is not related to the nature and riskiness of the different activities – insurance, banking, repos etc.
Cues for analysis	1. Is the number an outlier (at the low end) for similar entities at the same date? Review the last analysis. Is there a note that needs a follow up review? 2. If the ratio is below 20% • What is the size of investment in assets – how much capital would be used up if these fell 10%? • What is the size of the assets in FX – how much capital would be used up if the FX rate fell 10%? (without a change in liabilities in FX) • What is the size of the liabilities in FX – how much capital would be used up if the FX rate rose 10%? (without a change in assets in FX) • What is the size of the NET assets in FX – how much capital would be used up if the FX rate changed 50%? 3. If the analysis has revealed significant potential risks, discuss with next line of management. 4. Document the main conclusions of the analysis and the main contents of the call. If any matters discussed in a call need confirmation or are outstanding, agree to follow up the call with a letter to seek that confirmation or outstanding information. NOTE – the Commission does not have a risk based framework for capital, only a minimum requirement.

Activity	All
Name of Indicator	Current Ratio
Description	The indicator intends to show assets that should be turned to liquidity in the next year as a percentage of the obligations that need to be paid in the next year.
Key Risks	• There is a threat to the ability of the entity to cover its short-term debts and obligations as they fall due • The entity is unable to deal with sudden unanticipated short term liquidity calls
Metadata	$\sum \frac{TCA}{TCL\ exl.RL}$ TCA – Total Current Assets TCL – Total Current Liabilities RL – Repo Liabilities
Limitations	• The indicator does not have a natural level but the level depends on the type of company, the activities it undertakes, the approach of the CFO to financing. • The indicator does not recognize short term liquidity flows yet to come, the ability to access external liquidity, the ability to use longer term assets to obtain financing (which is common in financial markets). • The ration does not include repo considerations – a major source of liquidity stresses. Note it is excluded in order to avoid distortion of the numbers.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. How does the number look compare to levels over the previous 12 months? Do longer periods show an annual cycle – if so how does this year compare to earlier periods. 3. If it has fallen more than 0.5 in a quarter, review the detail to understand where the fall comes from and whether it represents a treat to the ability to pay going forward. 4. If the ratio is regularly below 0.75, review the details to understand how the entity is funding the payment of the liabilities – what approach is it taking? 5. If the analysis has revealed significant potential risks, discuss with next line of management. 6. If there is a perception of a real risk to the ability to pay going forward, call the firm to understand their view on their short-term liquidity. 7. Document the main conclusions of the analysis.

Activity	All
Name of Indicator	Earnings to Equity
Description	The indicator shows a simple calculation of return on equity.
Key Risks	• The business model of the entity is no longer competitive or is unsustainable. • The entity has taken disproportionate risks and is taking losses as a result or is generating high returns but is at risk of serious future losses.
Metadata	$\sum \frac{EBTD}{TC}$ EBTD – Earnings before taxation and distributions TC – Total Capital
Limitations	• The indictor is part of a year and may suffer from cyclical behavior • The data is for a small part of a year and may include very crude estimations and inaccurate cutoffs. These make them volatile. • The information is out of date
Cues for analysis	1. Is the indicator an outlier across the entities in the same period? 2. Review the last analysis. Is there a note that needs a follow up review? 3. How does the number look compare to levels over the previous 12 months? Do longer periods show an annual cycle – if so how does this year compare to earlier periods. 4. If there is a significant loss this quarter, review the details to understand what is the main component of the loss, particularly by comparing to previous periods. Key things to focus on are (i) income lines (ii) expense lines including staff and exceptional or extraordinary items and (iii) margins 5. If year to date losses are 15% or more, review details to understand why (as above). 6. Does the cause of the loss have any regulatory aspect – either in relation to the cause (the details of what caused the loss) or going forward (is there a risk that they will take inappropriate risks or risk clients' assets)?. 7. If there is a YTD loss, has the firm made any distributions? How do they justify that? 8. Are there losses across the whole group? Does this appear unusual?

Activity	All
Name of Indicator	Liquid Investments
Description	The indicator intends to show: (a) For registrants and banks etc. the percentage of investments that can be liquidated relatively quickly without a significant discount. (b) For mutual funds – the percentage of total AUM that can be liquidated relatively quickly without a significant discount.
Key Risks	• The entity cannot access liquidity when it needs it.
Metadata	$\sum \frac{Total\ Cash + FI + OA}{Total\ Cash + AI}$ FI – Foreign Investments OA – Other Assets AI – All Investments
Limitations	• The approach to the identification of liquid asset is relatively crude. • The category "other assets" in investments has been used for a wide range of instruments including often cash. In instances where there are significant non liquid assets in this category, the indicator will be impacted. • The indicator bundles repo and firm assets together, reflecting the fact that the firm can switch assets between the two portfolios relatively easy depending on liquidity needs in each area. This reduces granularity but is unavoidable.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. How does the number look compare to levels over the previous 12 months? Do longer periods show an annual cycle – if so how does this year compare to earlier periods. 3. (Mutual funds) How does the number look compared to the level of encashments? 4. (Registrants) How does the number look compared to the level of repo encashments? Use the formula below to estimate the maximum capacity for liquidity to absorb repo encashment

Activity	All
Name of Indicator	Sovereign Investments
Description	The indicator shows the concentration in securities whose valuation will move in accordance with the sovereign issuer
Key Risks	• The entity is over concentrated in one issuer. • The entity is exposed to possible default by the Government.
Metadata	$\sum \frac{GORTT + EURO + SOE}{TS}$ GORTT – Investments in debt issued by GORTT EURO – Investments in Eurobonds issued by GORTT SOE – Investments in debt issued by state owned entities TS – Total Securities
Limitations	• It includes all SOEs – most but not all are entirely dependent on the state for financing. Those not thought to be significantly dependent include NGC and FCB. • The indicator does not include adjustments for different durations or for debt versus equity.
Cues for analysis	1. Review the last analysis. Is there a note that needs a follow up review? 2. How does the number look compare to levels over the previous year? If it has increased significantly (more than 15%), what is the reason for this? What assets have changed over the last year? 3. Is the level inside or outside any investment policy ranges set (particularly for funds)? If outside any significant policy levels, call the entity and confirm whether they are in accordance with their policies. Understand fully the calculations or assumptions. Ascertain what solutions are in place if necessary to return for policy levels.