



FIVE COMMON MISPERCEPTIONS ABOUT CREDIT VALUATION ADJUSTMENTS (CVAs) IN SWAP VALUATIONS

INTRODUCTION

Under [ASC 820](#) fair value accounting rules, corporations must consider counterparty risk when reporting the value of a swap contract as either an asset or a liability. In some cases, this requirement is a non-issue because of mandatory central clearing, as required by the Dodd-Frank Act, which essentially eliminates most counterparty default risk by imposing certain risk-mitigation conditions such as margin/collateral requirements.

However, non-financial institutions that use swaps to hedge commercial risks are exempt from the central clearing mandate. Therefore, swaps entered by those entities are still subject to counterparty default risk for valuation purposes.

In such cases, corporations cannot simply report, for example, the value shown on a quarterly statement issued by a bank counterparty. Often, a counterparty bank's mark-to-market statement includes a clause indicating that the mark provided does not factor in profits, credit reserves, hedging, funding, liquidity, or any other cost or adjustment. Rather, a mark-to-market value of a swap is simply the net present value of all future cash flows calculated from the current swap curve.

That mark, therefore, must be adjusted to incorporate an estimate of the counterparty default risk. That adjustment is accomplished by calculating a Credit Value Adjustments (CVA) for a given swap position. CVAs are mathematically complex and sometimes unintuitive in the gains or losses that stem from them.

This article provides corporate accounting professionals with an overview of CVAs followed by five common misperceptions about them.

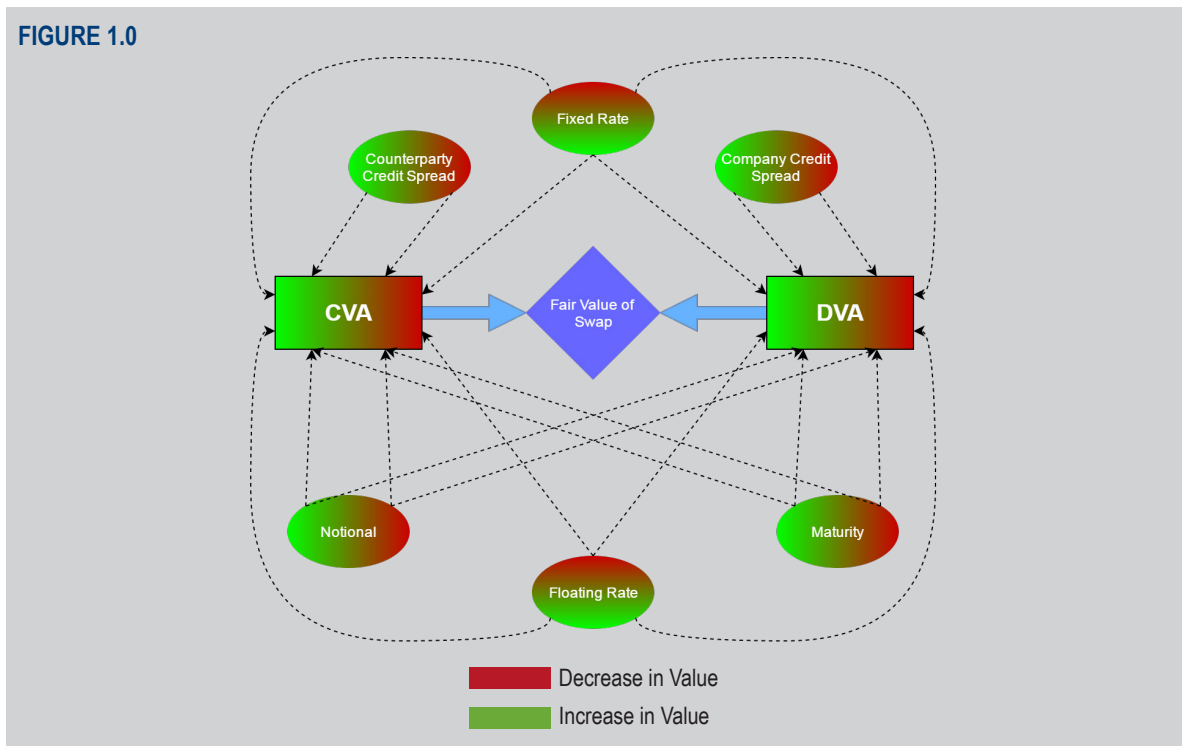
BRIEF OVERVIEW: WHAT IS A CVA?

Counterparty default risk may be gauged based on credit default swap (CDS) prices for companies deemed comparable. But when it comes to valuing swap contracts—and actually factoring in the counterparty default risk represented by CDS prices—the complexity of the matter becomes quickly apparent.

Consider, for example, fixed-to-float interest rate swaps. Corporations often enter these bilateral contracts to manage their floating vs. fixed interest rate exposures. Interest rate swaps are an excellent bilateral example for a typical Credit Valuation Adjustment (CVA) analysis; their multi-period cash flows driven by interest rate movements create challenging valuation approaches:

- There are two primary classifications for the valuation method: Current Exposure (CE) and Expected Future Exposure (EFE) Method. The EFE method is considered the most advanced valuation methodology as it incorporates not only the current risk profile but also the dynamics of possible flip between asset/liability positions.
- Specifically, the CVA is summation of the absolute value of the exposure driven by the interest rate model and probability of default inputs (which are applied at each periodic future cash flow associated with the contract).

FIGURE 1.0



CVA, conventionally, represents the credit valuation adjustment for the counterparty, from the company's perspective. Debt Valuation Adjustment (DVA) represents the credit valuation adjustment for the company – equivalently – the CVA of the company. Due to the bilateral nature of swaps, both CVA and DVA must be considered in the fair value of a swap.

There are several key drivers to the magnitude of a CVA. The above diagram (Figure 1.0) summarizes how each element impacts the magnitude of a CVA on a directional basis, all else being equal.

- In the preceding diagram, each entry is divided into green and red portions. Green signifies “higher” and red signifies “lower.” Arrows extend from or arrive into either the green or the red portion of each entry.
- For example, consider the Counterparty Credit Spread entry in the upper-left portion of the diagram. Here, as elsewhere, the color green means “higher.” So, we see that when the Counterparty Credit Spread is higher (green), the impact on the CVA is also relatively higher, as indicated by the arrow pointing to the green portion of the CVA entry.
- Contrarily, a lower Counterparty Credit Spread (represented in red) implies a relatively lower CVA value, as represented by the arrow.

- Note that the two credit spread entries—Counterparty and Company—each impact one or the other of the CVA or DVA.
- The other entries in the diagram impact both the CVA and the DVA. Here's where the diagram is especially helpful, because it helps to illustrate the often contrary impacts of a factor on CVA vs. DVA. For example, a relatively lower (red) Fixed Rate value implies a relatively higher CVA (arrow points to green) and relatively lower DVA (arrow points to red).

Another key driver of the magnitude of a CVA, in addition to those noted in the preceding diagram, is whether the swap is amortizing or non-amortizing. All else being equal, the CVA of an amortizing swap is less than that of a non-amortizing swap. The reason is that, as illustrated in the chart above, large notional amount results in a large CVA. Amortizing swap has a reduction in notional amount—which is used to calculate the exposure—at each payment period.

Having noted some of the key drivers affecting a CVA's magnitude, let's turn now to a few examples that help illustrate the potential scale of their impact on a swap's reported valuation. The table on the next page (Table 1.0) presents two hypothetical cases of swap holdings. For both Case 1 and Case 2, two scenarios are presented: Version A shows an application of the Current Exposure (CE) method, and Version B applies the Expected Future Exposure (EFE) method.

- Case 1 illustrates a swap held as an asset on a corporation's books. In this case, mark-to-market valuation of \$1.37 million is adjusted to a fair value of \$1.17 million (CE method) or \$1.30 million (EFE method).
- Case 2 illustrates a swap held as a liability, with a mark-to-market valuation of -\$1.03 million. Here, the CE method yields a fair value of -\$1.04 million, whereas the EFE method yields -\$1.06 million.
- While these are hypothetical examples, they convey some key points: (1) that the CVA amounts are often non-trivial relative to the mark-to-market values, and (2) the calculation method chosen can meaningfully impact the fair value—it is, therefore, important to appropriately select a method.

TABLE 1.0

	Fair Value	CVA	Mark-to-Market Value	Notional Amount	Fixed Rate	Maturity	Method
Case 1 - A	\$1.17M	\$20,000	\$1.37M	\$50M	1.00%	5 Years	CE
Case 1 - B	\$1.30M	\$70,000	\$1.37M	\$50M	1.00%	5 Years	EFE
Case 2 - A	(\$1.04M)	\$10,000	(\$1.03M)	\$50M	1.50%	5 Years	CE
Case 2 - B	(\$1.06M)	\$27,000	(\$1.03M)	\$50M	1.50%	5 Years	EFE

**The values are presented from the company's perspective, not the counterparty's.*

Now, having briefly introduced the role of CVAs in interest rate swap valuations, we'll now turn to five common misconceptions about CVAs as a way to further highlight key concepts for corporate accounting professionals.

Misconception 1: Counterparty default risk is eliminated due to the Dodd-Frank central clearing mandate

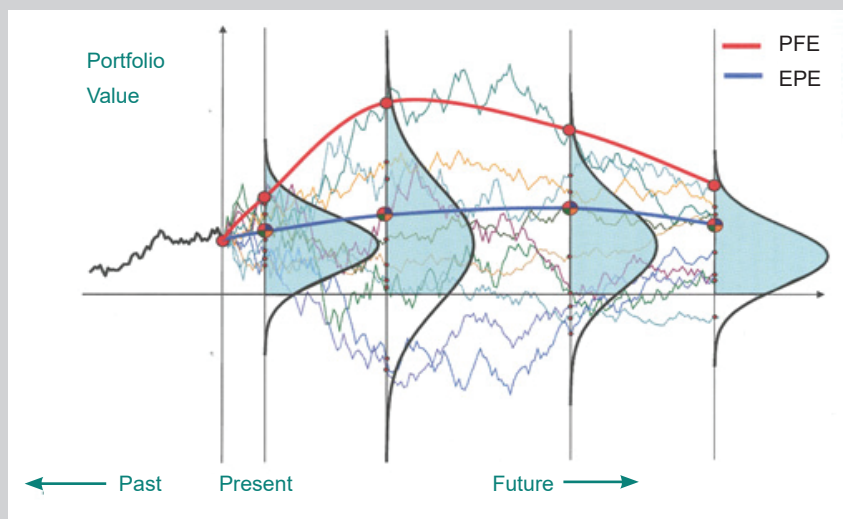
The mandatory central clearing includes an "end-user exception" rule which allows certain institutions to continue execute uncleared swaps with their counterparties. These institutions are mostly non-financial entities that utilize the swaps primarily to hedge their commercial risks.

Therefore, not all swaps are subject to the central clearing mandate as the result of Dodd-Frank Act. As such, the swaps entered by those entities are still subject to counterparty default risk for reported valuations.

Misconception 2: CVA calculation is entirely separate from contract exposure calculation

Since CVAs are summations of the absolute value of the exposure driven by the interest rate model and the probability of default models, calculating CVAs does involve the modeling of potential exposure profile for a swap. Figure 2.0 illustrates a typical exposure profile for an interest rate swap. In the diagram, the x-axis is the timeline that represents the payment periods for the swap; the y-axis represents the amount of exposure—in terms of the relevant currency—at each payment date.

FIGURE 2.0



Misconception 3: If a swap is currently an asset to the company, then only the other party's default risk shall be considered

Due to the bilateral nature of a swap contract, both parties' default risks must be modeled. The position of a swap contract is, among other things, a function of the swap curve primarily. Therefore, the position of a swap can flip between asset/liability depending on the evolution of the interest rate market.

For instance, consider this hypothetical example:

- Company A entered into a swap contract with Bank B. As of today, the swap is an asset to the Company—that is, the Company, on average, receives more floating payments *from* the Bank than the present value of total payments made *to* the Bank.
- Three months later, the forward rates dropped. At this time, the present value of total payments received from the bank is less than the present value of total payments made to the bank, resulting in a net liability position to the Company.
- Therefore, even if a swap currently is an asset to the Company, it's critical to consider the Company's own default risk because there is a chance that the position of the swap may flip in the future.

There are some counterintuitive results flowing from these concepts. For example, if a corporation holds a swap as a liability and the corporation's own credit quality decreases, the corporation may see a gain.

Misconception 4: Default probability impacts on swap valuations are almost always minimal

Sometimes the counterparty goes bankrupt. We have all seen this during the financial crisis. The theory of "too big to fail" did not stand the scrutiny of the reality that big financial institutions became insolvent.

Misconception 5: CVA calculation is a static discounted cash flow (DCF) type of analysis

The methodologies available to calculating CVA can vary with different level of complexities. While CVA calculations *can* be performed in a simple *static* DCF framework, there are important drawbacks involved in doing so. Before diving into the nitty-gritties, it's important to reemphasize that DCF analysis is, in essence, inherited in most of the analysis irrespective of the method being used. Equating the future value to the present value via a discount factor is at the heart of financial theories. Even within a Monte Carlo

simulation framework, the future payout pursuant to one realization is still being discounted to the present date by a discount factor.

Static DCF analysis involves one or a few cash flow projections. In the context of a CVA calculation, static DCF analysis is generally performed on a single set of cash flows calculated based off of the current market data—i.e., forward curve, swap rates, etc. Although this method is simple and easy to execute, one issue with it is that a single cash flow may not capture the true economics of the subject swap. The position of a swap and the *exposure* at each payment date changes as market conditions change. Consequently, these dynamics will have an impact on the CVA. As such, the valuation of CVA should reflect the dynamics of the changing market conditions—that is, the evolution of forward curves—and therefore capture valuation impact associate with those changes.

Figure 2.0 illustrates the different future exposure patterns as influenced by market condition dynamics.

CONCLUSION

As described briefly above, there are two principle approaches for calculating CVAs, the Current Exposure (CE) and Expected Future Exposure (EFE) methods. (An advantage of the EFE method is its capacity to address both the current risk profile and the dynamics of a possible flip between asset/liability positions.) In either case, the exposure profile of a swap must be modeled and then incorporated in the CVA calculation.

While the purpose of this article is not to dive too far into the math involved, we would like to conclude by presenting one way to express the equation actually used to calculate the CVA. In the following equation, E is the exposure value at time t . Other terms include R (the recovery rate), and PD (a model applied to calculate the probability of default). Recall that the CVA itself, on a high level, is the summation of the absolute value of the exposure driven by the interest rate model and probability of default inputs (which are applied at each periodic future cash flow associated with the contract).

$$CVA = \int_0^{\infty} (1 - R) PD(t, t + \delta t) \frac{B_0}{B_t} E(t) dt$$

Probability of Default Model

Interest Rate Model; Principal Component Analysis

Spot Rate Model; HJM Model; LIBOR Market Model, etc

For more information on the details of our modeling approach and how VRC can help you with the fair value reporting for swaps, contact VRC's Complex Instrument Group:

Tony Law, ASA | Managing Director
ALaw@ValuationResearch.com
414-221-6217

ABOUT VRC

Valuation Research Corporation (VRC) is a full-service, independent, global valuation firm, and the largest pure valuation firm in the U.S., offering judgment beyond modeling. Since 1975, our network of nearly 1,500 valuation professionals has provided objective, supportable conclusions of value to domestic and international clients ranging from Fortune 500 companies to privately held organizations of all sizes, across all industries. VRC also works closely with private equity firms, attorneys, not-for-profit institutions, fiduciaries and individuals. Connect with VRC at ValuationResearch.com or on [LinkedIn](#).

ABOUT THE COMPLEX INSTRUMENTS GROUP

The Complex Instruments Group specializes in the valuation of illiquid financial securities and derivatives. The valuations are provided to asset managers, private equity and hedge funds,

pension plans and corporations typically for financial reporting and tax requirements, transaction support and capital investor support.

Our team is comprised of individuals with strong backgrounds in quantitative finance, mathematics, as well as algorithm programming.