

Good practices on managing operational risk associated with trading activities

The HKMA conducts regular reviews of the operational risk management of AIs in relation to their trading activities. AIs have generally put in place effective frameworks for managing the risk. This annex summarises the good practices and key observations on the approaches adopted by the reviewed AIs. AIs should review from time to time their operational risk management for trading activities, giving due consideration to these good practices and observations, and take steps to enhance their risk management practices and control frameworks as appropriate.

I. Risk governance, oversight and overall control framework

Strong governance and adequate oversight by the Board of directors and senior management of a bank are key to AIs' robust frameworks for managing the operational risk associated with trading activities. In this regard, the HKMA observed the following essential elements from the reviewed AIs which exhibited sound management of the risk.

1. Board and senior management oversight

Most of the reviewed AIs had established committees comprising Board members and senior management to oversee the management of the institutions' operational risk arising from trading activities. These committees were responsible for, amongst other things, setting and reviewing the operational risk appetite of the AIs, approving related policies and procedures and overseeing their implementation.

Some AIs' board-level committees also identified emerging threats proactively and provided guidance on how to address them. These committees also steered the institutions to keep abreast of market developments (e.g. the use of technology in surveillance, lessons drawn from operational risk incidents occurred in other institutions) with a view to enhancing their own control frameworks as appropriate.

2. Policies and procedures (P&Ps)

In general, the reviewed AIs had established comprehensive P&Ps that set out clear standards and approaches for monitoring and managing operational risk associated with trading activities, thereby facilitating consistent implementation of the control frameworks. Their P&Ps also prescribed the processes for handling operational risk incidents, with a well-established reporting mechanism and criteria for escalation.

3. Segregation of duties

In accordance with the "three lines of defence" (LoD) model, most of the reviewed AIs had clearly defined the roles and responsibilities assigned to front office (i.e. traders and salespersons), control functions (i.e. middle office such as risk management and compliance, and back office such as settlement and financial control) and internal audit. These functions were operating under separate reporting lines following the organisational hierarchy of the institutions to preserve

independence. In addition to functional segregation, most AIs implemented physical separation to avoid potential interference of front office staff in trade confirmation, reconciliation, revaluation and settlement processes.

To support the segregation of duties, the reviewed AIs adopted robust system access controls to restrict staff access (and/or modification) to trading information and relevant data (e.g. data on risk measurement, valuation, settlement and financial reporting) as appropriate. Besides assigning access rights according to job functions and on a need-to-know basis, the AIs also put in place measures to ensure no individual staff having end-to-end access to systems for trading, risk management, settlement and reporting. The AIs maintained proper system access logs and audit trail of changes in data inputs, and conducted regular reviews and updates to access rights to make sure that any changes in roles or employment status of staff were properly reflected.

II. Trade lifecycle controls

The completion of a typical financial transaction involves a series of processes (i.e. the trade lifecycle), including placing and initial execution of the trade order, confirmation, clearing and settlement, and reporting. The reviewed AIs had put in place various control points along the trade lifecycle for managing the operational risk arising from trading activities, with some of them demonstrating stronger capabilities by adopting enhanced practices in this regard.

4. Pre-trade management

- *Trading mandates and limits checking* – The reviewed AIs typically had established trading mandates that articulated the authority and responsibilities of trading desks and individual traders. In most cases, these mandates were sufficiently detailed, specifying key parameters to limit traders' activities, such as instrument types, currencies and tenors. Mechanisms were in place to validate whether a proposed trade was permitted and within the trading limits.

Good practices were observed amongst the reviewed AIs which employed hard blocks predominantly to prevent a trader from executing a trade in violation of the mandate. This approach was more effective than soft blocks, where warnings or notifications would be issued without blocking the trade. These AIs also involved their second LoD functions extensively in the initial design, regular review and daily monitoring of pre-trade controls. This helped uphold independence and objectivity in managing the risk at the pre-trade stage.

5. Trade execution and capture

- *Trade input timeliness* – The reviewed AIs generally implemented controls which required input of transaction information into their trading systems shortly after a trade was conducted. These controls enabled trading positions to be timely reflected in the relevant risk management and reporting systems, facilitating effective oversight and control.

Some AIs employed straight-through processing (STP) for trade execution, enabling instantaneous capture and recording of transactions. In certain cases, STP was used extensively, or even exclusively, to minimise manual booking and eliminate delays in the trade input process.

- *Trade cancellations and amendments* – In general, the second LoD functions of the reviewed AIs would scrutinise trade cancellations and amendments to address the risk of traders concealing unauthorised trading activities or creating fictitious profit-and-loss (P&L) records. Most AIs had maintained proper documentation of trade cancellations and amendments, including the justifications provided by the front office for these changes and the assessment by the second LoD functions.

Some AIs further required traders to obtain pre-approval before initiating any cancellation or amendment, rather than relying solely on post-event reviews. This approach substantially reduced the risk of misusing trade cancellations and amendments.

- *Off-premises trading (OPT)* – The reviewed AIs generally maintained robust controls over OPT. Most AIs prohibited OPT on a business-as-usual basis, recognising the heightened risk of unauthorised trading associated with OPT due to the significantly reduced supervision and surveillance compared to activities conducted in a dealing room. OPT was only allowed under exceptional circumstances, and in such cases, most AIs implemented rigorous control measures such as a strict authorisation process taking into account the responsibilities and experience of individual traders.

Some AIs also implemented stringent oversight of trades that had been conducted remotely under exceptional circumstances. Such trades were flagged in the system, and subjected to independent and timely review by the second and third LoD functions, with escalation to senior management where appropriate.

- *After-hours trading (AHT)* – AHT activities expose an institution to higher operational risk because these activities are not captured in same-day (T+0) risk reports but in the following day (T+1) reports with a one-day delay. Certain surveillance and controls might also be reduced for AHT activities due to system limitations. To manage the risk, most of the reviewed AIs formally defined cut-off times for different desks and instruments, and set out procedures for recording and reviewing AHT in a timely manner.

Some AIs utilised more advanced, automated tools to identify and flag AHT activities, and to generate flash reports for the second LoD functions to assess the risks associated with these transactions.

6. Trade confirmation

- *Trade confirmation controls* – All reviewed AIs had set out in their P&Ps that confirmation needed to be performed in a timely manner after a transaction was initiated, and to be delivered solely to the counterparty's back office without passing through or delivery to the front office. Procedures were typically in place to verify the validity and authenticity of incoming confirmations. Most AIs kept comprehensive records of unmatched confirmations and long outstanding items pending confirmation, and performed reviews thereof.

Some AIs further required positive affirmation for all applicable trades wherever practicable. Under such arrangement, both trading parties must actively acknowledge and agree to the trade details, significantly reducing the risk of settlement errors. These AIs had also developed performance metrics such as confirmation rates, break volumes and resolution lead time. This enabled the AIs to identify emerging patterns or issues early and take appropriate actions proactively.

7. Settlement

- *Unsettled trades* – The reviewed AIs generally had established clear monitoring and follow-up procedures for trades which could not be settled as scheduled, including the escalation criteria having regard to the duration and nature of the trades.

Some AIs enhanced the controls by adopting a comprehensive range of performance metrics, such as settlement failure rates, average resolution lead time and the costs for failed trades, which enabled the AIs to identify deficiencies in their settlement operations early and develop targeted, effective solutions to address such deficiencies.

III. Ongoing risk management, monitoring and reporting

In addition to trade lifecycle controls, the reviewed AIs utilised a suite of tools which were common for monitoring and managing operational risk associated with trading activities, such as reconciliation, revaluation, and surveillance of trades and communication. While the AIs made adequate use of these tools in general, the level of sophistication varied.

8. Reconciliation

- *Coverage and methodology* – In general, the reviewed AIs conducted timely reconciliation of their trade data with those captured in risk and finance reports on a daily basis to validate consistency of records across different systems and platforms. These reconciliation processes typically involved verification of multiple data points, such as traders' positions captured in trading systems against the data contained in risk management system; the risk management data against the general ledger; and the general ledger data against brokers' statements.

Some AIs enhanced data integrity and accuracy by performing line-by-line matching rather than reconciling at the desk or business-line level, thereby improving the reliability of reconciliation results considerably.

- *Internal audit* – The internal audit functions of the AIs regularly reviewed the adequacy of the reconciliation framework and processes, and provided recommendations for enhancing the robustness thereof.

Being a party independent of the whole trade lifecycle, the internal audit teams of some AIs were assigned with the responsibilities for investigating cases of irregularity identified from the reconciliation processes, such as inconsistent valuation and accounting differences.

- *Off-market trades* – The reviewed AIs had established pre-defined thresholds and implemented controls for detecting and reporting trades with prices (or rates) which deviated significantly from market prices (or rates). In accordance with these AIs' P&Ps, their independent control functions reviewed every such trade to assess whether the deviation was justified, and to maintain proper documentation of the review results.

Some AIs performed detailed analyses regularly for establishing and updating granular thresholds for detecting off-market trades having regard to a range of factors such as instrument types, trade nature and prevailing market conditions. The reviews of off-market trades by these AIs' independent control functions were in-depth, taking into account various facts and evidence on top of explanations provided by the traders.

9. Revaluation

- *Sources of prices and rates* – In carrying out revaluation, the reviewed AIs generally made use of data sources that were credible and representative of prevailing market activities, properly approved and independent of those employed by the front office. The AIs also subjected revaluation calculation to independent verification.

Many AIs used multiple data sources to strengthen their revaluation processes, rather than relying on a single data source. This enabled the AIs to cross-validate inputs and reduce dependency on any one data source.

- *Frequency of revaluation* – The reviewed AIs generally performed revaluation at a sufficient level of frequency, typically on a daily basis.

AIs with strong risk management capability were equipped to conduct intraday revaluations, enabling more timely identification of risks and providing better support for liquidity and capital management.

- *Use of models* – Where models were employed for revaluation, the majority of the reviewed AIs applied their assumptions and methodologies in a consistent manner. The AIs also conducted independent validation regularly to assess the

performance of the models, as well as appropriateness of the adopted assumptions and methodologies.

In addition to validation, some AIs established a dedicated forum with members from the front office, second LoD and model team to discuss and review the models regularly. The forum in general met at a frequency higher than that of independent validation, thereby enabling timely identification and remediation of any model deficiencies.

10. Surveillance, key risk indicators, incident management and other controls

- *Trade surveillance* – The reviewed AIs implemented trade surveillance programmes and used tools, which were either built in-house or purchased from external vendors, to detect unusual or suspicious transactions (e.g. wash trading and spoofing).

Some AIs employed more advanced tools that enabled real-time monitoring, as opposed to relying solely on post-trade surveillance.

- *Communication surveillance* – The reviewed AIs generally had put in place surveillance programmes to record and analyse traders' communications, such as telephone calls and emails, to detect suspicious trading behaviours.

Some AIs utilised advanced technology, such as natural language processing, machine learning and semantic analyses, in combination with human oversight in their communication surveillance programmes. This approach enabled a more comprehensive coverage, improved efficiency and accuracy, and enhanced reliability of the surveillance outcomes.

- *Key risk indicators (KRIs)* – KRIs were used by the reviewed AIs to facilitate identification of operational loopholes and detection of suspicious trading patterns of individual traders. The AIs generally had established diverse sets of KRIs encompassing non-P&L related, risk- and compliance-focused metrics, such as the respective numbers of late-booked, cancelled and amended trades. Trend analyses of the KRIs were conducted, and dashboards were prepared and regularly reported to the institutions' senior management for review.

Some AIs designed and interpreted their KRIs in a holistic manner, giving due consideration to correlation amongst the indicators. For instance, they looked into situations where several indicators were close to, but had not yet reached, their respective thresholds, recognising that the collective levels of the indicators might be a signal of heightened risk. In addition, some AIs utilised automated tools and machine learning to enhance KRI analytics, thereby increasing processing speed and capability in identifying hidden patterns.

- *Incident management* – The reviewed AIs generally had established comprehensive incident management P&Ps that detailed the roles and responsibilities for managing operational risk incidents. The P&Ps also articulated the processes for incident identification, reporting and escalation, impact assessment, root cause analysis, follow-up and documentation.

Some AIs further incorporated “near-miss” incidents in their incident management framework. Such incidents could have caused the AIs to incur financial losses but ultimately did not. These AIs in general had stronger capability in identifying potential control gaps and implementing preventive measures to avoid similar incidents in the future that could result in actual losses.

- *Broker-fee analyses* – Most of the reviewed AIs conducted regular broker-fee analyses to detect any irregularities, e.g. potential collusion between traders and brokers, which included fee inflation, market distortion and other fraudulent activities.

In addition to desk-level analyses, some AIs performed detailed reviews at individual trader level. This approach enhanced the effectiveness of anomaly detection which might be obscured when data were aggregated.