CHALLENGES IN BANK FUNDING AND LIQUIDITY: A 3-PART FEATURE

Part 1: Derivatives Funding Policy and the FVA

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A return to conservative principles of bank liquidity and funding is an accepted consequence of the 2008 bank crash. Under Basel III, banks will be required to adopt a specified funding model by regulatory fiat. However, while this change will result in more stable through-the-cycle bank funding, it presents other challenges in liquidity risk management. In this series of articles, we review the current issues and recommend business best-practice funding policies. In forthcoming issues of Intelligent Risk, we will examine bank internal funds pricing policy (commonly referred to, somewhat misleadingly, as funds transfer pricing or “FTP”) and optimum liability strategy. We begin the series with a review of derivatives funding policy.

Derivatives Funding Policy

As part of sound liquidity management policy, all banks should have articulated funding policies in place for each of their business lines. These set out the liquidity and funding treatment of each product type within business units, including FTP rates, required tenor of funding, and so on. The treatment of the derivatives book can sometimes be particularly problematic. However, if we stop using the misnomer “off-balance sheet”, and treat the funding requirement that arises out of derivatives business in exactly the same way we should be treating the cash business, the derivatives issue regains clarity.

In practice this means that banks running derivatives portfolios, generally the derivatives dealers plus large users of derivatives, must treat the cash flow requirements arising out of this business with the same discipline and liquidity risk principles as they do any other business line. The divergence in bank cost-of-funds (COF) from Libor since 2008 confirms the importance of valuing and managing derivatives risk using such an approach, in a way that recognizes the bank’s term funding rates.

First Principles

Inter-bank derivatives trading takes place under the credit support annex (CSA) arrangement in the standard ISDA agreement. This means that the mark-to-market (MTM) value of each derivative contract is passed over as collateral, usually in the form of cash but sometimes as risk-free sovereign securities. In general, the collateral requirements under a two-way CSA agreement should result in a netted zero cash flow position, because what a bank needs to pass over as collateral on a derivative that is offside, it will receive from the counterparty to the hedge on this derivative. However, a number of counterparties, such as corporates, sovereign authorities, sovereign debt management offices and central banks, do not sign CSA agreements. This one-way CSA arrangement will create a funding requirement for a bank, as it will be required to transfer cash if it is MTM negative, while it will not receive any cash if it is MTM positive.

To incorporate the correct discipline with regard to the liquidity effects generated by uncollateralized derivatives business, the funding policy needs to incorporate an appropriate liquidity premium charge. This will apply to the net MTM value of all uncollateralized derivatives on the balance sheet. By charging the proper rate, the business lines are incentivized to work towards reducing uncollateralized business wherever possible.

A bank will fund its balance sheet at its specific COF, which splits into four categories:

- **secured short-term funding costs**: the rate at which the bank borrows against collateral. This is generally the OIS curve, and thus the lowest funding rate available (OIS lies below Libor). It is not relevant in an uncollateralized derivative context, because such instruments cannot be used as collateral (even if they are positive MTM);

- **secured long-term funding costs**: the rate at which the bank can borrow by issuing term secured liabilities such as covered bonds and mortgage-backed securities;

- **short-term unsecured funding costs**: the bank’s COF for short-dated (0-12 month) tenors. At its lowest this will be around Libor, although many banks’ ST unsecured borrowing rate is at a spread above Libor;

- **long-term unsecured funding costs**: the bank’s COF for long-dated (2-10 year) tenors, also referred to as the term liquidity premium (TLP).

A general position of OIS, Libor and TLP curves is shown in Figure 1.

The above categories, of course, exist in the “wholesale” or investment bank space. In reality derivatives dealers are often part of “universal” banking groups that also include retail and corporate business lines. A large part of the balance sheet will be funded therefore by low-cost liabilities of contractual short-dated but behaviourally long-dated maturity. These also need to be factored into the pricing curve in a way that is appropriate. One approach...
might be to calculate the derivatives COF from a “weighted average cost of funds” (WACF) curve that is an average of all balance sheet liabilities. Either way, care needs to be taken that business lines in the wholesale bank, which includes the derivatives desk, are charged an appropriate price and not necessarily the retail or corporate COF rate, particularly since customer deposits have short contractual tenors but long behavioural tenors, and so do not inflict a term liquidity premium (TLP) on the bank.

**Derivative Liabilities and Assets**

Derivative liabilities correspond to what is termed an overall expected negative exposure (ENE), the most basic example of which is a deposit. A derivative asset corresponds to an overall expected positive exposure or EPE and at its simplest would be a loan.

An appreciation of the terms of a derivatives funding policy requires an understanding of credit valuation adjustment (CVA), debt value adjustment (DVA) and funding value adjustment (FVA).

Following existing literature (for example, see Picault (2005) and Gregory (2009)), under a set of simplifying assumptions we have:

$$CVA = EPE \times PD \times LGD$$

$$= EPE \times \text{Counterparty Credit Spread}$$

where EPE is expected positive earnings, and PD and LGD are standard credit analyst expressions for default probability and loss-given-default. More formally, we write:

$$CVA = \left(1 - R\right) \int_0^T q(t)v(t)dt$$

where $R$ is the recovery rate, $q$ is the probability density function of counterparty default and $v$ is the value of the derivative payoff. In discrete time we write:

$$CVA = \left(1 - R\right) \sum_{t=1}^n q_i v_i$$

where $q_i$ is the probability of default between times $t_i-1$ and $t_i$.

$$DVA = ENE \times \text{RBS Credit Spread}$$

and

$$\text{Funding Cost} = (EPE + ENE) \times \text{Derivative Funding Spread}.$$  

In other words, the discounting to be applied for valuation is at the appropriate tenor bank funding cost.

The funding cost to apply to the derivatives portfolio cash flows may sometimes be selected depending on which assumption we make about the ease of unwinding the portfolio:

- **Assume no easy unwind:** if we cannot unwind the portfolio without punitive costs, we must assume we will have to fund the transaction for the full term. The funding cost of this commitment is given by the bank’s LT COF. If we fund (value) at ST COF we run the risk that sudden spikes in the ST COF will create funding losses, or that a liquidity squeeze in general will impact our ability to rollover funding for the position. To avoid this risk, we would fund with LT borrowing, and discount unsecured derivatives off the LT COF (TLP) curve.

- **Assume easy unwind:** if we can unwind the position with no extraneous cost, we can apply the ST COF, say the 1-year TLP. The assumption of easy unwind means that we are not committed to rolling over funding; in the event of liquidity stress we would simply unwind the portfolio and eliminate the funding commitment. This is a strong assumption to make, particularly at a time of stress, and would be a high-risk policy.

Therefore, in theory we recommend that the derivative asset be discounted at TLP and the funding for collateral postings be substantially term funded. That said, in some cases the funding generated from a derivative book (assuming no counterparty default) is contractually for a long maturity, and so the case may be made that this should be charged for / receive the secured funding rate as opposed to the unsecured COF rate. In such a case, the derivatives funding curve would sit below the bank’s COF curve, and closer to the secured funding curve. This is shown in Figure 1.

In general, when applying derivatives funding policy we assume no netting arrangements are in place. In practice, however, these are quite common and will have an impact on the bank’s collateral funding position in the event of default.

![Figure 1 — Derivatives Funding Curve as Secured Funding COF](image)
Derivative Portfolio Maturity

To apply the correct funding cost to derivative book cash flows, the contractual maturity of the derivative in question can be used as the tenor. Alternatively, one could split the portfolio into tenor buckets commensurate with the tenors at which we wish to fund the cash flows, with each bucket funded at the appropriate tenor COF.

Placing the derivative portfolio cash flows into appropriate term tenor buckets is a logical position on which to base how we choose to fund these cash flows. In practice, the derivative valuation model itself can be used to produce this tenor bucket breakdown, in the form of a “funding risk per basis point” (FR01) delta ladder. Using this model output removes the need for a subjective analysis of the maturity profile of the portfolio. In other words, the maturity profile of the portfolio is given by the model output. The appropriate tenor TLP is charged on the amount in each bucket.

This is shown on the grid in Figure 2.

In practice, the profile is unlikely to look like the one in Figure 2 (although it may). It is more likely, however, to be all one way – either net long or short across most if not all tenor buckets.

In summary, cash flows arising out of the derivatives business, both contractual and collateral, must be funded at the appropriate TLP COF for their tenor. This means term funding a large part of the portfolio cash flows.

Funding Valuation Adjustment

Funding value adjustment is as important in derivative pricing as CVA, if not more so, and is a vital part of an effective derivatives funding policy. When incorporating CVA, FVA and, where desired, the cost of associated regulatory capital (“CRC”) into a transaction, we take a portfolio view with each individual counterparty. FVA represents the value adjustment made for the funding and liquidity cost of undertaking a derivative transaction.

To illustrate, consider a portfolio of just one plain vanilla interest-rate swap (IRS) transaction. Assume it is fully collateralized with no threshold and daily cash collateral postings. This means that on a daily basis collateral is posted or received (MTM value). The bank exhibiting negative MTM borrows funds to post collateral at its unsecured COF, while collateral posted earns interest at the OIS rate (Fed Funds, SONIA or EONIA). This is an asymmetric arrangement that impacts the pre-crash norm of Libor-based discounting of the IRS, which was acceptable when the bank was funding at Libor or at the interbank swap curve. But post-crash the higher bank COF means that funding adds to the cost of transacting the swap. The magnitude of this cost is a function of [OIS% – COF%] for the bank.

If we consider now a book of derivative transactions, the funding cost for the counterparty banks (“Banks A and B”) is a function of the size of the net MTM for the entire portfolio. Therefore, exactly as with CVA, to calculate the impact of the asymmetric funding cost we need to consider the complete portfolio value with each counterparty, as well as the terms of the specific CSA. This means in practice that when pricing the single swap, unless Banks A and B have the same funding costs — unlikely unless one is being very approximate — we see that the banks will not agree on a price for the instrument, irrespective of their counterparty risk and CVA.

That means a bank can choose to use FVA for a profitability-type analysis only, not impacting swap MTM, or it can choose to cover this cost, in which case it will impact swap valuation. The decision may depend on the counterparty and the product or trade type, or it can be a universal decision. However, not passing it on or adjusting the price for FVA means the derivatives business line is not covering its costs correctly.

The position is not markedly different with uncollateralized derivatives, generally derivatives transactions in which one counterparty is a “customer”, e.g., a corporate that is using the swap to hedge interest-rate risk. The bank providing the swap will hedge this exposure with another bank, and this second swap will be traded under a CSA. This is shown in Figure 3.

The first swap has no collateral posting flows, but the second
one does. This is in itself an asymmetric CSA position; moreover, the second swap cost will include an FVA element. The bank may wish to pass on this FVA hedge cost into the customer pricing, which means making the FVA adjustment to the swap price.

In both of the above illustrations, at any time the transaction (or hedge transaction) or portfolio MTM is negative, the bank will be borrowing cash to post as collateral. This borrowing is at the bank’s cost of funds (COF), which we denote Libor + s where s is the funding spread. (Ignore specific tenor at this point). If we look at FVA intuitively, it is an actual cost borne by the derivatives desk (and therefore, the bank) as part of maintaining the derivatives portfolio – no different in cost terms than funding the cash asset side of the balance sheet. So at the very least, a bank needs to incorporate FVA into its derivatives business returns and profitability analysis. Ideally, the governance of FVA will be incorporated alongside all collateral management functions, including CVA, and overseen by the bank’s Treasury/ALM function.

Conclusions
Notwithstanding the strategic objective of a balanced portfolio policy, the net impact of uncollateralized derivatives transactions or any asymmetric derivatives and hedging arrangement is to generate an ongoing unsecured funding requirement. We should expect this funding requirement to be in place as long as a bank is a going concern; in other words as ordinary business. Therefore, it should be funded in LT tenors, with only a minority proportion funded in ST tenors.

The cost of funding a derivatives portfolio, whether as a market maker or simply for hedging purposes, is an important part of the overall profitability of a bank and needs to be treated exactly as would the funding cost of a cash asset. FVA is one approach to measure funding cost. It can be passed on in customer pricing or the bank can choose to absorb it, but the business line still needs to be charged for it (exactly as with cash asset funding).

It is important for FVA to reflect current reality, since the magnitude of FVA is a direct function of a bank’s COF, which fluctuates. By definition, banks with the highest COF (highest s and lowest perceived credit quality) will suffer a competitive disadvantage in this space.

References

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