



## Counterparty credit risk uncovered - part three

**Terri Duhon, managing partner at B&B Structured Finance and author of 'How the Trading Floor Really Works', discusses wrong-way counterparty credit risk**

Most of the chatter about counterparty credit risk is around OTC derivatives. Exchange-traded derivatives (ETP) have counterparty credit risk as well, but the overall size of the market (around 10% of the derivative market place), the average maturity of the product (less than one year), the type of product (mostly futures and options) and the daily margining requirements mean that those risks are dwarfed by the OTC market.

When we then examine where the risk lies in the OTC market, we find that the majority of the risk comes from the swaps market (primarily credit and rates) because of both the outstanding size and the long maturities of those products. The first in this series of articles (SCI May 3) examined the counterparty credit risk in a vanilla interest rate swap. The second in this series (SCI May 17) examined the same for credit default swaps. This article will now look at cross-currency swaps (including FX forwards), which are a subset of the interest rate swap market. Importantly, cross-currency swaps have some key differences to same currency swaps, one of which causes "wrong-way" risk.

Wrong-way risk is the term for the counterparty credit risk that results when the creditworthiness of the counterparty is adversely correlated to the mark-to-market of the derivative. In the second article in this series we introduced the risk of the counterparty being correlated to the reference entity in the CDS trade.

In CDS, wrong-way risk refers to the risk of a high default correlation between the seller of CDS protection and the reference entity resulting in the buyer of protection having a high potential future exposure right when the counterparty defaults. Because we generally assume that there is some positive default correlation between all counterparties and all reference entities when we trade CDS, to some extent all CDS trades could fall under the term wrong-way risk from the protection buyer's perspective.

As default correlation is unobservable (as discussed in the second article), the correlation assumption is just that – an assumption. It is an even bigger assumption to say that any one combination of counterparty and reference entity are that much more correlated than any other. Intuitively, it makes sense that dealers are more concerned about buying protection from JPMorgan on Goldman Sachs than on BMW, but putting an exact number on that is the challenge.

The more common association with wrong-way risk is with respect to cross-currency swaps. This includes all swaps that have an exchange of principal in different currencies at maturity.

When we examined credit default swaps in the second article, we identified three main differences between IRS and CDS counterparty credit risk: the symmetric (IRS) versus asymmetric (CDS) graph of potential future exposure; the difference in the potential future exposure as a percentage of the notional of the trade; and the correlation between the credit risk of the counterparty and the market risk of the trade which exists in CDS but not IRS. When we look at cross-currency swaps in contrast with IRS, only the last two differences apply as the potential future exposure for cross-currency swaps is also symmetric.

The difference in the potential future exposure as a percentage of the notional is what causes cross-currency swaps to have a disproportionate amount of risk, particularly compared to IRS. The correlation between the credit risk of the counterparty and the market risk of the trade, which exists in some cases, is what causes wrong-way risk.

While wrong-way risk exists to some extent in all CDS from the protection buyer's perspective and in some cross-currency swaps, in CDS the driver of the wrong-way risk is the correlation between the counterparty's and the reference entity's creditworthiness, whereas in cross-currency swaps the driver of the wrong-way risk is the correlation between the counterparty's creditworthiness and FX spot rates.

As in the case of IRS, cross-currency swaps have symmetric potential future exposure graphs. From a pure market risk perspective, the magnitude of the potential future exposure is the same regardless of which side of the trade the dealer is on.

As relative interest rates in the two currencies and the FX spot rate are the drivers of the mark-to-market, we say that these can go up or down with equal probability. Because there are two drivers of the mark-to-market, it is possible that they move in a way that cancels the other's impact; however, we focus on the scenarios where they amplify each other.

While the potential future exposure graph for a cross-currency swap is symmetric, the shape does not follow that of a vanilla same-currency interest rate swap. The driver of the different shape is the fact that cross-currency swaps have a principal exchange at maturity.

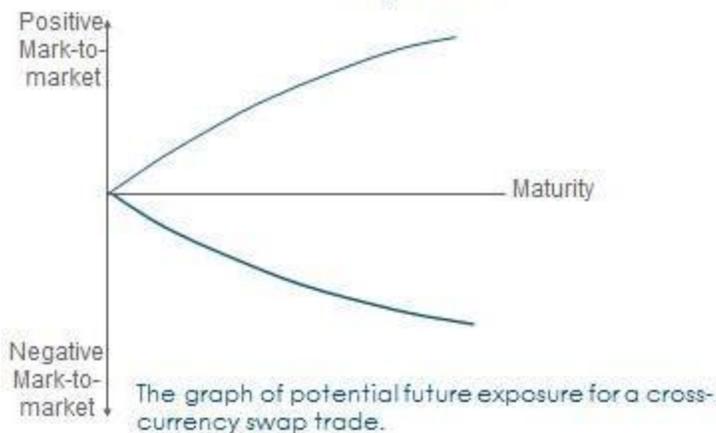
The notionals to be exchanged at maturity are fixed at the inception of the cross-currency swap and based on the FX spot rate at the time. Over the life of the trade, the magnitude of that final set of cashflows far outweighs any other cashflows that might exist in the swap. (FX forwards don't have any other cashflows, but most cross-currency swaps have some combination of fixed and floating legs. We ignore any initial exchange of principal, as that is generally done on day one and thus doesn't come into the potential future exposure calculation.) The two key determinants of the mark-to-market of that final set of cashflows are relative interest rates in the two currencies and the FX spot rate.

Over the life of the trade, one may dominate the other. At the maturity, the only determinant remaining is the FX spot rate on the day of exchange.

A simplified way to think about the potential future exposure is to think about how far the FX spot rate can move from the rate agreed at trade inception. Again, this is a function of the volatility that we assume and the confidence level that we want to analyse (e.g. 95% or 99%).

Based on how volatile the currency is, it can appreciate or depreciate as long as the trade is outstanding. The picture shown below demonstrates this assumption.

## Cross-currency swap potential future exposure



For example, imagine that a Mexican corporate has executed a five-year FX forward where the dealer has to pay Mexican pesos in five years and will receive US dollars in exchange. There are no other cashflows. Over five years, if the US dollar appreciates compared to the initial FX spot rate, the dealer has a positive mark-to-market; but if the US dollar depreciates, the dealer has a negative mark-to-market.

We all know that a weak currency is often considered positive for that country's economy. But a currency that is deteriorating rapidly can be a sign of a very weak economy and, in extreme cases, one that is in distress. The wrong-way risk in the Mexican peso example above is that when the US dollar has appreciated significantly against the Mexican peso, there is an increased probability that the counterparty will have deteriorated from a credit risk perspective.

The dealer has a positive mark-to-market when the US dollar appreciates and thus is more exposed to the credit risk of the counterparty exactly when the counterparty has a higher probability of default. However, if the dealer were paying US dollars in five years in exchange for Mexican pesos, this risk from a counterparty credit perspective would not exist. While the counterparty would still have a higher probability of default when the US dollar appreciates, that would be a negative mark-to-market for the dealer.

Hence the concept of wrong-way risk being directional. It is the risk derived from a trade that done in a particular direction generates higher counterparty credit risk than when done in the other direction.

Similar to the CDS counterparty credit risk, these correlations are assumptions that we make. However, if we take a more extreme example, we can see a more direct relationship. Instead of a Mexican corporate, let's assume that the counterparty is the government of Mexico.

The relationship in this case is more direct because the government of Mexico has the power to manipulate its currency in a number of ways in order to stimulate its economy. In the extreme, we could call this moral hazard risk, but it is unlikely that any swap between a government and a dealer will drive the exchange rate policy in that country.

These three articles have given us the tools to understand and manage the counterparty credit risk of the majority of OTC derivatives. The key is to start with the potential future exposure profiles which represent the market risk element of IRS, CDS or cross-currency swaps.

Then we consider the credit risk of the counterparty and any possible adverse correlation between the counterparty and the mark-to-market. At that point we can figure out the best way to manage the risk.

Despite increased levels of general knowledge in this space, we are still debating and discussing the best risk management practices around counterparty credit risk. The fourth and final article in this series will address the management of this risk including loss reserves (i.e. CVA).

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