

# **Prudent Adjustments<sup>1</sup>**

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## **Abstract**

The ongoing controversy about whether or not the FVA and KVA should be an adjustment to fair valuation originates from the attempt to shoehorn metrics quantifying market incompleteness into the traditional valuation paradigm based on complete markets. After reviewing the concept of fair valuation, we introduce the concept of prudent valuation in incomplete markets and discuss what went lost in translation in the FVA/KVA debate.

## **Fair valuations**

Complete markets are the subject of fairy tales whereby all conceivable trades can be executed; all payoffs can be perfectly replicated and there is no need for risk capital; REPO markets exist for all contingent claims and there are no funding costs for carrying derivatives.

In complete markets, the fair value of a trade equals its cost of replication. Trades can be priced in isolation at levels that do not depend on portfolio holdings. All economic agents are equivalent: there is no intrinsic difference between a broker-dealer, a corporate client, a lender or a bank shareholder. All market participants value assets identically. The value of a trade can readily be assessed as its exit price, i.e. the amount one can sell it for to any other market participant. Prices are also entirely insensitive to regulatory requirements regarding capital and collateralization.

When markets are complete, Modigliani and Miller [5] argue that all trades clear at levels that both parties consider as fair, i.e. without wealth transfers (i.e. day-one gains). According to this argument, if an investment decision were to increase the wealth of the bank as a whole but reduce the wealth of shareholders, managers should still opt to take it as shareholders would in this case retire the entire

<sup>1</sup> The analysis and conclusions set forth are solely of the authors and do not necessarily represent the views of Federal Reserve Bank of New York or Federal Reserve System.

debt of the firm to compensate for the wealth transfer. According to this reasoning, banks should optimally have no leverage at all.

Mathematically, fair valuations are uniquely computed as the discounted expectation of future cash flows, simulated consistently with all market information.

### **Wealth transfers and prudent valuations**

Although real markets couldn't be more different than they are, the mathematical concept of fair valuation as discounted expectation is still useful as a global anchor, market-wide measure of value which could not possibly give rise to any arbitrage opportunity, even if a market-competing infrastructure came into existence. However, there is no reason to expect that, in general, trades actually clear at fair valuation levels, i.e. without a wealth transfer between the parties.

XVA metrics (e.g. FVA, KVA, etc.) quantify such wealth transfers, i.e. they measure the degree by which fair valuation needs modification. Trades by broker-dealers typically trigger wealth transfers among shareholders, creditors and counterparties. Managers reflect wealth transfers in "prudent valuations" as their mandate is to preserve risk capital which funding costs could deplete. Prudent valuations also need to enable a sustainable dividend distribution policy. The difference between prudent and fair valuations is given by XVA metrics. A concrete implementation of XVAs - out of potential variety - reflects a specific choice for completing incomplete markets.

Hull and White agree in [4] that the FVA is a wealth transfer from shareholders to creditors, as proposed in [1],[2] and [3]. However, they argue that the wealth transfer should at least in principle be captured in the fair valuation of bank debt and trades should clear at fair valuation levels. In [1],[2] and [3] instead, it is stressed that virtually all decisions taken by bank managers are predicated on prudent valuations and are sensitive to XVA metrics.

The argument by Hull and White is subtle and clever: if systematic wealth transfers are triggered by trading, then they should be reflected into the price of debt at the time of issuance.

The argument revolves around the expectation that there is a constant and statistically predictable trade flow. Under this assumption, wealth transfers from bond-holders to shareholders would optimally occur at the time of debt issuance. Creditors would grant a discount equivalent to all future incremental FVA due to future trades. Banks would then recognize this discount as a gain and provision it as FVA reserve capital at the time of debt issuance.

Since trade flow uncertainty is by itself a risk factor with a potentially adverse impact on capital, we believe it is prudent to model portfolios on a run-off basis, i.e. treat each new trade as if it was going to be the last one ever to be entered. If a new trade triggers a wealth transfer from shareholders to

creditors, then the bank must pass on to end clients the wealth transfer amount, which is the incremental FVA, in order not to deplete capital.

The run-off assumption is also relevant in the case of the KVA metric. In Solvency II, the KVA is called risk margin and is a form of loss-absorbing capital which is sourced from clients, retained at inception and distributed gradually as the KVA is marked-to-market gradually with time. Dividends are modelled as being proportional to Economic Capital requirements by a proportionality factor called hurdle rate. The KVA is then computed on a run-off basis conditional to the bank never defaulting.

In summary, the prudent valuation of a trade

- does not entail a DVA benefit
- contains FVA adjustments to offset funding costs
- contains a KVA adjustment that eventually flows into the dividend stream

Since funding strategies involve portfolio-wide re-hypothecation and risk capital is computed for the entire book, the FVA and KVA are only meaningful when computed for an entire portfolio, not for individual trades. Strictly speaking, one can only talk about the incremental prudent valuation of a trade when it is added to a portfolio. In particular, while fair valuations are market-wide numbers, prudent valuations are entity specific. Polling banks for transaction prices yields the market average of prudent valuations but has no bearing on fair valuations.

### **Lost in translation**

Each and every single decision a broker-dealer takes makes reference to prudent valuations, unadjusted fair valuations are insufficient. By introducing FVA and KVA, the industry seeks to embed cost of funding and cost of capital into the valuation process in order to align the interests of managers and shareholders.

The banking industry struggles to accomplish this objective within the traditional accounting framework which is designed around complete markets. The English language was the first casualty of these inconsistencies. Since the only lever available to banks is fair valuation, the FVA and KVA were interpreted as adjustments to fair valuation, a statement that flies in the face of finance theory.

We agree with Hull and White [4] that the metrics academics refer to as fair valuation of derivative portfolios should not entail FVA and KVA adjustments. However, we also believe that fair valuations (in the academic sense of the word) are too aggressive for reporting purposes and prudent valuations should be used.

Apart for stoking a debate on semantics, we see no particular counter-indication in embedding the FVA in a redefinition of fair valuation. Pathological situations occur only when the FVA is computed symmetrically, by discounting at a spread over OIS, since portfolios dominated by liabilities give rise to fictitious gains as the portfolio FVA is negative. But if the FVA is valued asymmetrically as in [1], there is no material counter-indication in embedding FVA into a redefinition of fair valuation.

However, if the same procedure was followed for the KVA we would arrive at undesirable consequences. For instance, a change of target hurdle rate by managers would automatically trigger a write-off. It would be more appropriate if banks monitored the level of retained earnings on a mark to market basis to determine an “implied” hurdle rate for which the KVA would equal retained earnings. On this basis, banks may report to investors both the implied and the target hurdle rate, immunizing earnings and capital ratios from having any dependency on the hurdle rate.

The introduction of the KVA has a cascading impact on market dynamics. Two price metrics co-exist: market-wide fair valuations and local, entity-specific prudential valuations. The latter embed XVA adjustments and aim at preserving capital while seeking to generate a sustainable ROE. As trades are executed, the economy achieves only a local optimum restricted to the bank and the counterparty involved in the trade. Achieving the global, market-wide optimum requires a cascade of optimizing trades whereby further gains are achieved by re-allocating risk across all other financial institutions. A sequence of “XVA compression” steps is then required to achieve a global optimum.

In the brave new world of incomplete markets, the financial system is totally interconnected. The occurrence of each trade creates, generally speaking, a disturbance with market-wide impact triggering a cascade of bilateral and multi-lateral optimization steps for capital and collateral strategies. All complex systems showcase similar features whereby local optima are achieved rather quickly while global relaxation to equilibrium is a slower and more gradual process.

In conclusion, prudent valuations and their embedded XVA metrics are the key local drivers that guide the decision making process of economic agents as they constantly strive to achieve optimality in a local, entity specific sense. As markets evolve towards a global optimum and market-competing infrastructures evolve too, in the limiting case of vanishing market inefficiencies valuations theoretically will converge to market-wide fair values. However, current markets are a long way from that theoretical limit.

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