Credit risk management

Mission-critical, but underestimated

The concern that a counterparty may fail to pay or deliver the goods became a reality more than once in the California power debacle. Risk management is incomplete without attention to counterparty risk, also known as credit risk. Credit risk is often underestimated because the event of a default is typically seen as unlikely

Volatile markets may cause the demise or default of certain counterparties. But credit risk also exists in the absence of market volatility. As energy markets evolve, regulators may very well put capital adequacy regulations in place to create a capital "cushion" to protect investors and counterparties in the event of default. Until then, the management of credit risk should not take second place to market risk.

By Claudio Casarotti

Don't put all your eggs in one basket

Risk diversification is the golden rule in any commodity and financial trading activity. Historically, most economic disasters, both in the energy and the banking industries, have resulted from some form of risk concentration. Risk concentration means overexposure to certain market risk factors or an excessive dependence on a particular market segment. Credit exposure concentration involves overexposure to a certain single counterparty or a group of similar counterparties, related by geographic vicinity, industry affiliation, market penetration and dominance, and by type of commodity or security traded.

To avoid risk concentration, traders need only follow the practical philosophy of not putting all their eggs in one basket, and knowing who they are dealing with. While some of the mathematical and computational tools

1. Identifying credit risk sources

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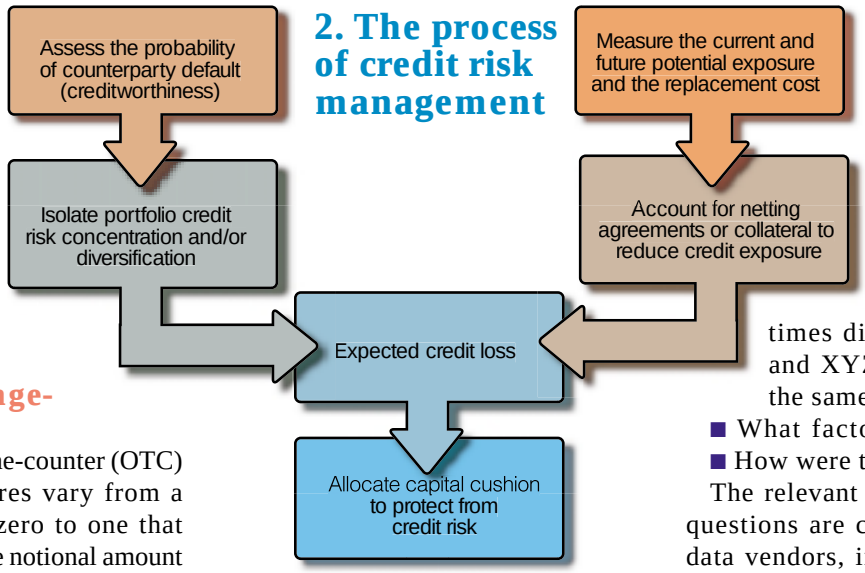
are new, credit risk management is as old as any form of trading. From a credit risk point of view, "Don't put all your eggs in one basket" translates to, "Don't trade only with one counterparty."



2. The process of credit risk management

OTC vs. exchange-traded deals

For bilateral or over-the-counter (OTC) deals, credit exposures vary from a prudential value of zero to one that could easily exceed the notional amount of the deal. For exchange-based trades, credit risk exposure is at minimum because the exchange takes on the credit risk through its clearing functions.

Generally speaking, one function of a clearinghouse is to reduce credit risk exposure. Even if a formal clearinghouse is not available, exchanges require their participants to provide some form of "guarantee" to prevent massive losses in case of a default. Many on-line platforms (such as EnronOnline, DynegyDirect, and HoustonStreet) offer the use of some financial instruments to protect from credit risk. EnronCredit, for example, is a first attempt to promote the use of credit derivatives to hedge credit exposure.

Credit risk defined

Credit risk refers to the risk and the expected loss incurred if a debtor defaults or is unable to meet obligations at delivery. Generally speaking, credit exposure is the amount that will actually be lost in the event of a default. Formally speaking, credit risk depends on three things: the nominal amount contracted with the debtor, the default probability of the counterparty, and the recovery rate.

The nominal amount, together with the payment frequency, helps project the incoming and outgoing cash flows to determine the credit exposure at the various payment dates.

The default probability indicates the likelihood that the counterparty will be unable to meet the contractual obligations on the various payment dates. It is based on credit ratings (Moody's or Standard and Poor's) or any available credit history and record. If no credit record is available, industry benchmarks or sector-specific data could be used to estimate the default probability. The default probability summarizes in one number the counterparty's credit-worthiness.

The recovery rate refers to the portion of the amount due that can be recovered if the counterparty goes bust.

Credit risk models

Models used to estimate credit risk all try to come up with a "credit value at risk" or credit VaR number using probability distribution functions and Monte Carlo simulations. These models all simulate different credit risk "states of the world" and strive to answer questions like:

- How many times did the counterparty XYZ default last year?
- How many times did counterparty ABC and XYZ default together at the same time?
- What factor caused a default?
- How were the positions hedged?

The relevant data to answer these questions are collected from credit data vendors, industry benchmarks, and estimates based on any credit record history information.

From a computational/mathematical point of view, these models do not differ greatly from those used for market risk VaR calculations. Often, the Monte Carlo simulation engine used is the same.

A credit VaR recognizes that:

- Credit risk is not stationary over time.
- Credit events (defaults, recovery rates, a change in credit ratings) are rare but do happen.
- Credit events are driven by the general economic condition—that is, a slowdown in the general state of the economy can lead to an overall downgrade of all credit status and therefore account for more credit risks.
- Default events are correlated, and the default probability is not constant over time.
- Credit recovery rates are uncertain—that is, they vary from counterparty to counterparty.
- Credit risk is not a static measure but needs to be projected in the future with simulations and scenario analysis to quantify the impact on credit risk of different states of the world.
- Credit risk is a positive function of the market liquidity and accounts for seniority.

Managing the process

Credit risk management is a two-fold process. Firstly, one needs to identi-

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Limitations in credit risk management

The BIS (Bank of International Settlements) has noted that, "credit risk models are not a simple extension of their market risk counterparts." The key reasons:

- Data and instrument limitations. Credit ratings for most of trading counterparties are not available, and credit derivatives markets are still in their preliminary stages. Moreover, credit risk analysis often requires historical data, which are sometimes not available.
- Time horizons and market liquidity. Looking closely at the contractual structure of energy contracts (and excluding hedging and spot optimization instruments—such as futures and some type of options and forwards), one can see that most of them have a duration that exceeds a year. Credit risk is calculated on time horizons longer than the holding period used in market risk VaR calculations. The problem with this is that energy markets are not liquid enough to guarantee solid proxies to compute with. Moreover, deciding which time horizon to choose is not trivial because contracts unwind not in days, but rather in weeks, months, or years.
- Model validation. Although techniques exist to back-test market risk management models, credit risk validation frameworks mostly rely upon the choices the risk manager has made. When all is said and done, the credit-worthiness of a counterparty is in the eye of the beholder.

fy the sources of credit risk (Figure 1) in the energy value chain. Second, trading with multiple counterparties in multiple global locations requires monitoring calculations and recognizing that the credit process (Figure 2) does not mean just setting credit limits per counterparty and checking it against the trading activity. There are limitations to establishing a credit risk management framework, however (see box above).

Higher priority

The complex energy contract structures often embed a large—and sometimes underestimated—credit exposure. While energy players have already started dealing with credit risk in a viable manner, they still do not give it a high enough priority. For example, most credit risk management practices are developed just after sound market risk management procedures are put in place. But a best practice would be to tackle both types of risks together. This approach would help establish an enterprise-wide risk management approach to protect the organization from risks and unnecessary losses. ■

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