COVID Response – Credit Risk Management

September 2021

Singapore Exchange

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1. Introduction

COVID-19 and its effects have resulted in many unprecedented challenges to firms and individuals since 2020. Many individuals have had to work from home or remote locations. Despite and perhaps because of this, firms have been required to maintain or even better their standards of operation.

Among the challenges this shift in working style has brought is the absence of face-to-face interactions with counterparties. Members' resources and systems may consequently have come under additional stresses. Working from home has somewhat limited the ways in which information can be received from counterparties. In respect of know-your-counterparty reviews, for example, hard-copy documents and in-person representation may have previously been common for some firms. These may now be greatly reduced. Such changes may therefore have impacted the efficiency with which these reviews are being carried out.

In early 2021, we also observed some unprecedented global market phenomenon. Investor interest was strong and this resulted in extreme price movements. Several investment companies also defaulted, resulting in large losses at some major banks.

All these events have put the spotlight on the need for robust credit and risk policies that are continually reviewed for relevance to the ever-changing market requirements.

In March 2021, SGX RegCo surveyed SGX Members on how they have dealt and will continue to deal with the policy and market changes brought about by the pandemic. Also surveyed was how their processes have adapted to meet these challenges with a particular focus on their counterparty credit review. The survey covered 42 Members across the SGX securities and derivatives markets.

This document summarizes for the benefit of Members the results of the survey. The objective is to help Members understand how COVID-19 responses as well as credit risk management policies and processes vary across the industry. Members can then compare themselves on various aspects with their peers based on findings of this review.

2. COVID-19 Challenges

The COVID-19 pandemic which caused a lockdown in many countries from the beginning of 2020 resulted in disruption in many markets as well as workplaces. These disruptions created additional economic and other stresses on corporations and individuals alike.

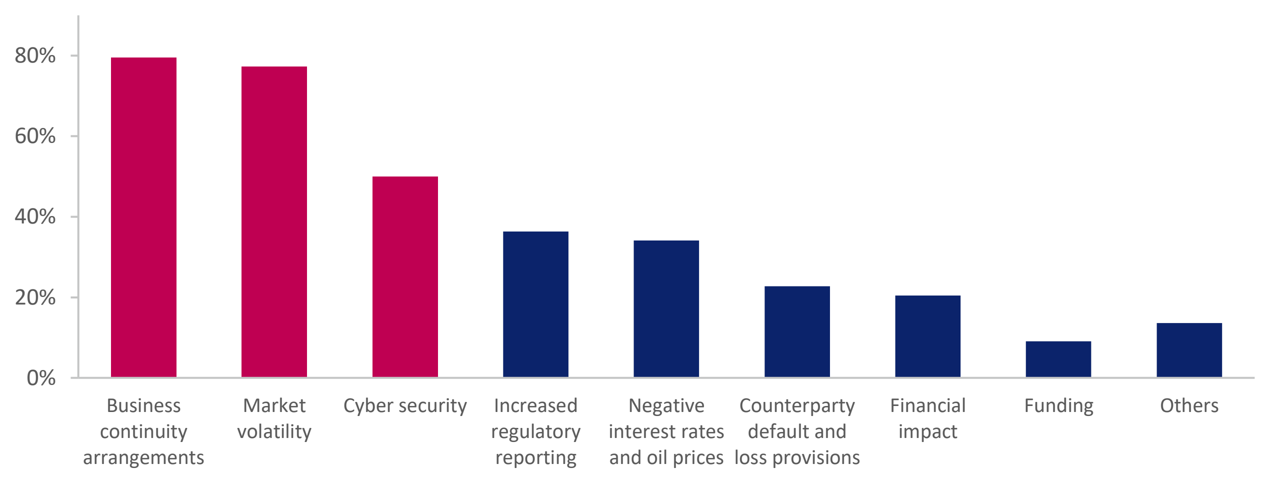
The SGX RegCo survey included questions on Members' business and operational outlook during and beyond COVID-19, with a focus on how key risk areas arising from the pandemic have been managed. The survey also covered Members' back office systems resiliency in terms of dealing with increased trading activities.

2.1. Key Risk Areas

Members were surveyed on the key risk areas impacting their firms during the pandemic. Figure 1 below shows Members' responses on what they felt were the key risks they had to address during this period.

Some of the key risk areas reported by Members include market volatility risks as well as operational risks resulting from business continuity arrangements. In particular, staffing issues posed many challenges to Members as they had to ensure adequate resources and support for staff working from home, overcome the challenges of not being able to service their counterparties face-to-face as in the pre-COVID-19 times, as well as maintain and improve staff welfare under the new working arrangements. As a result of the change in working arrangements where many staff no longer work from their primary location and have transitioned into online rather than face-to-face interactions with internal and external stakeholders alike, the issue of cyber security has been brought under greater scrutiny. Most Members expect these key risk areas to persist into the foreseeable future.

FIGURE 1. KEY RISK AREAS IMPACTING MEMBERS DURING THE COVID-19 PERIOD



To mitigate the operational risks brought about by the changes in working conditions, Members have put in place additional measures to ensure minimal impact to their business. These measures include providing adequate infrastructure support for staff working from home to ensure they have secured access to the Members' networks as well as the requisite hardware and software support. Many Members also adopted split-team arrangements for staff to work across the primary office and recovery locations. These new arrangements have necessitated the need for Members to enhance cyber security controls to detect and contain any potential data leakage issues. In addition to this, some Members have also reported that they have increased the frequency of security patches rollout, as well as increase the cyber security awareness of staff through additional advisories and trainings.

To combat increased market volatility and credit risk that arose during the COVID-19 period, many Members had put in place closer monitoring on counterparties' exposure and trading activities, particularly on limit and liquidity monitoring of counterparties.

FIGURE 2. ENHANCED MONITORING BY MEMBERS DURING THE COVID-19 PERIOD

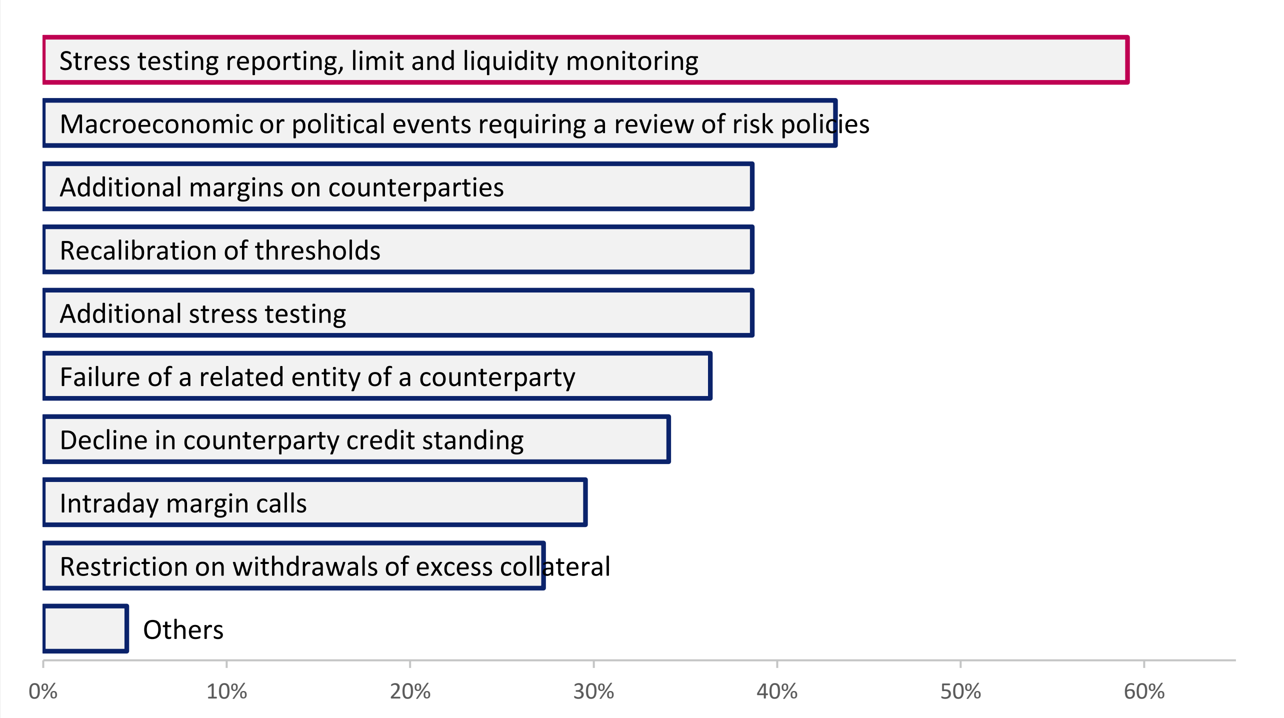


Figure 2 above shows the areas in which Members have reported an increase in focus, and these include an increased monitoring of risk exposures to affected sectors, calling for additional and intraday margins from counterparties with higher exposures, and restricting withdrawals of excess collaterals and exposure to specific contracts. Members have had to increase inter-departmental cooperation and communication as one of their key responses during this period so that staff could remain up-to-date with the latest information in order to deal with the rapidly changing market and counterparty situations.

Stress testing is generally performed by Members to assess adequacy of capital and liquidity, determine the need to call counterparties for more collaterals in anticipation of periods of extreme volatility and serve as a reference to set limits to mitigate credit exposure.

Arising from the survey, we note that stress testing remained an area of focus with one-third of Members considering additional factors in their stress tests, and many recalibrating their stress testing assumptions and scenarios, as well as reviewing and updating their risk policies to ensure that they remain relevant. While most Members found their usual suite of historical market stress scenarios and forward-looking market stress scenarios to have been sufficient to prepare them for this period of volatility, some Members have also found it useful to incorporate some new factors into their stress testing that have arisen as a result of erratic market movement in some markets during this period. One such major trigger for Members to consider as an additional factor in their stress testing was the global oil futures price which traded at negative prices, an unprecedented behaviour for oil prices up till that point, as well as the increased levels of market volatility. Other additional factors considered include the level of government support provided to economies, as well as the relative impact on COVID-19 in various jurisdictions and industries.

When performing stress testing, we strongly encourage Members to consider incorporating a multitude of historical and forward-looking market stress scenarios to test their resilience to various market movements. Members may also consider appropriate risk parameters and period of risk in their stress testing, as well as vary the frequency of stress testing in accordance with their risk appetite and market conditions. Rigorous stress testing will enable Members to remain prepared to deal with credit situations brought about by unexpected market movements.

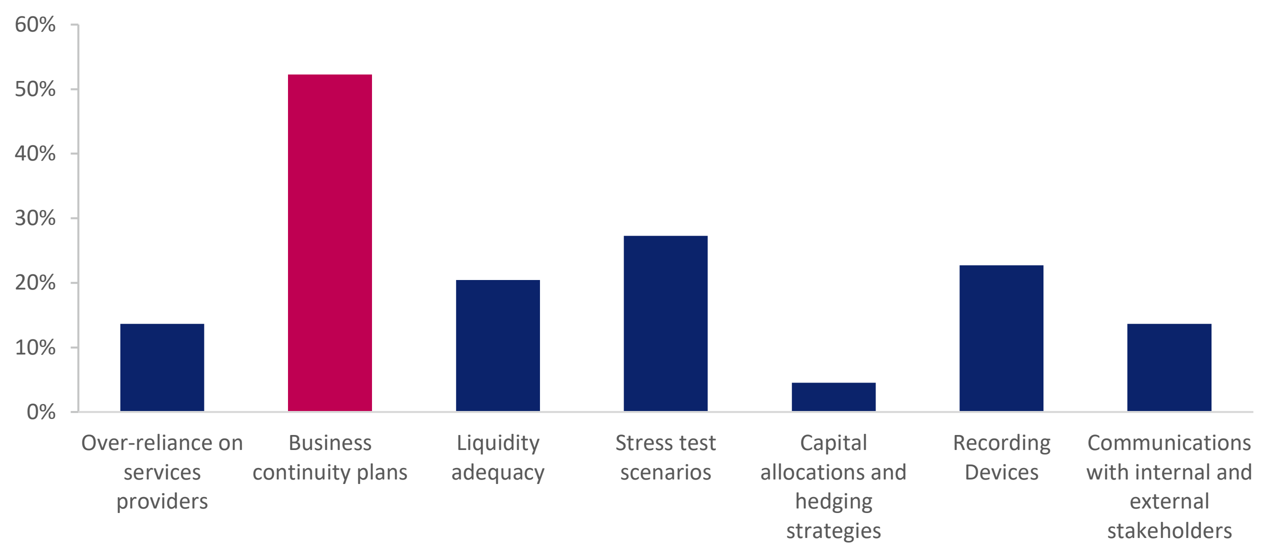
Best Practices:

- Members should conduct periodic rigorous stress testing to remain prepared to deal with credit situations brought about by unexpected market movements.
- Members should provide adequate infrastructure support for staff working from home.
- Members should enhance cyber security controls to combat increased cyber security risks arising from working from home arrangements.

2.2. Key Challenges

The COVID-19 pandemic has exposed various challenges for Members. While most Members had already established controls in place which were sufficient to overcome these challenges, Members have identified some processes that could benefit from further improvements. Figure 3 below shows some of these.

FIGURE 3. KEY CHALLENGES FACED BY MEMBERS



Some areas of potential improvements identified include reviewing the robustness of business continuity plans as the pandemic saw many Members having to support unprecedented levels of alternative work arrangements away from their primary office locations. Support for these work arrangements include ensuring sufficient infrastructure resources and support, maintaining access to critical systems, as well as putting in place relevant controls to ensure business-as-usual processes can continue to operate seamlessly.

The shift in working conditions during COVID-19, coupled with increased market volatility resulting in a surge in trading volumes across many platforms has created stresses for Members' trading systems and infrastructure.

SGX-ST Rule 4.1 and Futures Trading Rule 2.6.2A both prescribe that a Member must have the capacity to accommodate current and anticipated trading volume levels. During the COVID-19 period, Members have demonstrated that they generally have adequate capacity to handle the increase in transaction volumes and are in compliance with SGX requirements.

SGX-ST Rule 4.1 Member Systems
"A Trading Member must ensure that its systems and connections to the Trading System operate properly at all times and have adequate redundancy and scalable capacity to accommodate current and anticipated trading volume levels."

FTR 2.6.2A Adequacy of Systems
"A Member must ensure that its systems and connections to the Markets operate properly, and have adequate and scalable capacity to accommodate trading volume levels."

In the same vein, Members were also surveyed on their back office readiness to deal with any unexpected spikes in trading volumes to ensure they have sufficient resources and capacity to adequately handle all critical post-trade processes.

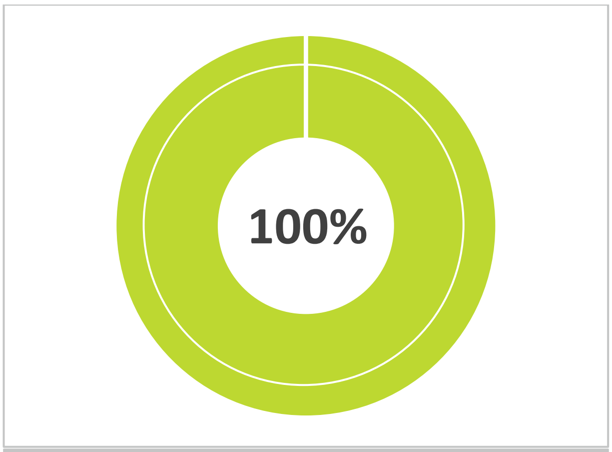


FIGURE 4. MEMBERS THAT PROVIDE FOR CONNECTION, HARDWARE AND APPLICATION REDUNDANCY

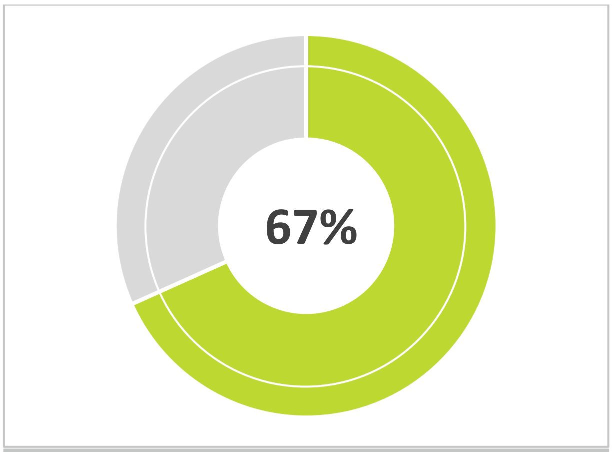


FIGURE 5. MEMBERS THAT CONDUCT PERFORMANCE TESTING FOR BACK OFFICE SYSTEMS

All Members provide for connection, hardware and application redundancies. 67% of Members affirmed that they conduct performance testing for their back office systems. Members that do not conduct performance testing generally utilise systems which form part of global systems that are allocated ample buffer capacity at the global level. Tests for these systems are typically managed and performed at the global level, with the capacity similarly managed at the global or regional levels. In such cases, a volume increase in a single market is unlikely to have a significant impact on overall performance of the systems. On top of periodic performance testing, most Members also perform regular routine checks on capacity utilisation of disk space and CPU, as well as any error log monitoring.

Many of our Members utilise third-party vendors to support their back office systems, where the performance testing is performed by these vendors. In such instances, it is observed that Members typically have in place service level agreements to ensure that the third-party vendors are able to perform and support the business at the level required by the Members. The vendors are also able to provide periodic performance reports to the Members as part of their agreement with the Members.

Member systems are typically configured to ensure that the processing of critical processes is prioritised, with priority being accorded to processes with the lowest downtime tolerance. For Members, critical processes are generally processes which impact the Member's operations and their customers' ability to transact on the Exchange. Majority of Members also review their manual processes periodically for any potential automation and digitisation to optimise their process flows.

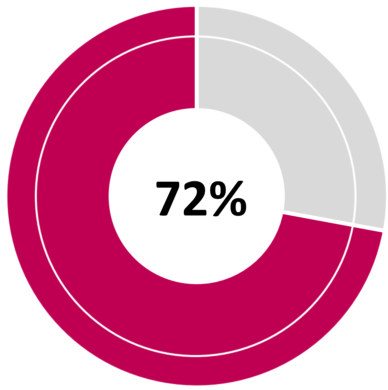


FIGURE 6. MEMBERS THAT EXPERIENCED SYSTEM DOWNTIME IN 2020

However, despite the controls in place, 72% of Members reported experiencing some type of system downtime in the year 2020. While most system outages were resolved quickly, Members still need to ensure that back office systems are resilient enough to cater for various trading conditions.

Having in place robust data reconciliation and recovery processes are pertinent for Members to restore data and services promptly and resume operations. While manual reconciliation and recovery processes may work well for minor disruptions, having automated processes will equip Members with the ability to scale their processes up quickly in the event of a more extensive or severe disruption.

Best Practices:

- Members should have redundancy for critical process, connectivity and hardware, with no single point of failure in infrastructure.
- Members are recommended to conduct performance testing on their back office systems at least once a year to ensure that they have sufficient capacity to handle critical post-trade processes.
- Members should have robust processes to recover their data in the event of data corruption.
- Members are recommended to have automated data reconciliation and recovery processes in place to ensure that they can quickly resume operations in the event of any technical disruptions.

2.3. Observations

Many of the key risk areas reported by Members relate to operational risks resulting from business continuity arrangements as well as market volatility risks.

In the area of business continuity arrangements, SGX RegCo had close engagements with Members to understand if their business continuity arrangements were in place and sufficient to support the new working arrangements. It was observed that Members had the necessary infrastructure and processes in place to cater to staff working from home and no significant disruptions were noted in their business-as-usual processes.

Market volatility during the COVID-19 period, however, exacerbated customer defaults which impacted the bottom line of Members as well as their affiliates. Such defaults have also thrown the spotlight on robust and up-to-date credit risk management policies and processes, and compelled regulators to re-examine these processes.

The COVID-19 pandemic, while viewed as a crisis for all, has indeed presented opportunities for Members to deliberate and enhance their current policies and procedures, particularly in the area of credit risk management.

In the next section, we will present observations from SGX RegCo's review of the credit risk management policies and processes of Members.

3. Credit Risk Management Framework

A robust credit risk management framework aligned with a firm's overall risk appetite helps to ensure that a firm operates within its risk parameters.

3.1. Tone at the Top and Risk Culture

Underpinning a robust credit risk management framework, effective tone at the top is essential to drive risk culture within the firm. Tone at the top starts with the Board of Directors and senior management who influence staff behaviour and risk culture through the setting of the firm's credit risk management strategy, framework and risk appetite, as well as day-to-day credit decisions. There should also be sufficient resources allocated to the Risk functions and training provided to all staff, to increase risk awareness within the firm.

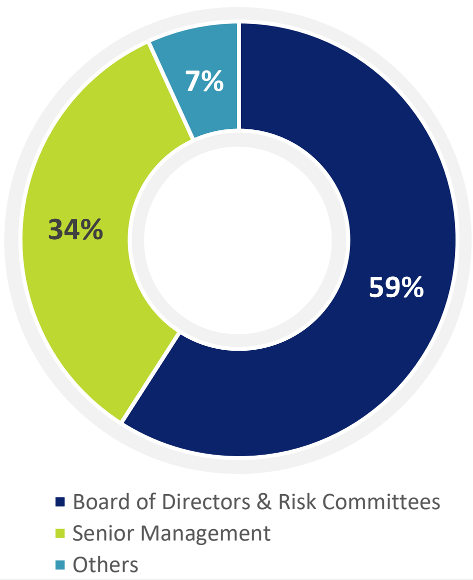
3.2. Management Oversight

Maintaining adequate management oversight is pertinent to ensure that the policies and processes within the firm adhere to management-prescribed guidelines, and that the firm operates in line with its own risk appetite. Adequate management oversight includes assigning persons of sufficient seniority and expertise to oversee the risk policies within the firm, ensuring that the risk framework within the firm is reviewed periodically, as well as maintaining a clear escalation and management reporting channel to ensure that management is continuously kept apprised of any potential or ongoing credit risk issues.

Within the SGX Member base, it has been observed that Members generally maintain a strong management oversight over their credit risk framework, with over 93% of Members having their credit risk management framework presided over by senior management, the Board of Directors or the Risk Committees.

Where the credit risk framework is presided over by Members' senior management, this typically includes the Chief Risk Officer, a Branch Manager, or other senior personnel within the firm.

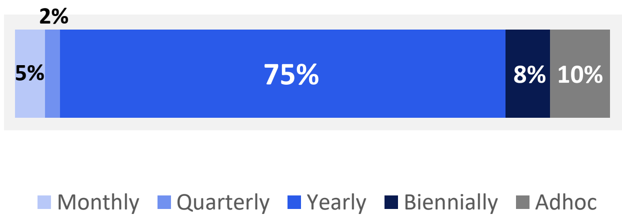
FIGURE 7. PERSONS RESPONSIBLE FOR APPROVING AND REVIEWING CREDIT RISK MANAGEMENT STRATEGY AND FRAMEWORK



Over 82% of Members have indicated that they review their credit risk management strategy and framework at least annually, with 5% indicating that they review their strategy and framework on a monthly basis.

On top of the scheduled periodic reviews, Members will also perform ad hoc reviews of the strategies when required. Potential triggers for review include legislative changes, or a change in management policies and directions.

FIGURE 8. FREQUENCY OF APPROVING AND REVIEWING CREDIT RISK MANAGEMENT STRATEGY AND FRAMEWORK



A periodic review of the credit framework helps to ensure that the credit risk policies remain up-to-date and in line with contemporary market developments and regulatory requirements. Additionally, the engagement of third-party experts to review the internal risk management framework will also provide additional assurance for Members that their policies and processes are robust and up-to-date.

Best Practices:

- Management team overseeing credit risk should have adequate relevant expertise and representatives from an independent Risk function.
- There should be clear escalation and reporting channels to management.
- Credit risk framework should be reviewed at least annually.
- Senior management, the Board of Directors or the Risk Committees should meet frequently to discuss matters in relation to day-to-day credit risk management.
- Third-party experts can be engaged to review and assess framework and policies where necessary.

3.3. Credit Risk Policies

Credit risk is the risk of financial loss which may result from the failure of counterparties to meet their contractual obligations. Credit risk policies help to ensure that the Member operates within its pre-defined risk tolerance.

Members generally have comprehensive credit risk policies covering the key areas mentioned in Figure 9 below, which set out guidelines and processes for each key area.

FIGURE 9. MEMBERS' CREDIT RISK POLICIES COVERAGE

A credit risk policy should cover at least the following key areas:

(i) **Staff roles and responsibilities:** Roles and responsibilities, as well as processes for their day-to-day duties, should be clearly defined in internal policies. There should be clear segregation of duties, and independent checks and balances. For instance, approval of credit limits should be performed by a function independent of the business unit. Most Members observed have clearly defined roles and responsibilities within their framework, with key committees set up to oversee the Member's credit risk management framework.

(ii) **Delegation of authority:** Proper delegation of authority provides clarity on the authorised approving authorities for various risk processes, such as approvals for credit limits and exceptional circumstances. As part of the delegation of responsibilities, a prompt and robust escalation process should also be in place to ensure that persons of the appropriate seniority are kept apprised of any changes in risk profiles, and appropriate action can be promptly taken to protect the Member from any extended risk exposure.

(iii) **Guidelines for identification, evaluation, and mitigation:** Counterparties should be thoroughly assessed to identify and evaluate the level of credit risk they potentially pose to the Member. The level of liquidity risk posed by counterparties including their sources of funding, time taken to meet liquidity needs, and the Member's ability to liquidate the counterparties' portfolios should also be taken into consideration. Upon identification and evaluation of the risk, Members should then have procedures to mitigate or accept the risk exposure posed by the counterparties. These measures could include the setting of appropriate limits for each counterparty, as well as the amount of leverage the Member is willing or able to grant each counterparty, having assessed and taken into account the profile of each counterparty, and the amount of collateral on hand. Having clear guidelines in place for these processes helps to ensure that the firm takes a robust, consistent and systematic approach in assessing and mitigating the risk across different counterparties. Taking a systematic approach also ensures that the risk can be appropriately quantified and compared, with trend monitoring.

(iv) **Credit risk acceptance criteria:** A set of credit risk acceptance criteria helps staff in the firm to evaluate the risk posed by counterparties in a systematic manner and make decisions on accepting new or continuing existing business relationships. We observed that most Members have set out their credit risk acceptance criteria in their policies to reflect the risk appetite of the firm in line with its business strategies.

(v) **Credit facilities terms and conditions:** Where Members engage in providing facility structures such as credit facilities for its customers, it is beneficial to include the general terms and conditions of the facility structure in the policies for standardisation and guidance on the offerings allowed by the firm.

(vi) **Acceptable collateral:** Collateral may be accepted in cash or other forms, such as securities, or government bonds. While there are jurisdictional rules and regulations on acceptable collateral, many Members adopt a more conservative approach on what constitute acceptable collateral. Many Members accept only cash as collateral, and where non-cash collateral is accepted, Members generally have clear policies defining the types of acceptable collateral, as well as appropriate haircuts to be applied. Where a counterparty is engaged in multiple lines of businesses with the Member, it may also be helpful to obtain a consolidated view of the counterparty's aggregate collateral maintained with the Member and its affiliates, to identify any potential points of concentration or weakness. It would also be prudent to holistically assess any requests for withdrawal of collateral by the counterparty.

(vii) **Standards for review and monitoring:** Maintaining standards for review and monitoring not only help to ensure that the level of credit risk is maintained within the Member's risk appetite, it also helps the Member to align itself with regulatory requirements on credit risk management.

(viii) **Concentration risk management:** Clear guidelines on concentration risk management helps a Member to manage its aggregate exposure to a counterparty, groups of counterparties, sector, geography, or portfolio. Aggregate exposure limits should also be defined and approved, so that the sum of individual credit exposures in a particular group does not exceed a Member's risk appetite. One aspect of concentration risk is also whether a counterparty may have similar exposure concentration to other players in the market, thereby increasing the risk of its ability to fulfil its obligation to the Member, should it encounter a default situation with another firm. Where public information about a counterparty's position concentration in a market is not readily available, it is good practice for Members to perform additional and regular due diligence to understand directly from a counterparty if it is engaged in any activities (with other Members or financial institutions) or procure information on the counterparty's aggregate exposures (where possible) to ascertain risks of any potential failure in fulfilment of contractual obligations.

While comprehensive credit risk policies are pertinent for good credit risk management, Members should also be prepared for default management and conduct default simulation exercises at least annually to familiarise themselves with the procedures in the event of a counterparty default. A well-established default management process will help a Member manage a defaulting counterparty's positions expediently and hence, mitigate the risk of potential losses that may result from holding on to these positions.

Best Practices:

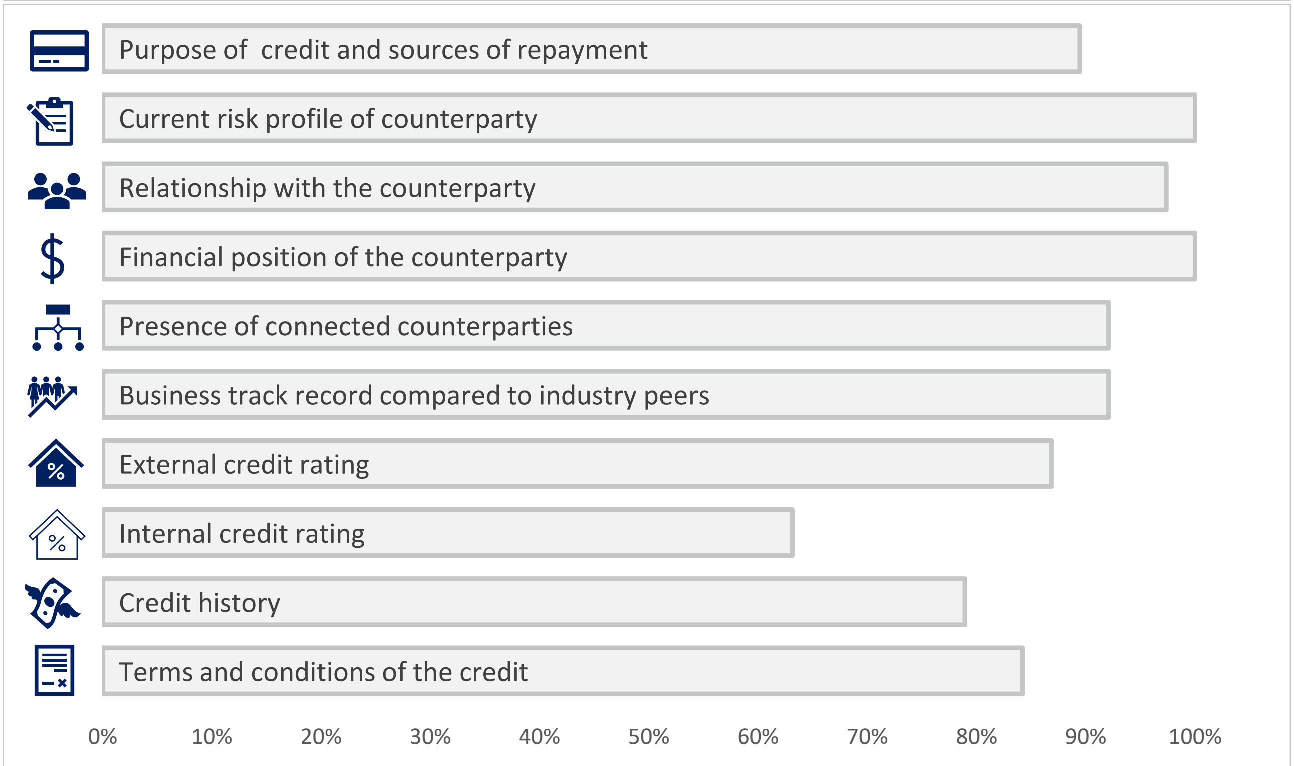
- Where public information about a counterparty's position concentration is not readily available, Members should perform additional and regular due diligence with attempts to obtain the necessary information directly from the counterparty.
- Members should conduct default simulation exercises at least annually.

3.4. Credit Risk Limits

One major part of credit risk management is setting appropriate credit risk limits on a Member's counterparties. This helps to limit the maximum amount of potential losses the Member may face against the counterparty in the event the counterparty is unable to meet its financial obligations to the Member.

In setting and reviewing credit limits for counterparties, it is important to understand the counterparty's trading behaviour, objectives, as well as financial situation. Figure 10 below shows the factors Members considered when determining the acceptable credit limits for counterparties. We note that Members in general make holistic assessments of a counterparty's financial situation before deciding to accept a counterparty as a customer and applying acceptable credit limits.

FIGURE 10. MEMBERS' CONSIDERATIONS WHEN DETERMINING CREDIT LIMITS



We observed that while 92% of Members indicated that they considered the presence of connected counterparties in determining the appropriate credit limits, only 68% of Members set credit limits at the connected counterparties level. Connected counterparties tend to have significant overlaps in financial and reputational consequences in the event of any adverse circumstances impacting one entity. As such, it is prudent to set credit limits at the connected counterparties level. Where this is not practical, it is recommended that credit exposure be monitored at a connected counterparty level to ensure that any concentration in the connected group of counterparties can be managed appropriately.

86% of Members indicated that the setting and review of credit risk limits are performed by the credit risk functions, while the rest of the 14% indicated that these were performed by senior management staff in the firm.

Around 77% of Members review their credit limit settings at least annually, while 20% of Members indicated that they do so on an ad hoc basis. For Members who indicated that they perform ad hoc limit reviews, these ad hoc limit reviews are typically triggered when there are limit adjustment requests from business, when there are deposits and withdrawals, or when there are significant changes to a customer's equity. Members who perform only ad hoc credit reviews typically only have direct affiliate customers and hence deem the affiliate credit risk to be low.

FIGURE 11. PERSONS RESPONSIBLE FOR SETTING AND REVIEWING CREDIT RISK LIMITS

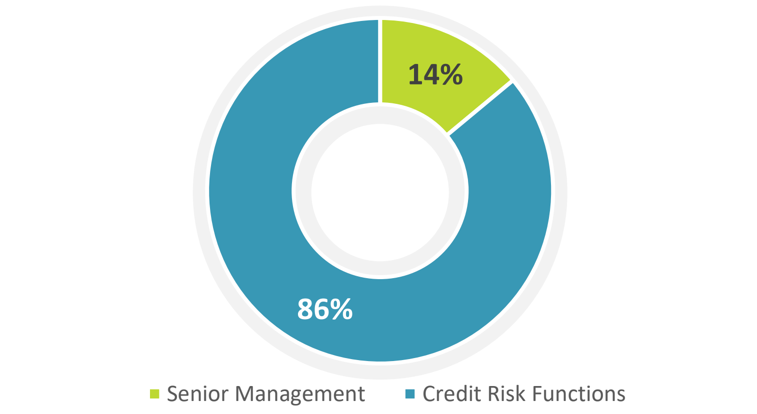
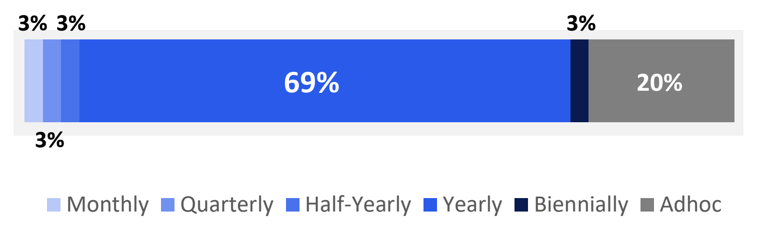


FIGURE 12. FREQUENCY OF SETTING AND REVIEWING CREDIT RISK LIMITS



We further observed that all SGX-ST Members who engage in cash transactions which are settled via the Delivery versus Payment ("DvP") method currently set credit limits on counterparties despite deeming these transactions as posing low credit risk.

Performing periodic credit limit reviews, even on affiliate customers, remains a good practice. This ensures that the limits applied remain valid and within the firm's risk appetite. Frequent reviews will also help to ensure that the limits remain relevant, and are adjusted in accordance with any changes in a customer's profile, or prevailing market conditions. Breaches of limits should be escalated and reported to Senior Management promptly to limit the firm's risk exposure.

In addition to credit limit reviews, Members should perform credit limit monitoring across all counterparties that expose them to any level of risk, regardless of whether the counterparty engages in cleared, over-the-counter trades, or any other business engagement with the firm. There should be robust processes in place to ensure that Members do not accept transactions from counterparties that exceed the credit limits set by the Member.

In the event that Members decide to accept such transactions, it is recommended that a control function comprising senior management independent of the business functions perform such an assessment and be part of the decision-making process. The control function should also periodically monitor and assess if there are any potential lapses or mismanagement of the credit review and monitoring processes.

Best Practices:

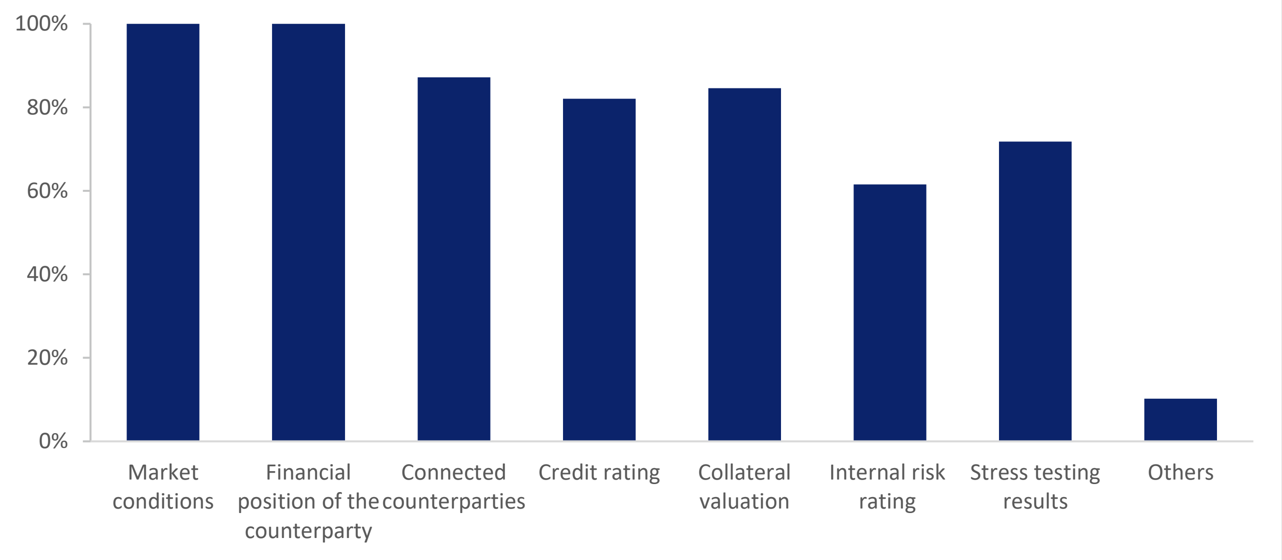
- Setting and review of credit limits should be performed by staff of appropriate experience and seniority, independent of the business functions.
- Credit limits should be reviewed at least annually.
- Credit limits can be set at the connected counterparties level. Where this is not practical, it is recommended that credit exposure be monitored at a connected counterparty level.
- Credit limit monitoring across all counterparties should be performed by a control function independent of the business functions.

3.5. Credit Risk Exposure

SGX requires all Members to have in place policies to adequately monitor and manage the credit risks arising from Members' engagements with their counterparties.

Figure 13 below shows what Members consider when monitoring the credit exposure of counterparties. Members generally place a higher emphasis on market conditions and a counterparty's financial positions when considering credit exposure. However, it is also important to consider other factors such as the valuation of a counterparty's collateral as well as the exposure of connected counterparties as a whole.

FIGURE 13. MEMBERS' CONSIDERATIONS IN MONITORING CREDIT EXPOSURE OF COUNTERPARTIES



62% of Members utilise an internal risk rating system developed or modified in-house to assess the credit risk of their counterparties. These internal risk rating systems are typically developed in-house, and on top of the factors mentioned in Figure 13 above, also consider additional factors such as a counterparty's credit history, industry type, geographical location, and assessment of a counterparty's management.

Many Members also consider the stress testing results of counterparties in their monitoring of credit exposure. These stress scenarios typically include extreme market and liquidity conditions, as well as counterparty-specific circumstances related to industry and geography.

In monitoring credit exposure of counterparties, if counterparties are common across different Member affiliate entities and jurisdictions, it is a good practice for Members to share such information within the group for a more holistic analysis of counterparty exposure. In such instances, Members can also adopt follow-the-sun monitoring of counterparty exposure. Any areas of concern can be brought up at global or regional platforms.

Another factor to consider in the monitoring of credit exposure is whether the counterparty has a history of requesting and being granted exceptions to margin policies. Repeated requests for exceptions to be granted may indicate that the counterparty is facing financial difficulties or is accumulating exposures outside of a

Member's usual risk appetite. Such counterparties pose a higher risk and Members should consider tightening leverage on these counterparties.

Other than monitoring exposure at counterparties level, Members can review the concentration of exposure at various levels, e.g. counterparty, groups of counterparties, sector, geography, or portfolio levels, to manage the firm's exposure in these areas. This will reduce the risk of a large potential loss in the event of any adverse event impacting a particular area.

Best Practices:

- In monitoring the credit exposure of counterparties, Members should take into consideration factors such as connected counterparties, credit rating, collateral valuation and stress testing results, where applicable.
- If counterparties are common across entities and jurisdictions, Members can consider sharing counterparty information within the group and adopt follow-the-sun monitoring of counterparty exposure.
- Members should monitor the concentration of exposure at various levels.

3.6. Margins

For derivatives Members, customer margins procured from customers serve to mitigate the credit risk of these counterparties. To ensure the accuracy of customer margins computation, Members should thoroughly understand and conduct review of the risk parameters and client account setup in their margin systems on a periodic basis and where necessary, e.g. whenever there are major system changes or upgrades. Daily margin reconciliations should also be performed to ensure Members' margin requirements on customers are at least equal or more than SGX's margin requirements on Members.

SGX-DC Rule 7.22.4 and Futures Trading Rule 3.3.12(e) both prescribe that a Member shall call for additional margins from a third party if at any time the third party's total net equity falls below the maintenance margins. Such additional margins posted should be sufficient to bring the relevant account up to the initial margins level within a reasonable period.

FTR 3.3.12 Customer Margins

"Margins payable by a Clearing Member to the Clearing House shall be governed by the Clearing Rules. For margins applicable to Customers, margin calls and related matters, the following requirements apply:

(e) a Member shall call for additional margins from a Customer if at any time the Customer's Total Net Equity falls below the Maintenance Margins. Such additional margins posted should be sufficient to bring the relevant account up to the Initial Margins level within a reasonable period. Nothing herein prohibits a Member from making a call for additional margins or imposing a stricter settlement period as it sees fit."

SGX-DC Clearing Rule 7.22.4 Margins of Third Parties

"A Clearing Member shall call for additional margins from a Third Party (including a Customer) for whom the Clearing Member provides carrying and/or clearing services if at any time the Third Party's total net equity falls below the maintenance margins. Such additional margins posted should be sufficient to bring the relevant account up to the initial margins level, within a reasonable period. Nothing herein prohibits a Clearing Member from making a call for additional margins or imposing a stricter settlement period as it sees fit."

We note that some members already perform intraday and additional margin calls, where practicable, particularly during times of higher market volatility and on counterparties with higher credit risk exposure. Performing intraday margining helps to mitigate the risk of market movement during that day which may adversely impact a counterparty's outstanding exposures.

Members can consider imposing additional margin requirements (i.e. over and above the clearing house's minimum Initial Margin amount required), to mitigate risks of selected counterparties. Such additional margin requirements could be called upon due to a counterparty's deteriorating financial condition, adverse news, concentration risk arising from the counterparty's portfolio in certain contracts or asset class, etc. While some Members may choose to apply a margin multiplier for higher risk counterparties, utilising a dynamic margining approach, where the margin multiplier varies according to changes in counterparty's underlying position, financial situation, as well as market behaviour, is generally considered more prudent than static margining, where the margin multiplier is fixed at the point of trade inception. Members can better manage counterparties' credit risk exposure when adopting the dynamic margining approach, as more collaterals may be called from counterparties in times of volatility or concentration.

A small number of Members (14%) may choose to delete (end-of-day) margin calls on an intraday basis. Such margin calls are deleted at a specific timing during the day when total net equity rises above initial margins and are re-issued when the total net equity falls below maintenance margins. Upon restoring the call, the aging of the margin call is reset.

While this practice is acceptable under the SGX rules, we recommend that Members who practise this exercise caution and monitor for excessive deletion of margin calls by a single counterparty.

In the area of monitoring of margin calls, we observed from the survey that 77% of Members perform intraday monitoring of customer margins, and 58% Members perform real-time monitoring. The majority of Members have automated systems in place to perform margin monitoring. Members should consider performing intraday monitoring of customer margins, where practicable, to mitigate credit exposure.

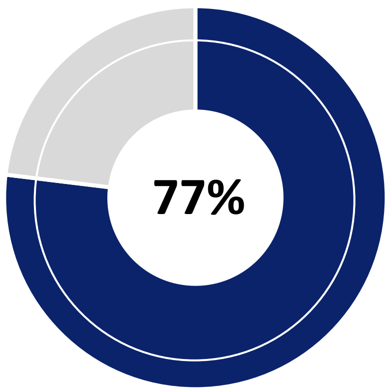


FIGURE 14. MEMBERS PERFORMING INTRADAY MONITORING

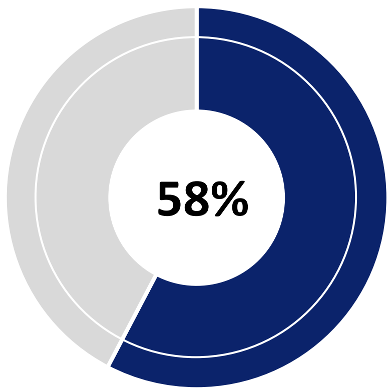


FIGURE 15. MEMBERS PERFORMING REAL-TIME MONITORING

Best Practices:

- Members should ensure that margin practices are managed in line with legislative and rule requirements.
- Members should thoroughly understand and conduct review of the risk parameters and client account setup in their margin systems on a periodic basis and where necessary.
- Members should perform daily margin reconciliations to ensure Members' margin requirements on customers are at least equal or more than SGX's margin requirements on Members.
- Members should consider adopting the dynamic margining approach to better manage customers' credit risk exposure.
- Members should consider performing intraday and additional margin calls, and intraday monitoring of customer margins, where practicable, to mitigate credit exposure.

3.7. Summary

Members are recommended to adopt a robust credit risk management framework, taking into consideration the following best practices.

Management Oversight

- Management team overseeing credit risk should have adequate relevant expertise and representatives from an independent Risk function.
- There should be clear escalation and reporting channels to management.
- Credit risk framework should be reviewed at least annually.
- Senior management, the Board of Directors or the Risk Committees should meet frequently to discuss matters in relation to day-to-day credit risk management.
- Third-party experts can be engaged to review and assess framework and policies where necessary.

Credit Risk Policies

- Where public information about a counterparty's position concentration is not readily available, Members should perform additional and regular due diligence with attempts to obtain the necessary information directly from the counterparty.
- Members should conduct default simulation exercises at least annually.

Credit Risk Limits

- Setting and review of credit limits should be performed by staff of appropriate experience and seniority, independent of the business functions.
- Credit limits should be reviewed at least annually.
- Credit limits can be set at the connected counterparties level. Where this is not practical, it is recommended that credit exposure be monitored at a connected counterparty level.
- Credit limit monitoring across all counterparties should be performed by a control function independent of the business functions.

Credit Risk Exposure

- In monitoring the credit exposure of counterparties, Members should take into consideration factors such as connected counterparties, credit rating, collateral valuation and stress testing results, where applicable.
- Members should conduct periodic rigorous stress testing to remain prepared to deal with credit situations brought about by unexpected market movements.
- If counterparties are common across entities and jurisdictions, Members can consider sharing counterparty information within the group and adopt follow-the-sun monitoring of counterparty exposure.
- Members should monitor the concentration of exposure at various levels.

Margins

- Members should ensure that margin practices are managed in line with legislative and rule requirements.
- Members should thoroughly understand and conduct review of the risk parameters and client account setup in their margin systems on a periodic basis and where necessary.
- Members should perform daily margin reconciliations to ensure Members' margin requirements on customers are at least equal or more than SGX's margin requirements on Members.
- Members should consider adopting the dynamic margining approach to better manage customers' credit risk exposure.
- Members should consider performing intraday and additional margin calls, and intraday monitoring of customer margins, where practicable, to mitigate credit exposure.

4. Acknowledgements

This document was prepared based on the review of SGX Members' policies and processes in the course of SGX RegCo's ongoing supervision of activities across the SGX Membership base.

SGX RegCo would like to thank Members who have contributed to this document in one way or another, and who have provided feedback on our initiatives and publications.

Members that have queries on the review may contact Member Supervision.

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