FVA Demystified

CVA, DVA, FVA and their interaction (Part I)

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There is currently a rather heated discussion about the role of Funding Value Adjustment (FVA) when pricing OTC derivative contracts. On one hand, theorists claim that value should not be accounted for as it leads to arbitrage opportunities. On the other hand, practitioners say they need to account for it, as otherwise their cost base is not reflected in the price of a contract. On the surface these claims seem to be contradictory, but upon closer examination in fact they are not. In this paper, we define FVA, explain its role, how it interacts with CVA, and how it should (and should not) be used in an organisation. We shall see, however surprising it may sound, that this debate can be seen as a semantic misunderstanding. The two sides of the argument are using the same word 'price' for two very different things: 'fair price' and 'value to me'. Noting this, the paradox disappears, and we may properly understand the role of CVA, DVA and FVA in an organisation.

In 2012, Hull and White published a paper in Risk Magazine [3] that shook the quantitative community in investment banks. Since 2008, banks have suffered a notable increase in their funding costs, and hence derivative dealers have been calculating this cost and subtracting it from valuations of derivatives. However, the theorists (i.e. Hull

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and White and those that share their view) refute this approach, since it can create arbitrage opportunities, and insist that funding should not be accounted for when pricing a derivative. Furthermore, the double-counting that could take place with DVA, the 'funding' side of CVA, is also mentioned. The practitioners have responded by asserting that they must account for the actual costs when valuing a trade, of which funding is an important component. In turn, the theorists have declared that DVA already accounts for funding. Such discussion has been active for a while now, yet has not reached any final consensus.

A primer on CVA

Those readers who are familiar with the concept of Credit Value Adjustment (CVA) may want to skip this section. However, reading is recommended as in this section we will establish clearly all fundamental concepts and names.

It is best to explain the idea behind CVA with a simple example. Let us say that we are a corporate client, and we want to enter into an OTC derivative to hedge some of our risks. We have two potential dealer banks to do this with, one that is AAA rated and one that is BBB rated. The derivatives that the two dealers offer us are identical; the only difference between them is the dealer itself (i.e. our counterparty). If we leave aside subjective matters like business relationships, personal preferences etc., and if both dealers offer us the same price, we are obviously going to prefer the transaction with the AAA counterparty, as the deal has less default risk. With this in mind, if the BBB dealer wants to be competitive and have a chance of winning the deal, they need to decrease the price. If they keep on reducing it, there will be a point at which we may consider doing the deal with the BBB bank instead. The difference between the price given by the AAA bank and that given by the BBB bank, which makes one view them as 'even', is CVA.

With this in mind, CVA is then defined as the difference between the price of a derivative with and without counterparty risk.

$$P = P_{\text{risk-free}} - CVA \tag{1}$$

The CVA number is driven by how much it costs to hedge out the default risk. In fact, CVA in the example above is the difference between these hedging costs for the AAA and BBB counterparty.

In other words, for the BBB bank to make his price competitive, he must decrease it as much as the cost for us to hedge out the credit risk.

As a result of this, we can see that CVA has two components: on one hand, the 'asset' side of CVA represents the credit risk we are facing, and its value reflects our cost of hedging out that risk; on the other hand, the 'liability' side of CVA represents the credit risk that our counterparty faces from us and, similarly, its value reflects their cost of hedging out that risk.

The terminology for these different sides of CVA has become somewhat convoluted. Indeed, CVA can refer either to the sum of both of these quantities, or to the asset side only; sometimes the asset side is called *unilateral* CVA (uCVA); sometimes the combined sum is called *bilateral* CVA (bCVA), which can be quite confusing. Also, the liability side is known as Debit Value Adjustment (DVA).

For the remainder of this paper, we shall consider CVA in a bilateral way by default (unless otherwise stated); that is, with two sides, asset and liability.

A CVA approximation A sound and widely used approximation for each side of CVA is the following decomposition into two terms: one that accounts for the future exposure each counterparty may give to the other (Expected Positive Exposure, EPE, and Expected Negative Exposure, ENE), and one for the credit quality of each counterparty.

$$\begin{aligned} CVA &= CVA_{asset} + CVA_{liab} \\ CVA_{asset} &\approx EPE \cdot s_{cpty} \\ CVA_{liab} &\approx ENE \cdot s_{own} \end{aligned} \tag{2}$$

where EPE represents how much, on average, we can be owed[1]; ENE how much, on average, we can owe[2]; and s_{cpty} and s_{own} are the counterparty and our own average credit spreads respectively.

An important feature of CVA is that it is symmetric: our asset side is our counterparty's liability side, and vice-versa. In this way, the two counterparties have the same CVA but with different sign, leading to a unique derivative price, a key feature of a no-arbitrage framework.

The liability side of CVA as its funding component

One idea underlying the confusion between CVA and FVA is that CVA's liability side can be seen as a funding price.

In a perfect and ideal world, with infinite information, infinite liquidity, instantaneous price updates reflecting all available information and so on, the CDS credit spread of each company will be the same as its funding spread. By funding spread we mean the

[1] If the counterparty defaults.
[2] If we default. This is a negative number.

spread over the risk-free rate[3] at which an organisation can borrow cash in an unsecured way.

This leads to another way of looking at the liability side of CVA: the cost of ensuring we do not default. In the ideal world that we have mentioned before, that cost is going to be the same as the cost to our counterparty to hedge the credit risk it is facing from us.

As a result of this, we see the liability side of CVA is related to the funding cost in the contract we are pricing. However, we must not forget that what it really does is account for the cost of hedging default risk for our counterparty[4].

The reader can find a deeper and more fundamental review on the interpretation of CVA in the paper *CVA Demystified* [7].

A Healthy Disclaimer

We would like to be able to say that we know everything about FVA, and that we understand it perfectly. However, we must admit that is not the case. FVA is a complex matter, that is still under discussion in the industry and academia. As a result, we need to be humble and accept that all we can going to do in this paper is to explain our view. This view is the result of lots of research, conversations, and thinking, but it is still in a maturing process. Because of this, we must be realistic and accept that we may change our mind about FVA in the future.

We think this is the most reasonable approach to this.

[3] We'll discuss later what this risk-free rate is. Let's say for now that it exists, and it is the rate at which a non-defaultable organisation can borrow unsecured cash.

[4] Sometimes it is said that this liability side should not be accounted for because it cannot be monetised. That is not true. Let's say we have are a solid derivatives dealer and a portfolio of derivatives with a company in an emerging market economy. Let's say that on a Friday, that portfolio is worth $100m in our favour, and the credit spread of the counterparty is 100 bps. Over the weekend, there is a political revolution in the country, which makes the default probability of our counterparty increase massively; its credit spreads jumps to 1,000 bps. On Monday we have an risk management meeting, and decide to try to close that portfolio. We go the counterparty and tell them our intentions. One day later they come back to us saying that they are happy to close the portfolio, but at a price of $80m (instead of $100m), even though the markets that drive the risk-free price of the portfolio have hardly moved since Monday. We think about it and agree to those terms, as we find it is better losing $20m now than the risk of losing it all in the future. In this example, the reader can see how the counterparty has actually monetized its own liability side of CVA. In fact, they could have gone down in price as much as the cost to us of getting credit protection at 1,000 bps. If the counterparty had not marked its liability side of CVA with the 1,000 bps on Monday, it would have made a profit 'out of the blue' when the portfolio liquidation takes place.

The Origin of the Funding Value Adjustment

Derivatives dealers now feel the need for a Funding Value Adjustment (FVA) to account for the additional funding costs they are facing since 2008. Funding risk arises wherever there is a cash flow in an institutions; if an outflow, this needs to be funded, if an inflow, it can either reduce funding needs or, even, be lent out. In the business of OTC derivatives, there are two distinguishable sources of funding risk.

1. **FVA from Collateral Asymmetry** One of the main sources of that funding cost is illustrated in Figure 1 for an uncollateralised netting set. To start with, the derivatives dealer agrees to an OTC derivative contract (or a group of them that form a netting set) with a counterparty. Then, it is going to hedge that contract so that any profit on one side (the derivative) is a loss on the other side (the hedges), and vice-versa. In this way, the derivatives dealer is market-risk neutral, and cashes in an extra spread, over the cost of hedges, that it puts to the derivative price. In other words, the dealer is synthetically recreating the (perhaps complex) derivative contract with vanilla products, typically in an exchange, and makes its fee from that synthetic manufacturing of the derivative.

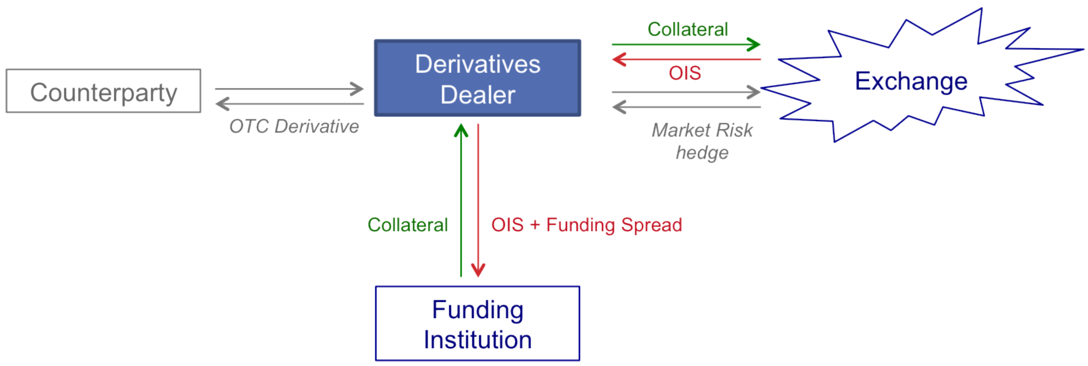

Figure 1: Illustration of the source of funding cost for an uncollateralized OTC derivative.

The key here is to realise that the hedging side of the operation is going to be fully collateralised while, in this example, the OTC derivative side is not. Any collateral that needs to be posted to the Exchange will need to be borrowed from a funding institution. When doing so, the dealer is going to receive the currently perceived risk-free 'OIS' rate for the collateral posted, but it needs to pay OIS plus its own funding spread for it. As a result, the dealer is going to lose its own funding spread on the collateral borrowed in this transaction.

Let's say now that we have a collateral CSA agreed with the counterparty. That situation is illustrated in Figure 2. The Exchange side of the collateral (Ex Collateral) is typically fully collateralised, with an initial margin. However, the CSA side may or may not be fully collateralised; it could have daily, weekly etc. margin calls, collateral thresholds, and so on. As a result of the lack of symmetry between both collateral arrangements, the dealer is also going to face a funding cost from its own collateral needs.

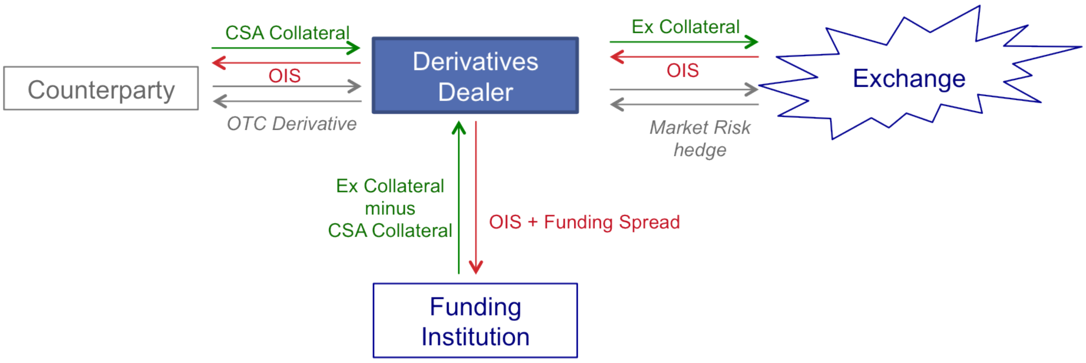

Figure 2: Illustration of the source of funding cost for an collateralized OTC derivative.

In other words, **a derivatives dealer is going to have a funding cost coming from the lack of perfect symmetry in collateral needs between the OTC derivatives and the hedging sides in its book of trades**. Because of this, dealers need to account for it, and put it as an adjustment to the value of a derivative.

2. **FVA from Derivative Cashflows** Regardless of any collateral arrangement, a second source of funding risk comes from the ideal assumptions in the standard Black-Scholes derivative pricing model. That model, assumes that a dealer can borrow and lend, in unlimited amount, at a risk free rate. However, all the cash-flows that take place in a derivative must be funding at a non-risk-free rate.

   For example, if we sell and option, we will have the option premium as a positive cashflow (in our favour) at the beginning of the deal. This cash flows will somehow decrease the funding needs the organisation has overall, or perhaps can even it out. Another example, if the market has an upward slopping yield curve, if we agree to a payer interest rate swap, the swap rate is going to be, roughly the average of the interest rate in the yield curve up to the swap maturity. As a result, at the beginning of the swap we are going to be net paying in each coupon period, but at the end we are going to be net receiving (provided the yield curve does not move much). All these outgoing and incoming cashflows are going to have an impact in our global cashflow needs, hence in our funding needs.

   This divergence from reality in the Black-Scholes model has been already studied theoretically [2, 6, 5, 1, 4]. A new modified Black-Scholes pricing framework is explained in those pieces of work. We do not want to enter into details of it now for clarity purposes, we will go in more detail into it in the second part of this paper, but the reader should just bear in mind, for now, that apart from any collateral arrangements, we also face funding needs from the derivative cashflows themselves.

Because of all this, financial institutions now feel the need to adjust the price of a deal with a FVA component

$$V = P_{\text{risk-free}} - CVA - FVA. \quad (3)$$

Why the controversy around FVA?

The problem is the following: we have seen that the liability side of CVA can be viewed as a funding component. So, why do we need to account for it again? If we do that further funding adjustment to the price, are we not doing some sort of double-counting? Because of this, the theorists oppose this adjustment to the price of a derivative, as they say that it is double-counting, it is particular to the dealer, and that as a result it is creating arbitrage opportunities in derivative pricing.

On the other hand, practitioners argue that they cannot price a deal without accounting for the costs they will be facing, and funding is a true and important cost right now, one that is not properly covered by the ideal assumptions of the Black-Scholes risk-neutral derivative pricing framework. Hence, FVA is needed.

A construction company

Let's draw a parallel example that will help us understand. Let's imagine that we are a small construction company. We are assessing the value of a construction project. Given that we are small, we do not have the purchase power of other large companies, and so the cost to us for each brick that buy we is \$0.10, while for a large company it is \$0.08. Question: when we value a project, which of those prices should we use? I think the answer is trivial: *our* cost of bricks. I think everyone would agree on this.

One of the core functions of a financial institution is to provide funding. That provision has a (funding) cost, which is intrinsic to each institution. So why should a bank be different to a construction company, in the sense that, to value its business, why should it not use its own intrinsic sources of cost?

Expanding a bit more on this, let's say that we (the construction company) have bought a piece of land on which to build a block of flats. We have two options: building basic or luxury apartments. In order to decide which way to go, we do the following comparative analysis:

	Basic Apartments	Luxury Apartments
Market price	\$1.0m	\$1.5m
Cost of building	\$0.6m	\$1.2m
Value to me	\$0.4m	\$0.3m

As shown in this table, the sale price of the apartments is \$1.0m if basic and \$1.5m if luxury. However, the cost of building those apartments is \$0.6m for basic or \$1.2m for luxury. As a result, the project is worth \$0.4m to me if we construct basic apartments, or \$0.3m if we build luxury ones. Which of those two possibilities is therefore the most economically sound? Obviously, the one that yields the highest value: the basic apartments.

The root of the problem

Now we can get to the root of the problem: the difference between *Market Price* and *Value to Me*.

Prices are driven by supply and demand forces If we live for a moment in a world in which there are lots of transactions and high liquidity, we have to understand that *the price of a deal is given by the market's supply and demand.* That price is set externally to each institution. This is key.

Last month I went to New York from London on a business trip. I found that if I went from Monday to Thursday to cover only my business needs, the return flight price was GBP 1,400, but if I went Friday to Thursday, so I could visit some friends over the weekend, the return flight was GBP 600! Why are the airlines putting the price of a trip during business days much higher than that of a personal trip with a weekend in the middle? Quite simply, because they can.

If the market price of airline tickets, flats, cars, computers, etc, are driven by supply and demand, why should OTC derivatives be different?

Prices are also driven by special circumstances However, when we hit the reality of OTC derivative trading, things are not that simple. That market that we have described above, with lots of transactions and high liquidity, is quite idealistic. In reality buying and selling is also influenced by many other factors. The more concentrated a market is in only a few sellers or buyers, the more power those players will have to influence the price.

Having said that, this will always be done under the laws of supply and demand. A market may become 'distorted' because of its strategic value to a player; for example, it temporarily pushes the price down to a loss level to push competition out. However, if that happens, prices are being moved by some 'special' circumstances, but the fundamentals of supply and demand still prevail; if fact, it is because of them that it can push the price down.

The problem here is that, up to 2008, all banks were more or less perceived as very similar, but since the crisis, they are not seen as default-free any more, and each of them has a different funding and credit profile. As a result, the concept of 'fair' price or 'exit' price is being profoundly challenged, because the price that different institutions are willing to pay for the same product can range quite widely, as a result of their different circumstances.

The key point to realise here is that, in real life, derivatives do not have a 'unique' price, the same way any other product in the economy does not cost always the same. Price are driven by a supply and demand, but special circumstance also play a role. When we calculate 'fair' price, we try to estimate an 'exit' price, but that is all we can do, an estimation.

The difference between Price and Value

Let's crack onto the core of the problem now.

At trade inception, and during the life of a trade, each derivative dealer is going to calculate two numbers: 'Price' and 'Value to Me', where

$$\boxed{\text{Value to Me} = \text{Price - Cost of Manufacturing}}$$

Let's explore each of them:

1. **Price**

   This is the market's price. This number reflects the cost of hedging the derivative in the 'risk-free' world that we see. It is given by two components: (i) the cost of hedging without defaults plus ($P_{\text{risk-free}}$) (ii) the cost of hedging defaults (CVA):

   $$P = P_{\text{risk-free}} - CVA \tag{4}$$

2. **Value to Me**

   As seen previously, in order to calculate how much we expect to make out of a project (an OTC derivative for a dealer), we need to calculate how much the deal is worth to us, and for that we need to account for the deal's hedging (manufacturing) cost that we create. In a bank, a major source of cost is funding. Hence, in this context,

   $$V = P - FVA \tag{5}$$

If $V > 0$, we'll make money, but if $V < 0$, it is uneconomical for us to enter the deal.

We hope it is now clear that an FVA adjustment to calculate the value of a trade is most important, indeed. Without it, the dealing desks will not account for the institution's 'manufacturing' costs and, hence, will not make correct business decisions.

However, when marking the price of a deal to the market, typically for balance sheet accounting, FVA must not be used, as the 'exit' price of a deal is unconnected to the manufacturing cost each institutions faces, in the same way as the market price of a block of flats is given by the market, not by how each individual construction company manages its manufacturing cost side.

In other words, the price of a trade P is the one that must be used for balance sheet calculations, but it is the value of the trade V that must be used to decide whether we get into a deal or not, and hence also to create the internal incentives in the organisation.

In fact, Hull & White already say in their Risk paper that "assuming the objective is to maximise shareholder value rather than employ some accounting measure of performance, FVA should be ignored" [3]. This doesn't contradict any of the above.

The dependency between Price and Value

A source of confusion comes from the fact that Price and Value are related, although not the same.

Using the 'block of apartments' example as an illustration, if the construction cost of luxury apartments is higher than those of basic ones, its market price should be higher in general, but that does not mean that is *always* going to be higher. That price is driven by supply and demand, and hence also driven by many other factors, like saturation of the market, new buyers and sellers entering the market, change in the needs of market players, regulations, etc.

Similarly, the funding cost is going to be an important component in the final price of a deal, but we must not forget that this price is set by supply and demand in the market.

Sometimes we hear professionals in derivative dealers asking the question "should we or should we not pass the FVA as a cost to the customer?". That question has no answer because it is the wrong question to ask. The right questions to ask from a derivative dealer viewpoint are (i) what is the maximum price I can charge for this deal, without making the customer run away? and (ii) will I make money at that price? To answer (i) salespeople need to know their customers and the competitive environment they operate in. To answer (ii) they need to calculate the *Value to Me* of the deal, with FVA in it, as the *Price* does not provide much help for that question.

Similarly, if we are a client of a derivatives dealer, a question that is often heard and yet is wrong is "why do I have to pay for the funding cost of these guys?". The right questions are (i) what is the minimum price I can get in the market? and (ii) am I willing to pay that price to hedge my risks? The sources of the costs that the dealer puts on the table are irrelevant to us. We only care about the price (that includes the credit quality of the dealer and our own's) and possibly other intangible matters like business relationships, accessibility to other dealers, etc.

The construction and airline examples clearly show how the price of things is driven by supply and demand, with the addition of 'special circumstances' as explained. As said, there is no reason why OTC derivatives should be different.

The interaction between CVA, DVA and FVA: rehypothication, netting and hedging

There are a few examples that help to illustrate further the interaction between CVA and FVA.

The Role of Rehypothication When collateral is received we can do two things with it: we can reuse it for our benefit, or we can put it aside in a segregated account. In the latter case, the counterparty is then assured that should we default, collateral will still be there for them. As many will know, the act of reusing collateral is also called *rehypotication*.

From a CVA point of view, rehypotication makes little difference, but from a collateral FVA viewpoint, it can have a major impact.

Let's say that we are a dealer. We have a collateralised portfolio, where rehypothication is permitted. As we have seen, any collateral that we receive can be passed onto the exchange where the hedges lie, and so our funding requirements are minimal. However, if rehypothication is not permitted, the counterparty risk will remain unchanged when we receive collateral, but our funding requirements will increase substantially, as we now need to borrow the collateral that we need to post to the exchange.

Because of this, a fully collateralised trading facility where rehypothication is not permitted has minimal CVA, but it has maximum collateral FVA. That is, forbidding rehypothication in a CSA has limited impact in CVA, but the netting set becomes 'uncollateralised-like' from a FVA viewpoint.

The Role of Netting CVA is calculated at netting set level, because if a counterparty defaults, trade prices can be summed up at that level for the portfolio liquidation. Because of this, trades in different netting sets cannot be netted off to compute CVA, and the CVA of a portfolio is the sum of the CVA of its netting sets.

However, the funding requirements that an institution faces crystallise at portfolio level[5]. Let's say that we have two derivative contracts, identical except that we are long in one and short in the other. Each of them constitutes a netting set by itself, and both netting sets are uncollateralised. In this case, CVA will be maximal, because each trade is a netting set, but FVA will be zero, because any cashflow in one trade can be passed onto the other one. If we only had one of those trades in the portfolio, FVA will be high, as we'd need to fund all collateral needs with the hedging institution, but in this case of two opposite trades, they hedge each other, so we do not have any collateral funding needs.

In other words, FVA must be calculated at portfolio level, while CVA at netting set level.

Naked Positions Let's say that we have a portfolio of trades. Regarding hedging, we have two options: we can either delta-hedge the portfolio P&L with vanilla positions in an exchange, or we may decide not to do so. That decision is going to drive the collateral funding requirements and hence FVA for that portfolio. However, CVA remains the same whichever decision we make about hedging, because it reflects the default risk of our counterparty and ourselves, which is independent of our hedging strategy.

The following table summarises the outcome of the different options we have regarding the existence of CSAs in the portfolio (i.e., if it is collateralised or not) versus the hedging options, with the implications to CVA and FVA.

Portfolio CSA	Market Risk Hedging	CVA	Collateral FVA
yes	yes	min	min
yes	no	min	max
no	yes	max	max
no	no	max	min

Let's take the first two cases. If we have a fully collateralised CSA, CVA becomes minimal. If we hedge its market risk, then there is a lot of symmetry between the collateral requirements in the CSA versus the hedging positions, hence FVA is small. However, if we decide to leave the portfolio naked (good luck!), then there is a complete asymmetry between the collateral requirements and hence FVA is maximum.

Changing the hedging strategy does not change the future cashflows coming from the derivatives, hence the market price of the derivative remains the same. However, the *Value to Me* is going to be different in each case.

[5]By 'portfolio' we mean all the positions that the organisation takes.

There isn't any Funding Double-Counting

Another source of confusion with CVA and FVA is the (wrong) sense that, if we account for both to value a trade, we may be double-counting our default probability. That comes from the fact that the liability side of CVA can be understood as the funding part of CVA, as explained above.

This concern is understandable, but incorrect in our view.

To start with, let's have a look at Equation 6. These are two good approximations for CVA_{liab} and FVA in quite typical conditions (we are going to see this in detail the second part of this paper, soon available at www.iruizconsulting.com).

$$\begin{aligned} CVA_{liab} &\approx \sum_{nettingsets} ENE^{nettingset} \cdot s^{CDS}_{own} \\ FVA &\approx (EPE^{portfolio} + IM) \cdot s^{funding}_{own} \end{aligned} \quad (6)$$

where EPE and ENE are the time-integral expected discounted positive and negative exposure profiles; IM is the initial margin required by the exchange where the hedging positions are; and s^{CDS}_{own} and $s^{funding}_{own}$ are the CDS and funding spread of the organisation doing this calculation.

Those equations illustrate that CVA_{liab} and FVA are indeed two different things. First of all, CVA_{liab} and FVA are driven by two different spreads; they are related, but are not the same. However, even if they were the same, FVA has an initial margin component, that does not exist on the CVA side. Going even further, if for some reason the exchange were happy to operate without any initial margin, CVA_{liab} is proportional to the sum of ENE in each netting set, while FVA is proportional to the portfolio's EPE.

In other words, they are two very different things.

Another more conceptual way of looking at this is to use the illustration of Figure 3. CVA is related to a netting set of OTC derivative, and only to this, independently of the synthetic manufacturing (hedging) strategy we may take and the collateral agreement we have with the exchange, as well as independently of any cashflow netting it may have with the derivatives in other netting sets, or with collateral needs. However, the organisation funding requirements are driven by all those global net cashflows needs.

Indeed, if we say for a moment that $s^{CDS}_{own} = s^{funding}_{own}$, and that $IM = 0$, then the liability side of CVA represents the cost of the money we need to borrow today to make sure that we will be able to meet my cash liabilities *with the counterparty* during the life of the trade. However, FVA goes beyond that, and it represents the cost of the money we need to borrow globally, which is driven by many factors, including the the asymmetry

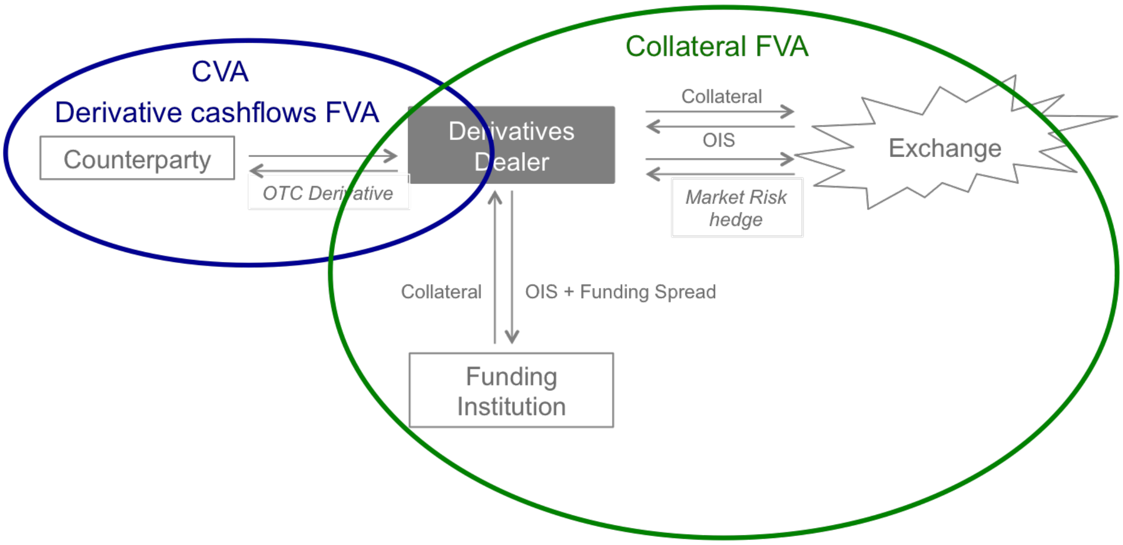

Figure 3: Illustration of the area that relates to CVA and to FVA.

between the collateral agreements with the counterparty and the exchange. These are two very different issues.

We trust these examples illustrate that the liability side of CVA and FVA are two different things, related in their calculation, and perhaps with some overlapping, but different in their core ideas. As such, accounting for them when valuing a trade or a portfolio of trades does not carry double-counting if done with care.

Conclusions: CVA, DVA, FVA and their interaction

The main point to learn from this text is that FVA is related, but different, to the *Price* and to the counterparty risk of a book of derivatives. However, it must be used when *Valuing* a trade.

FVA is driven by the asymmetry in the collateral needs we have, given a book of derivatives and the hedging strategy that we decide to take. In particular, it is driven to a high extent by the lack of symmetry in the collateral arrangements with the counterparties and with the institutions where the hedging positions lie.

However, CVA is related to the counterparty risk a book of derivatives has, regardless of how that book is hedged. Different hedging strategies for market risk in a derivatives dealer are going to yield different funding requirements, but these do not change the *exit* price of the deal, nor CVA.

Hence, introducing FVA into the price of a derivative is wrong. That would be the same as a construction company changing the market price of a building as a result of the strategy they take to build the same building. They could change that number in their internal documents if they want, but that is not going to change the cash they will actually get when they sell the property.

However, introducing FVA into the value of a deal to an organisation, into its internal incentive program and into its decision making process is utterly correct, as otherwise the organisation will make business decisions without this essential information. Business units need to see the effects of the marginal costs they create in the organisation by their trading activity. Not doing so would be like a construction company deciding on whether to enter into a project or not without considering how much it will actually cost them to execute the project.

FVA is there to calculate

- the *margin* at which a dealer is trading, but not the market price, or equivalently...
- the minimum price at which an organisation may want to enter into a deal.

A confusing case happens when a dealer has a very dominant position in a market. When that is the case, it can influence the market price and, obviously, it is going to make sure that the price it quotes is so that $V > 0$ for her, as long as the client accepts it. In this sense, some could say that FVA is used to calculate P, but that is not accurate. If the dealer charges a price X so that $V > 0$, is because the demand side accepts it. As a result, if for a magical reason FVA drops to zero, we can be assured that it will still be charging X, if it can, and basically make a larger margin on the deal.

As a result of all this, the price P must be used when setting the price of a deal in a balance sheet, but its value V must be used when deciding whether to enter into a deal or not, and to set internal incentives.

It is for these reasons that in the FVA debate all parties are right from their own perspective. It seems that the root of the discussion may not be a fundamental quantitative finance problem, but rather a semantic one: each side of the discussion is using the word 'price' for a different thing; theorists for 'fair value', while practitioners for 'value to me'.

In the second part of this paper, we will explore how to compute and manage FVA. We will see how, if we already have a proper CVA engine, it is not too difficult, subject to some reasonable assumptions.

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