



Guideline

Subject: Derivatives Best Practices

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This guideline outlines factors that the Superintendent of Financial Institutions expects the management¹ and board of directors of a federally-regulated financial institution to consider when derivative instruments are part of its investment and financing profile. Neither derivatives, nor the individual risks inherent in them are, by themselves, new. However, the growing complexity, diversity and volume of derivatives products, facilitated by rapid advances in technology and communications pose increasing challenges to managing these risks. Sound risk management practices are as important for derivatives as they are for their underlying financial instruments and should be incorporated into the risk management programs of each financial institution that makes use of derivatives and adapted to reflect the nature and scope of its derivatives business, including that of a dealer and limited end-user. This guideline applies to all federally-regulated financial institutions and their consolidated subsidiaries under generally accepted accounting principles. For this guideline, a financial institution includes the Canadian branch operations of foreign institutions.

Financial institutions engaging in derivatives transactions as a dealer should also be aware of, and strive to implement the recommendations of the Global Derivatives Study Group (Group of 30) in their report issued July 1993, *Derivatives: Practices and Principles*.

¹ Where the FRFI is a foreign entity (i.e., its Canadian business consists of a branch operation regulated by OSFI), the role of management shall be discharged by the foreign entity's chief agent in Canada (insurance company or fraternal benefit society branch) or principal officer in Canada (authorized foreign bank in respect of its business in Canada). The role of the Board may be discharged by a senior officer or committee of the foreign FRFI that has been delegated responsibility for the Canadian operations and that has the authority to approve the policies developed to comply with this guideline.

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Definition

Derivatives are financial contracts whose values are derived from the value of an underlying primary financial instrument, commodity or index, such as: interest rates, exchange rates, commodities, and equities. Derivatives include a wide assortment of financial contracts, including forwards, futures, swaps and options. While some derivatives instruments may have very complex structures, all of them can be divided into basic building blocks of options, forward contracts or some combination thereof.

Derivatives allow financial institutions and other participants to identify, isolate and manage separately the market risks in financial instruments and commodities for the purpose of hedging, speculating, arbitraging price differences and adjusting portfolio risks. The risks that are associated with derivatives include market risk (comprising currency, interest rate risk, equity price risk and commodity price risk), credit risk and liquidity risk.

The risks of derivatives are more directly related to size and price volatility of the cash flows they represent than they are to the size of the notional amounts on which the cash flows are based. In fact, the risks of derivatives, and the cash flows which are derived from them, are usually only a small portion of the notional amounts.

Financial institutions may use derivatives as end-users and dealers. For example, an institution acts as an end-user when it uses derivatives to take positions as part of its proprietary trading or for hedging as part of its asset and liability management. It acts as a dealer when it quotes bids and offers and commits capital to satisfying customers' demands for derivatives.

Documented Policies and Procedures

The primary components of a sound risk management process include policies and procedures that: clearly delineate lines of responsibility for managing risk, set in place adequate systems for measuring risk, create appropriately structured limits on risk taking, establish effective independent internal controls, and describe comprehensive and timely risk monitoring and reporting. These components are fundamental to both derivatives and non-derivative activities alike. The process of risk management for derivatives activities should therefore be integrated into the institution's overall risk management system to the fullest extent possible using a conceptual framework common to the institution's other activities.

In addition, each type of derivative product that an institution proposes to use should be subject to a product authorization signed off by senior management. The product authorization should document which individuals or units are authorized to buy or sell the product, and the use(s) to which the product will be put - whether it will use a derivative product strictly to hedge positions or to actively take positions based on a market view, take advantage of arbitrage opportunities or to gain income from fulfilling customer orders.

As is the case with all risk-bearing activities, the risk exposures a financial institution assumes in its derivatives activities should be fully supported by capital. The financial institution should ensure that its capital is sufficient to support all the quantifiable risks, of which derivatives are a part, on a fully consolidated basis and that adequate capital is maintained in all group entities engaged in these activities.

Management Involvement

At least annually, senior management should review the adequacy of its written policies and procedures in light of the institution's activities and market conditions. Management must also ensure that derivative activities are allocated sufficient resources and staff to appropriately measure, report, manage and control risks.

Institutions should have knowledgeable individuals or units responsible for risk monitoring and control functions that are independent of the line units that conduct the trading activity and create the risk exposures. The responsibilities of such individuals or units include but are not limited to:

- developing risk limit policies, in consultation with trading staff and internal audit staff, for approval of senior management and the board of directors or a committee thereof;
- actively monitoring transactions and positions for adherence to policy limits;
- designing stress scenarios to measure the impact of market conditions that might cause market gaps, volatility swings, or reduce liquidity; and
- reviewing the performance of the internal measure of credit exposure, market risk, pricing models and valuation systems against actual experience.

Board Involvement

The board of directors or a committee thereof should approve and periodically review all significant policies pertaining to the institution's use of derivatives. In approving significant policies, the board should reflect its level of risk tolerance taking into consideration the level and probability of loss from derivatives activity, the capital resources of the institution as well as its business strategy and the level of expertise of its senior management and trading staff.

It should have, and ensure that senior management has, a good understanding of the institution's risk management process, the derivative products in use and the risk exposure arising from those products. This can be achieved by conducting and encouraging discussions between its members and senior management, as well as between senior management and others in the institution.

Internal Inspection

Financial institutions should have an internal inspection program that includes coverage of their financial derivatives activities that ensures timely identification of internal control weaknesses and operating system deficiencies.

The internal inspection function must be independent of the functions and controls it inspects. If an institution does not have an internal inspection department, it may rely on the parent, an affiliate or, by a specific mandate, its external auditors to perform the inspection function.

Internal inspection coverage should be provided by competent professionals who are knowledgeable of the risks inherent in derivatives.

Risk Management

Market Risk

OSFI believes that the ability to accurately measure market risk against formal internal exposure limits in a timely fashion is a prerequisite for management control.

Market risk may be broadly categorized into four types: currency risk, interest rate risk, commodity price risk and equity price risk. Currency risk is the risk that the value of a derivative will fluctuate due to changes in exchange rates. Interest rate risk is the risk that the value of a derivative will fluctuate due to changes in market interest rates. Commodity and equity price risks are the risks that the market value of a derivative will fluctuate due to changes in the price of the commodity and equity respectively that underlie the derivative instrument.

The sophistication of an institution's analytical approach to measuring risk should match the depth of its involvement in the derivatives market and the complexity of its positions. For example, dynamic hedging of positions using options implies sophisticated and more frequent risk monitoring and control than would the consumption of simpler derivatives with more symmetrical payoffs (for example, futures contracts).

The timeliness of information provided to management must be commensurate with the price volatility, time-horizon and turnover of the instruments and portfolios being measured.

For example, proprietary trading and market making in derivatives requires more sophisticated and more frequent risk measurement than does using derivatives for hedging investment portfolios valued at historical cost.

Exposure Limits

Management should incorporate an institution's derivatives business into its board-approved internal global policy limits on the combined market risk of all financial instruments. Global policy limits approved by the board of directors should be consistent with the board's view of the maximum amount of the institution's capital that should be put at risk on an ongoing basis. The global policy limits for market risk should also relate to the measures of risk used internally and be accordingly allocated to individual business units. Accordingly, such limits and their allocation would apply to the Canadian branch operations of foreign institutions.

Measurement of Market Risk

The appropriateness and adequacy of the assumptions and parameters that underpin an institution's technique for measuring market risk should be fully documented and reviewed at least annually against actual experience and updated market information.

At a minimum, risk measurement systems of dealers, active position-takers and limited end-users should evaluate the possible impact on the institution's earnings and capital which may result from adverse changes in interest rates, exchange rates, and other relevant market conditions.

Limited End-users

An institution whose derivatives activities are limited in volume and confined to hedging risk as a limited end-user may need less sophisticated risk measurement systems than those required by a dealer or active position-taker.

Limited end-users who use derivatives with a symmetrical payoff profile to hedge investment portfolios can more easily incorporate these instruments into market risk measures that, for example, range from simple gap analysis to complex simulation models of interest rate risk. On the other hand, active buying and selling of derivatives with the asymmetrical payoff profile typical of options will require more sophisticated techniques of option pricing models.

Dealers and Active Position-takers

For dealers and active position-takers whose derivatives are carried at their market value, market risk is typically measured as some form of "value at risk" using probability analysis based upon an appropriate confidence interval and time horizon. For example, such a measure could indicate with a 97.5% probability (i.e., a "confidence interval" corresponding to calculations using about two standard deviations) that the change in the value of a portfolio would not exceed a specified amount over any given one week holding period.

Where measures of value at risk are not explicitly adjusted for probability (e.g., interest rate sensitive trading portfolios that are revalued assuming a fixed basis point change in interest rates), management should nevertheless document implicit assumptions the measure makes about volatility in comparison to historical experience.

As a best practice the internal risk measurement model in use should exhibit the following characteristics:

1. Provide figures that are translatable into amounts at risk:
 - a. For committed cash flows, valuation should use a discounted cash flow (DCF) algorithm to net present value positions and/or cash flows. Committed cash flows comprise money market products, fixed income securities, foreign exchange forwards, swaps, futures, forward rate agreements, etc.
 - b. For contingent cash flows, valuation should use an appropriate pricing model to calculate market values of options positions and contingent cash flows. Contingent cash flows comprise all option-based products.
2. Calculate amounts at risk from committed cash flows using appropriate market discount factors adjusted for the volatility of rates based on:
 - appropriate minimum holding period(s);
 - a sufficiently long series of historical data; and
 - a minimum level of probability (e.g., 95 times out of 100).
3. Reflect in the calculation of amounts at risk:
 - the risks of loss arising from changes in the level of interest rates as well as the slope of the yield curve; and
 - where relevant, the risk of loss arising from the degree to which changes in market rates for different instruments of the same term are not correlated.
4. For the purpose of determining amounts at risk for contingent cash flows, the required output of an option valuation model should include:
 - changes in the price or rate of the underlying position (delta);
 - changes in the rate of change in the price of the underlying position (gamma);
 - changes in volatility (vega); and
 - time decay (theta).

5. Valuation and estimation of amounts at risk should be available on a daily basis.
6. Underlying assumptions and the historical data on which they are based should be updated frequently in order to facilitate the periodic reviews of significant policies by senior management and the board.

The last of these characteristics is particularly important for the complex mathematical models that are sometimes used by dealers to identify and aggregate risk. These models can have intrinsic shortcomings that include assumptions about statistical "normality", correlations between risks and between markets and about the liquidity of over-the-counter markets that may not continue to be accurate as markets change and develop. Periodic reviews and incorporating simulations of adverse events help address these concerns.

Simulations

Dealers should regularly perform simulations that change the assumptions of their models to determine how their portfolios would perform under stress conditions. Simulations of market environments are important in risk analysis because many assumptions that are valid for normal markets may not hold true in abnormal markets.

Simulations should reflect both historical events and future possibilities. Stress scenarios should include abnormally large market swings and periods of prolonged inactivity. The tests should consider the effect of price changes on the mid-market value of the portfolio, as well as changes in the assumptions about the adjustments to mid-market (such as the impact that decreased liquidity would have on close-out costs). The results of the stress tests should be considered in developing risk management policies.

Frequency of Measurement

The frequency with which exposures should be evaluated varies according to the level of scrutiny, the nature and size of an institution's involvement. For the trading book of dealers and active position-takers, such evaluations should be available at the trading-desk management level on a daily, and even intra-day, basis. Position reporting and evaluation may be less frequent, e.g., weekly, at higher levels within the control structure. For derivatives used to hedge positions in the investment portfolio of an institution, even less frequent evaluations may be sufficient given the low turnover of the book and its emphasis on hedging the longer term profile of the more static investment portfolio.

Credit Risk

Credit risk management for derivatives activities should be incorporated into the prudent person approach for traditional lending. Timely, meaningful reports should be prescribed and prepared in accordance with policy and procedure requirements.

Institutions should have a unified credit risk management function that is independent of individuals and units that conduct trades and create risk exposures. The credit risk management function should have strong analytical capabilities in derivatives, and have clear authority and responsibilities that include:

- approving credit exposure measurement standards
- establishing and assigning credit risk ratings
- setting credit limits and monitoring their use
- reviewing credits and concentrations of credit risk
- reviewing and monitoring risk reduction arrangements

Exposure Limits

Derivative credit lines should be approved using standards that are consistent with those used for other activities, and comply with the institution's credit risk policies and consolidated exposure limits. Business with a counterparty should not commence until a credit line has been authorized.

Senior management should ensure that credit authorizations are provided by personnel who are independent of personnel responsible for engaging in derivatives trades.

It is important that the reputation and management sophistication of the counterparty be considered among other factors in assessing the counterparty's credit worthiness. The criteria that counterparties must meet should be explicitly outlined in the institution's credit risk policies.

Measurement of Credit Risk Exposure

Credit risk is the risk that a loss will be incurred if a counterparty defaults. Prior to settlement, the credit risk exposure of a derivative is measured as the sum of its replacement cost (or current exposure) and an estimate of the institution's potential future exposure. Replacement cost is the cost of replacing the remaining cash flows of a derivative at the prevailing prices and market interest rates. Potential future exposure is primarily a function of the time remaining to maturity and the expected volatility of the price, rate or index underlying the derivative.

The method used to measure counterparty credit risk exposure should be commensurate with the volume and level of complexity of the derivatives activity. Dealers and active position-takers should have access to credit equivalent exposures, which represent the replacement cost plus a statistically-based estimate of the potential change in the value over the remaining life of the

contract (potential future exposure). The potential future exposure is generally determined using the analytical capabilities of simulation modelling. The replacement cost calculation simply involves marking-to-market each derivatives contract.

Limited end-users may elect to use a less sophisticated method for measuring the potential future exposure (e.g., a percent of notional value times the number of remaining years to maturity) as long as other mitigating factors are in place. Examples of mitigating factors include restricting transactions to the highest quality counterparties or limiting contracts to mature, less volatile derivatives.

Senior management should receive reports that document credit risk exposure by counterparty. Such reports should include the credit risk exposures of derivatives with all other credit risk exposures the institution might have to a particular customer.

Netting

In order to reduce counterparty credit risk exposure, an institution should, where appropriate, use bi-lateral and multi-lateral netting agreements with its counterparties. However, institutions should control and monitor their derivatives' credit exposures on a net counterparty basis only when there is reasonable assurance of the enforceability of close-out netting arrangements with counterparties under the laws of all of the relevant jurisdictions. Legal enforceability should extend to any relevant insolvency proceedings of the counterparty. The institution should be able to demonstrate that it has exercised due diligence in evaluating the enforceability of these contracts.

Settlement Risk

Settlement risk can be defined as the risk an institution faces when it has performed its obligations under a contract, but has not yet received value from its counterparty. Settlement risk becomes credit risk if the counterparty defaults during the settlement cycle.

Institutions should establish limits and monitoring procedures for settlement risk exposures. In the case of FRFIs that are branch operations, the limits and procedures within the branch operations should be integrated with those used in the home jurisdiction. Settlement risk exposure limits should be established as a subset of credit risk exposure limits as part of the credit

risk management program. In establishing these limits, management should consider the institution's own capital adequacy, operations efficiency and credit analysis expertise as well as the operational structure and degree of finality of payment in the payment systems that are likely to be used.

Liquidity Risk

The liquidity risk of derivatives takes two forms: market liquidity and cash flow. Market liquidity will have an impact on the potential changes in market value of an instrument. If there is insufficient market activity, an institution may not be able to unwind its position quickly enough to avoid serious loss. The impact of derivatives on the net cash-flow profile of an institution is germane to the assessment of an institution's ability to fund itself as obligations become due.

When an institution establishes its market risk exposure limits, it should consider how long it would take to unwind a position (i.e., time to close) based on the length of time required to hedge or liquidate a position under normal market conditions. Where markets or products are illiquid and there is little variety or depth to hedging alternatives, the institution should assume longer holding periods in measuring market risk.

As part of its cash flow and funding management program, an institution should have procedures in place requiring traders to alert senior management to early indicators of resistance to the institution or to significant counterparties, as well as resistance to individual products or maturities, or by particular markets or geographic regions.

Legal Issues

Prior to engaging in derivatives transactions, an institution should satisfy itself that its counterparties have the legal authority to engage in those transactions. Where agents are involved, an institution should take all reasonable steps to assure itself that the necessary legal authorities exist.

In addition to determining the authority of a counterparty to enter into a derivatives transaction, an institution also should satisfy itself that the terms of any contract governing its derivatives activities with a counterparty are legally sound. This is especially important with respect to provisions governing (i) the timing of the termination of outstanding transactions and (ii) the calculation of settlement amounts payable to or between parties upon the termination of a transaction or an agreement.

An institution should act honestly and in good faith when marketing, entering into, executing and administering transactions. Accordingly, management should conduct regular performance evaluations of their marketing and sales staff, satisfying themselves that they are adhering to prudent practices and ensure that they have received appropriate training.

Over-the-counter derivative transactions are predominantly arm's-length transactions in which each counterparty has a responsibility to review and evaluate the terms and conditions, and the potential risk and benefits, of prospective transactions and to obtain such additional information or independent professional assistance as it may require in connection with a particular transaction.

Operations and Systems Risk

Operating risk is the risk that deficiencies in information systems or internal controls will result in unexpected loss. Operating risks should be assessed through periodic reviews of procedures, documentation requirements, data processing systems, contingency plans, and other operating practices through the internal inspection function.

Mechanisms should be in place to assure the confirmation, maintenance and safeguarding of derivatives contract documentation. These mechanisms should also provide for exception reporting to senior management.

The design of information systems will vary according to the needs demanded by the scope and complexity of an institution's involvement in derivatives. The degree of accuracy and timeliness of information processing should be sufficient to meet an institution's risk exposure monitoring needs.

Appropriate information processing and reporting capabilities should be put into place and be fully operational before introducing new derivatives products and before commencing proprietary trading and dealing in those products. Where different systems are in use by individual business units or for different products, care must be taken to ensure valuations are prepared consistently and that risk management reporting can be effectively consolidated.

The approach taken to the valuation of derivatives should be documented and applied consistently within a portfolio. For instance, derivatives used to hedge may have different accounting treatments than derivatives that comprise part of a dealing or proprietary trading portfolio.

One example of an approach to valuing derivatives is based on mid-market levels less adjustments such as unearned credit spreads, close-out costs, and investing and funding costs. A second example is the pricing of derivatives on the basis of bid levels for long positions and offer levels for short positions. In either case, valuations for accounting purposes should be made with reference to generally accepted accounting principles and relevant accounting guidance from the OSFI.

The valuation function and the trading function should be separated and conducted independently by different personnel and units. Where valuation systems are automated, security arrangements should be in place to restrict access to a list of authorized personnel. Trading personnel should not be permitted entry.

GLOSSARY

Arbitrage:	trading strategies designed to profit from price differences for the same or similar instruments in different markets.
Basis risk:	the exposure of a transaction or portfolio to differences in the price performance of the derivatives it contains and their hedges.
Commodity price risk:	the risk that the market value of a commodity will fluctuate due to changes in the price of the commodity(ies) that underlie the contract.
Credit risk:	the risk that a counterparty will not pay an amount due as called for in the original agreement, and may eventually default on an obligation.
Credit risk exposure:	the amount at risk from the failure of a counterparty to perform its obligation, regardless of the probability of default or severity of loss. For derivative transactions, credit exposure is a function of the replacement cost and the potential future exposure.
Currency risk:	the risk that the market value of a financial instrument will fluctuate due to changes in exchange rates.
Current exposure:	see the definition of replacement cost.
Delta risk:	the exposure to a change in the value of a transaction or portfolio corresponding to a given change in the price of an underlying.
Dealer:	a financial market intermediary who acts as a principal by buying or selling from its own account. Dealers may also act as market makers by regularly quoting bid and offer prices and standing ready to make a two-sided market.
Equity price risk:	the risk that the market value of a financial instrument will fluctuate due to changes in the market value of the underlying equity instrument(s).
Gamma risk:	the possibility that the relationship between the price of an underlying and the value of a transaction or portfolio is not linear. The greater the non-linearity (i.e., convexity) the greater the risk.

Interest rate risk:	the risk that the market value of a derivative will fluctuate due to changes in market interest rates.
Limited end-user:	enters into derivatives transactions in an investment portfolio context to hedge positions arising from a mix of assets and liabilities.
Market risk:	is the probability that an investment will vary in price as market prices or volatility changes. It includes currency risk, interest rate risk, equity price risk and commodity price risk.
Market liquidity risk:	the possibility that a financial instrument cannot be sold quickly and at full market value.
Market value:	is the amount obtainable from the sale or payable on the acquisition of a financial instrument in an active market or, when a quoted market value is not available, the amount that could be exchanged or settled between knowledgeable, willing parties in an arm's length transaction.
Potential future exposure:	what the replacement cost of a derivative could be in the future if the underlying variables that determine the market value of the contract move adversely. It is primarily a function of the remaining time to maturity and the expected volatility of the price, rate or index underlying the contract.
Replacement cost:	the cost of replacing the remaining cash flows of a derivative at the prevailing prices and market interest rates.
Symmetric payoffs:	a pattern of changes in value that moves continuously and proportionally up or down in response to price movements of an underlying security or other instrument. Traditional securities, futures and forwards tend to have symmetric payoffs. Options and instruments with option components typically have asymmetric payoff patterns over some price ranges.
Theta risk:	is associated with options, and is the exposure to a change in the value of a transaction or portfolio arising from the passage of time.

Vega risk: is associated with options and is the exposure to a change in the value of a transaction or portfolio resulting from a given change in the expected volatility of the price of an underlying.

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