

# Comments on the Fundamental Review of Trading Book Regulation

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## 1 Overview

The prevailing market risk capital regulatory framework was first published by Basel committee in its seminal paper, *Amendment to the Capital Accord to incorporate market risks*, in 1996. Since then, this regulatory framework has become the standard regulatory guidance of market risk capital management across different jurisdictions and played a critical part in promoting the market risk consciousness as well as discouraging excessive risky speculations in the banking industries globally.

However, with the outburst of the 2008 global financial crisis and the strong repercussions still felt today, Basle committee is constantly reviewing its regulatory requirements on market risk capital, reflecting on the key weaknesses of the current market risk capital regulatory framework exposed in the crisis. In July 2009, two key changes has been introduced to address the key risks not has not been well addressed in the 1996 framework. Incremental risk charge as a new supplemental capital charge designed to capture default risk and migration risk for un-securitized credit products. The other major change is the proposition of the stressed value-at-risk, where banks are required to calculate Value-at-Risk against a stressed period of time related to significant trading loss. The stressed value-at-risk has proven to be an important tool in reduce the procyclicality of the minimum capital requirements for market risk under internal models approach.

As more recent responses to weakness of the existing design of the market risk capital management framework, the Basel committee has issued two consultative papers, with the first one in May 2012 and the second one in October 2013, in order to further address the shortcomings of the existing market risk capital management framework. The second consultative paper contains concrete proposals for reforming the market risk capital management, taking into account of the comments received from the first consultative document. Draft text of the future Basel Accord is also enclosed in this consultative paper for comments. Hence, this consultative paper is of critical importance in the forthcoming reforms of the market risk capital management framework. This article aims to present the key reflections on this consultative paper from the perspective of a seasoned risk management practitioner with extensive interactions with banks of various sizes from different regions focusing on internal model approach.

## 2 Comments on Moving from Value at Risk to Expected Shortfall

Value at Risk has been in the centre stage of the market risk capital regulatory framework since the initial incorporation of market risk into the overall banking capital regulatory framework. However, one key criticism of Value at Risk is the inability of the tail risk of portfolio loss, which was exposed more strikingly during the financial crisis. In light of the above deficiency of Value at Risk, one of the most fundamental changes proposed in the Basel's consultative paper is the replacement of Value-at-Risk with expected shortfall as the core market risk metrics determining the market risk capital charge. As per the draft text of the future Basle accord enclosed in the consultative paper, Value at Risk at 99% confidence level will be replaced by expected shortfall at 97.5% confidence level.

Expected Shortfall, by definition, does sound more theoretically appealing than Value at Risk, especially in the context of volatile financial markets. However, the adoption of Expected Shortfall as a key risk control measure similar to Value at Risk's current roles does have some practical concerns.

### 2.1 Higher Volatility of Expected Shortfall

Firstly, Expected Shortfall in general will have a larger volatility than VaR. The jump in volatility becomes more severe when the portfolio loss function has fatter tails. This creates significant burdens on setting reasonable limits based on Expected Shortfall.

Table: Standard Deviations of VaR and Expected Shortfall

Risk Measure	Normal	Student t , $\nu = 5$	Student t , $\nu = 2$	$\nu=5/$ Normal*	$\nu=2/$ Normal*
VaR <sub>95%</sub>	2.93	4.90	10.98	1.67	3.75
VaR <sub>99%</sub>	5.36	12.85	49.57	2.40	9.25
VaR <sub>99.5%</sub>	7.07	20.74	101.43	2.93	14.35
ES <sub>95%</sub>	3.52	8.77	62.785	2.49	17.84
ES <sub>99%</sub>	6.58	24.77	281.63	3.76	42.80
ES <sub>99.5%</sub>	12.9	48.58	552.43	3.77	42.82

*\*The numerical test is done through portfolio loss simulation assuming different types of probability distributions as done in Sun Zhi(2011). The right most two columns are ratios of VaR and Expected Shortfall figures of student t distributions over the corresponding VaR and Expected Shortfall figures of normal distributions.*

To reduce the volatility of Expected Shortfall, banks need to absorb much higher computation cost. For example, under the student t  $\nu = 5$  case, to reduce the volatility of ES<sub>99%</sub> to roughly the same level of VaR<sub>99%</sub>, the simulation paths need to be increased by four folds, from 5000 to 20,000.

## 2.2 Back-testing Concern

In addition to the concerns on higher volatility of Expected Shortfall, attentions also need to be given to how to fit Expected Shortfall into the existing back-testing scheme. The current back-testing scheme, which is used to validate the accuracy of VaR measures, may not be helpful in checking the integrity of Expected Shortfall figure. The back-testing scheme, used by most banks, is designed to estimate the actual probability where realized loss exceeds VaR, based on the history of realized profit and loss. Expected shortfall is not able to be back-tested directly as per the current back-testing scheme.

## 2.3 Calibrating Market Risk Capital to a Stress Period

Stressed Value at Risk is introduced by Basel Committee in July 2009 in “Revisions to the Basle II market risk framework” to reduce the pro-cyclicality of Value at Risk through calibrating the market risk capital charge against a stressed period of time. With the introduction of expected shortfall, a similar calibration but more computationally intensive scheme to calibrate the market risk capital charge against a stress period of time is given by Basle committee as below.

$$ES = ES_{R,S} \times \frac{ES_{F,C}}{ES_{R,C}}$$

where the expected shortfall for capital purposes (ES) is equal to the expected shortfall based on a stressed observation period using a reduced set of risk factors ( $ES_{R,S}$ ) multiplied by the ratio of the expected shortfall measure based on the current (most recent) 12-month observation period with a full set of risk factors ( $ES_{F,C}$ ) and the expected shortfall measure based on the current period with a reduced set of risk factors ( $ES_{R,C}$ ).

Moreover, this reduced set of risk factors must have observation history more than 10 years and able to explain 75% of the variation in the full ES model as per the initial plan. The actual percentage will be confirmed through the Quantitative Impact Study (QIS).

As observed from the above proposal in the consultative paper, to calculate the stressed expected shortfall, banks need to calculate three risk metrics instead of two as per the current regulations. The computational cost of expected shortfall with reduced set of risk factor will be roughly equal to the cost of computing the expected shortfall of the full set of risk factors following either historical or Monte-Carlo methodology.

Moreover, from a practical point of view, it is very difficult to justify the exact percentage the reduced set of risk factor could have explain the variations of full ES

model. If there are no straightforward methods available to decide this percentage, the value of expected shortfall calculated with full risk factors for a stress period would be good enough for stress calibration purpose.

### **3 Comments on Capitalizing Liquidity Risk**

As clearly instructed in the consultative paper, liquidity risk will be incorporated in the calculation of core market risk metric, expected shortfall. In order to capitalize liquidity risk of trading book exposures, the Basel committee has decided to through assigning different liquidation horizons to different risk factors. In terms of system implementation, it will mostly impact the way historical and Monte-carols scenarios are generated as risk factors will now have different horizons. Furthermore, Basle committee has suggested each local supervisor to specify a risk factor horizon table for the banks under their jurisdiction.

This above proposal is indeed a big step forward to tackle the increased importance of liquidity risk directly in the regulatory capital framework. However, through assigning different risk horizons to different risk factors judged from liquidity may have some intrinsic conflict with expected shortfall/VaR simulation methodologies where historical data are used as a key input. The essence of expected shortfall/VaR simulation against a historical observation period of one year or two year is that the natural market correlation across different risk factors will be embedded in the simulation scheme by design.

With the assignment of different liquidity horizons to different risk factors, the market correlations will not be preserved as risk factors of simply of different holding horizons. The break of market correlations is against the key designing principle of historical VaR/Expected shortfall as it is supposed to reveal the portfolio weakness in scenarios that really happened. This conflict becomes more severe in VaR/Expected shortfall on a stressed market period as the market correlations with the real stress market will be totally broken due to different liquidity horizons assigned to risk factors.

## **References**

- [1] Coherent Risk Measures and Value at Risk, with Practitioners' insights (2011), Master Thesis, Sun Zhi, National University of Singapore.
- [2] Fundamental review of the trading book: A revised market risk framework (2013), Basel Committee on Banking Supervision
- [3] Revisions to the Basel II market risk framework (2009), Basel Committee on Banking Supervision