FIGHTING OVER FINANCIAL MODELS

Taylor Spears examines some of Basel III's moving parts.

Bankers have long used mathematical models to assess the value of financial instruments. But models are also used by financial regulators to monitor the actions of financial institutions, or even to compel institutions to act in particular ways. This is why, in the world of international regulation, regulators and banks are fighting over the details of financial equations.

Consider a bank's RWA – or risk-weighted assets – an estimate that adjusts the value of a bank's holdings according to their risk. The models that produce these weightings are enormously important because they determine how much capital a bank is required to hold against its liabilities. Capital is a cushion that protects the institution from insolvency in the event that its assets unexpectedly lose value. Roughly speaking, it is the money left over after all liabilities are subtracted from an institution's assets.

Capital requirements can vary across countries, but most national regulators choose to follow the components of the Basel Accords, a set of international standards. Basel requires that banks maintain a certain ratio between their capital and their RWA number. Under Basel III, the minimum capital ratio is set at 10.5 per cent:

$$\frac{\text{Capital}}{RWA} \geq 10.5\%$$

In this formula, the measurement of a bank's RWA is extremely important. All else being equal, if RWA shrinks in the denominator the bank will be required to hold less capital to maintain its ration at 10.5 per cent. Likewise, a bigger RWA number forces the bank to allocate more capital, which can be costly and reduce its potential profitability.

Despite its mechanistic simplicity, this little equation packs in a tremendous amount of mathematical complexity. Drill a little deeper, and you'll find out that to get to RWA, the bank must find and summate several outputs produced by distinct models, each of which draws upon labyrinthine flows of data created in different parts of the bank. Consider for example the CVA (credit valuation adjustment) capital charge, one of the components that feeds into the greater RWA calculation.

CVA is a complicated character in and of its own right that attempts to capture the risks a bank faces when the creditworthiness of its trading partners changes. For instance, if a bank has entered into a series of long-term derivatives contracts with a corporation, and the market's perception of the creditworthiness of that corporation deteriorates, then the CVA charge determines how much additional capital the bank must set aside to protect itself from changes in the value of its assets that arise from this increased risk of insolvency.

Until Basel III, the CVA capital charge was not an element of the accord. The Committee justified its decision to include CVA because nearly two-thirds of all credit-related losses during the financial crisis were caused by changes in the credit risk of trading partners, and not by partners' failure to pay the owed amounts. *Asia Risk*, a popular trade publication among derivatives traders and quants, reports that many bankers believe the Committee's motivation was overtly political. They say it was designed to push "over-the-counter" derivatives trading onto centralised clearing houses so that counterparty risk would be reduced.

Ever since the CVA charge was proposed in 2009, banks have been sparring with regulators. They have been vigorously lobbying local authorities through the traditional channels to request special exemptions from the calculation. In July 2013, the European Banking Authority responded to these demands, permitting European banks to avoid CVA when they trade with pension funds, non-financial corporations, and government entities. US banks are in a different boat. At the time of writing, US regulators are still refusing to grant any exemptions to the standard Basel CVA charge, much to the chagrin of major derivatives dealers.

Exemptions are one obvious moment of political wrangling in the world of financial regulation. There are, however, more fundamental issues at stake than deciding where and when CVA should be applied. A lesser noticed but arguably more divisive dispute is that banks and regulators cannot agree on how to mathematically define the CVA capital charge when it is employed for regulatory purposes.

Regulators often prefer using standardised formulas, because without an explicit statement of how capital should be calculated, there is little guarantee that measurements will be consistent across institutions. But according to many bankers, CVA can never be reduced to a single formula. The banks argue that CVA can only be accurately calculated using the internal risk management systems they've developed, which are built to suit each institution's particular style of risk management. Bankers further oppose standardized formulas because they tend to produce higher capital numbers. More conservative calculations may serve the public interest, but for banks, heavier capital requirements weaken profitability.

Financial and political stakes meet smack in the details of how CVA gets calculated. Consider an asset that involves a series of payments between the bank and a corporation over several years. A CVA represents a reduction to the bank's recorded value of this asset to capture an increased possibility that the other side may go bankrupt and never make its previously agreed upon payments. In simple terms, if we are members of an entity that is owed, say, £2 million by the corporation at a future date, but we come to expect it will go bankrupt, then to do proper risk management we ought to reduce our valuation of that £2 million payment on our books to accommodate the chance we may never receive it.

The big question is by how much? By what amount should the valuation be adjusted? To decide, we'll need at least two pieces of information: the likelihood (probability) that the corporation will default on its payment, and our financial exposure if and when this happens. Ideally, we would model the probability that our trading partner will default, and in the case of more complex assets like derivatives we would also model how interest rates and market prices of assets underlying it might move up to the expiry date of the derivative in question. What is more, this exercise would ideally be done at the level of the portfolio, which means we would model all of our trades with a particular counterparty, simultaneously.

Banks spent millions building up incredibly sophisticated measurement systems in the late 1990s and early 2000s that use powerful computers to calculate CVA by simulating all of the possible future values of all the derivatives the bank has with a particular client.

All of this computational complexity has a surprising start. A former trader explained that at his bank, the system was initially deigned to make the interactions between traders and risk managers "less emotional". He recalled that before CVA was introduced, credit officers imposed limits on the amount of risk traders were allowed to take. CVA eliminated this contentious process by transforming credit risk from a restriction set by a manager, into a price charged to the trader. The money collected by levying the charge was then used to "hedge" the additional risk the trader was taking by reinvesting it in instruments like credit derivatives.

If emotional management was the initial motivation, by 2006 banks gained an altogether different incentive to invest in the calculation of CVA. Thanks to the major accounting standards boards who would require banks to report their CVA to investors, it would no longer be just a measurement for managing day-to-day trading risk, but would gain a financial reporting function. Organizations with more comprehensive CVA calculating infrastructures benefited from the new accounting rule. The institutions better able to net CVA across assets reported a smaller number, which could boost reported earnings.

If the banks had their way, the Basel committee would allow them to use their internal models to calculate CVA capital charge for regulatory purposes. But when the committee first proposed adopting CVA for capital determination, it ignored the indigenous CVA calculation systems that had sprung up across the banks. Instead, the Committee put forward a standardized formula known as the "bond equivalent" approach, which drew widespread criticism from banks and the derivatives industry trade group ISDA. Banks claimed this alien formula for calculating regulatory CVA was not only unnecessarily conservative, but actually discouraged them for reducing their CVA exposure by hedging their counterparty credit risks using credit derivatives.

At present, Basel III's CVA formula is a compromise between banks and regulators that co-exists beside the institution's internal CVA calculation. When the Basel Committee released a new proposal in December 2010, it maintained a formula-based approach albeit with re-developments to make the regulatory calculation less onerous and to more accurately capture the effect of credit risk hedging. However, the newer formula does not take into account changes in CVA that arise from changes in interest rates and asset prices.

From a mathematical perspective, the banks stand on firm ground. To fully capture the factors that affect CVA for the purposes of accounting and risk management, internally developed models are the best option. And these are the only models that can ensure internal consistency when banks calculate CVA for accounting and for regulatory reporting. However, bespoke models limit the power of the Basel committee or other regulators to measure banks' risks and determine whether they are complying with the law. On the other hand, even if Basel endorsed more sophisticated, exogenous approaches, these models would almost certainly be implemented in different ways across banks, which would produce unwanted calculative variation in how banks' report RWAs.

The point of this story is that mathematical equations are not a means of avoiding political confrontation. The formulas for international capital requirements are just one example of how natural variation in calculations becomes the fodder for high stake battles between the state and private corporations. It is perhaps time we stop judging models merely according to their technical merits, and start thinking of them as forums of negotiation.

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