



MARKET PERSPECTIVE

Wrong-way Risk Part II

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Dan Travers and Jean-Marc Schwob, product managers for SunGard's enterprise risk solution Adaptiv demonstrate how credit exposure profiles could be adjusted to reflect elements of wrong-way risk.

In our first whitepaper [found on <http://www.sungard.com/enterpriserisk>], we outlined a pragmatic approach to the detection of wrong-way risk situations, combining a numerical analysis of portfolio sensitivities with a judgement-based assessment of counterparties' business risk sensitivities. In this second paper we extend this argument to demonstrate how credit exposure profiles could be adjusted to reflect elements of wrong-way risk. Furthermore, we examine whether exposures should be adjusted in Basel II Pillar 1 capital calculations.

Exposure at Default

Credit exposure is defined as the amount that would be lost if the borrower or counterparty were to default, with no recovery from the subsequent liquidation. This exposure is traditionally measured independently from the quality or nature of the counterparty. A given transaction or portfolio of transactions will generate the same level of exposure no matter who the counterparty is. This view stems from the lending world, where exposure is a known quantity, such as the outstanding loan balance or a contractually committed credit extension by the lender.

In the trading world, however, exposure fluctuates markedly with changes in market factors; as we have seen all too clearly in recent months. Counterparty exposure is an uncertain amount, so the simplest approach is to measure exposure at default as the expected exposure taken over a large number of simulated market conditions.

The assumption of independence between potential exposure and potential default may be pervasive and convenient, but it is questionable as to whether it provides the best reflection of the bank's credit exposure and risk managers should consider what alternative options are available.

The shortcomings of the above approach can be seen when applied to sample transactions. If a reverse repo is entered into where the counterparty pledges its own stock as collateral, it is clear that the collateral will be worthless *if* the counterparty were to default. A diligent credit manager would therefore not assign any value to the collateral and would treat this reverse repo as an unsecured loan (exposure = 100% of notional). A similar conclusion may be reached if the collateral were issued by an entity closely related to the counterparty, such as a subsidiary. The prudent course of action would be to ignore the value of the collateral in the measurement

of such exposures. In fact these examples are cases of wrong-way risk and they implicitly validate a policy of adjusting exposure numbers to reflect such considerations.

If we follow this argument further, less blatant cases of wrong way risk could also result in an adjustment of the exposure calculation. Consider for example the purchase of credit default swap (CDS) protection on one UK bank from another UK bank. In calculating the exposure at default, one has to consider a number of options – should it be the expected exposure, all things being equal, or should the likely demise of both UK-based banks together be factored in? What about entering into a cross-currency swap with a Polish bank, paying Polish zloty and receiving dollars? In such cases, it is likely that the exposure (i.e. the market value of the derivative position) at the point of counterparty default will be higher than if it were calculated under normal conditions. In other words, and using simulation terminology, the scenarios leading to a default of the counterparty will generally coincide with scenarios leading to above average exposure.

We contend that the paradigm of measuring exposure independently from the counterparty's probability of default is flawed in the presence of wrong-way risk. The term 'Exposure at Default' (EAD), which is used widely in the world of risk modelling and capital adequacy, already hints at this position. Exposure is only relevant if there is a default; it should therefore be measured with the premise that counterparty default will occur. If there is any element of correlation between potential exposure and probability of default, this should be reflected in the exposure number.

Measuring exposure for risk and capital purposes is already fraught with complexity when wrong way risk is a significant concern. The problem is more acute when credit valuation adjustment (CVA) is considered. A CVA is typically levied by the Credit Portfolio Management (CPM) group to cover the 'cost of credit' that should be embedded

in the pricing of any transaction involving counterparty risk. In many institutions CPM takes on the counterparty risk and uses the associated revenue to manage the credit risk portfolio and hedge undesirable exposures. The CPM group usually acts as a profit centre and will certainly not want to take on hidden wrong-way risk in counterparty portfolios without being duly compensated for it. Hence CVAs should also reflect any element of wrong-way or right-way risk.

The Methodology: Exposure Conditional on Default

So how could one go about adjusting exposures to reflect wrong-way risk? A crude methodology would be to scale the reported exposure by a certain factor (say 150%) or use a percentage of notional amount or loan value (say 80%) when in the presence of wrong-way risk. This non-scientific approach has the advantage of simplicity but it certainly is not sufficiently risk-sensitive and will become unworkable when considering large and complex portfolios.

A better approach is to use a simulation-based methodology. As outlined above, a normal simulation calculates exposures independently from counterparty creditworthiness. To account for the likelihood of the counterparty defaulting and subsequent right or wrong way risk, there are two options:

- a) Simulate the defaults and market events explicitly; or
- b) Calculate the exposures *conditional* on the counterparty defaulting.

Option a) involves many more simulations and a correspondingly greater computational burden than option b) and would necessitate huge additional hardware investment by the bank.

The second approach is analytically more challenging but conceptually very attractive. The methodology takes the standard inputs for an independent exposure simulation plus

any correlations between the counterparty's creditworthiness and the market risk factors such as FX, interest rates, commodity prices or CDS spreads that drive the exposure.

The algorithm internally transforms the simulation space to produce a simulation conditional on counterparty default, and hence exposure conditional on the counterparty defaulting. A conditional expected exposure which is significantly higher than the unconditional expected exposure shows wrong-way risk. Conversely, right way risk will produce conditional expected exposure

that is lower than the unconditional expected exposure.

Using this method is clearly preferable to using the approach outlined in (a), since it requires as little as 1% of the computation time. It enables the derivation of conditional exposures to be as fast as normal exposure calculations, allowing wrong-way risk to be reflected in day-to-day reports. Calibrating the model is simple, as the user must input only correlations considered to be significant. In other words, quantify the cases you can observe and make no assumptions otherwise.

Conclusion

Wrong-way exposure calculated with either a simple or sophisticated methodology can be employed in a number of key areas:

- Daily reporting of wrong-way exposure for each counterparty portfolio, hence complying with regulatory requirements around wrong-way risk, notably Basel II pillar 2
- Calculating a CVA figure which truly reflects the expected exposure when the counterparty defaults
- Supplying more representative input to the bank's economic capital model by providing figures that include wrong or right way risk in a combined assessment of trading and banking book economic capital

It is not clear where banks would be comfortable using such estimates of exposure conditional on default. Clearly banks must monitor wrong-way exposure under Basel II's pillar 2, but the regulations are less clear about whether such numbers should or can be used as EAD in pillar 1 regulatory capital calculations.

Whilst wrong-way risk would result in an upward adjustment in reported exposures, cases of right-way risk, where potential exposure and probability of default are negatively correlated, should logically result in a reduction of reported exposure. In the current environment however, it would be very surprising if regulators were prepared to allow reduced capital due to a bank's model or assumptions concerning right-way risk. Instead, it is likely the maximum of the wrong-way exposure and the normal unconditional exposure would be required, but this raises the spectre of asymmetrical measurement of risk and is hardly an incentive to invest in better tracking of wrong-way exposures.

Although there is still much room for debate, such calculations and thought processes clearly can benefit the bank by injecting far more analytical rigour into wrong way risk measurement and management. By quantifying wrong-way risk, banks will have a more accurate reflection and allocation of their credit risks, from the risk taker to the risk manager and all the way up to senior management.

Lastly, the authors would like to see regulators specifically address issues around the inclusion of wrong way risk in Pillar 1 capital measurements. We believe these techniques add value and risk sensitivity to capital calculations, but there is currently little guidance as to whether banks may proceed to utilize these measures.

About Adaptiv

SunGard's Adaptiv provides enterprise-wide credit and market risk management and operations solutions for financial services institutions. Adaptiv assists institutions of varying size and complexity to deploy technology to meet both internal and regulatory requirements for risk management and operational control. Adaptiv helps financial services institutions from the banking, hedge fund, asset management, insurance and corporate sectors with our deep understanding of risk management and operational processes.

To find out more about Adaptiv please visit: www.sungard.com/adaptiv or contact an expert on +44 (0)208 081 2779.

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