Revision of the quantification of market risk in the Basel III regulatory framework*

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The purpose of our study is to provide an overview of the revisions made to the Basel III regulatory framework in the aftermath of the 2007 crisis, with regard to measuring the risk associated with positions included in the trading book. The calculation of the regulatory capital requirement (i.e. the capital to be earmarked for covering the losses of trading book portfolios exposed to market risk) is based on the value-at-risk (VaR) to date. The literature pointed out the weaknesses of VaR as early as the turn of the millennium, and the financial crisis of 2007 only confirmed the inadequacy of the previous system. Nevertheless, moving the Basel regulatory framework to a new system of risk measurement was only put on the agenda after a significant delay. Formulating the details of the changes affecting the trading book has gained momentum in recent months, resulting in a series of consultative documents, issued by the Committee, which constitute the foundation for the impending new recommendations.

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1. Introduction and the definition of value-at-risk

Market risk reflects the possibility of losses arising from exchange-rate and interest-rate movements. This type of risk is related to investment activity and, accordingly, it affects the positions held in banks' trading books.

The Basel II regulatory framework prescribed the use of value-at-risk (VaR) for banks to calculate the capital requirement intended to cover exposure to market risk. The popularity of the VaR approach is probably due to its ability to capture risk directly through losses.

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VaR indicates maximum loss at a given confidence level (α) at a given time horizon. If the loss distribution (L) is known, then VaR is the α-quantile of loss distribution at the α confidence level (*Dowd-Blake 2006*), that is:

$$P\left(L \leq VaR_{\alpha}\right) = F\left(VaR_{\alpha}\right) = \alpha. \qquad (1)$$

In the equation above, *P* is the probability of the event shown in parentheses, and *F* is the related loss distribution function. If the confidence level is 95 percent, the risk measurement period is one day and the VaR value calculated as shown above is HUF 200 million, the maximum loss we are likely to suffer is HUF 200 million for 95 days of the next 100 days. Out of the 100 days there will be five days when our losses will exceed HUF 200 million. However, we have no information on the actual – possibly even excessive – extent of these losses, which is considered one of the most serious limitations of the VaR system.

For lack of an optimal method of measuring risk, mainstream scientific research turned its focus to a precise mathematical definition of the properties that can be expected of risk measures. One of the most well known and academically recognised sets of axioms is a criteria system proposed by *Artzner et al. (1999)*, which defines the properties of a coherent risk measure. The system of translation invariance, sub-additivity, positive homogeneity and monotonicity has become known in the literature as ADEH, after the initials of the authors' (Artzner, Delbaen, Eber, and Heath) last names. These criteria revealed another notable deficiency of the VaR system; namely, that it violates the principle of subadditivity. This means that, when measured by VaR, the risk calculated for a portfolio made up of sub-portfolios can be more than the sum of the risks of the sub-portfolios. From a risk management perspective, another shortcoming of VaR models is the fact that they can lead to non-convex optimisation tasks, which are technically difficult to handle (*Ágoston 2012*).

Expected Shortfall (ES) – which is counted among the coherent risk measures – offers a solution for eliminating the weaknesses of the VaR.

2. Definition and properties of ES

Expected Shortfall (ES) expresses the expected value (weighted average) of the losses in excess of the VaR at a given confidence level (α) and at a given time horizon.

$$ES_{\alpha} = E\left[L \middle| L > VaR_{\alpha}\right] \qquad (2)$$

For continuous distributions, it can be defined *(Embrechts 2014)* as follows:

$$ES_{\alpha} = \frac{1}{1-\alpha}\int_{\alpha}^{1} VaR_{x}\, dx \qquad (3)$$

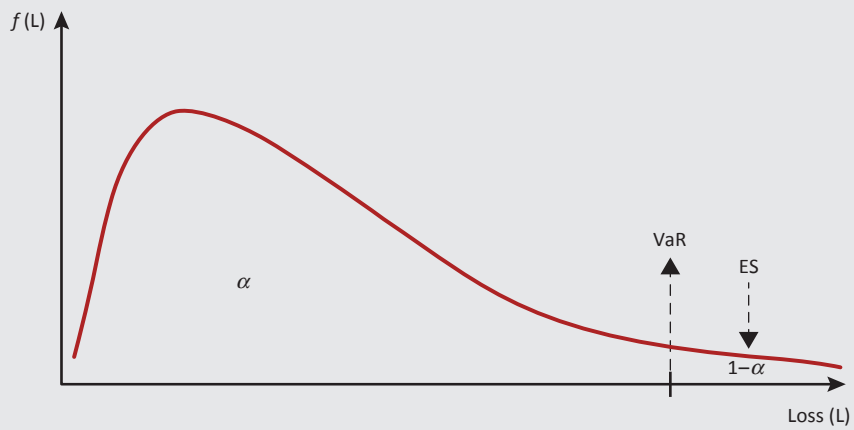
In the case of a sample containing an empirically observed finite set of *n* loss outcomes (L_i) (i.e. discrete probability distribution), it is calculated as follows:

$$ES_\alpha = \frac{1}{1-\alpha}\sum_{i=k}^{n} L_i \cdot p_i \qquad (4)$$

This calculation only needs to be performed for losses exceeding VaR $L_i > VaR_\alpha$. In order to do this, the losses should be arranged in ascending order, and the calculation should begin with the loss outcome that first exceeds the VaR (in formula [4], the *k*th outcome).

Returning to our previous example, suppose that there are only three loss outcomes that exceed the HUF 200 million VaR value. Their values are HUF 250, 350 and 380 million, with a probability of 1%, 2% and 2%, respectively. Based on equation (4), the value of the Expected Shortfall (ES) will be HUF 342 million, which significantly exceeds the VaR value. Obviously, in practice even more extreme losses can be expected, which the VaR is unable to capture. The relationship between VaR and ES is illustrated by the density function included in *Figure 1*. The area under the curve stretching up to the VaR value equals the confidence level. The ES is determined on the basis of losses falling into the range denoted by 1 – α.

Figure 1.
Calculation of value-at-risk (VaR) and expected shortfall (ES)



Source: Authors' work

By definition, the risk estimated with ES is always higher than that estimated with VaR. From a regulatory perspective, the ES method will yield a higher capital requirement value than the VaR. Obviously, it is not in the interest of any bank to hold a higher regulatory capital amount than required. At the same time, holding a lower amount than required jeopardises the safety of the financial system; in other

words, it creates a systemic risk. It is the responsibility of policymakers to reach and maintain a balance between longer and shorter-term interests.

In principle, ES resolves the deficiencies of VaR, but it raises a number of new problems. It should be stressed that the quantification of risk always means an estimation in the statistical sense of the word. In order to determine both VaR and ES, we need to estimate the future loss distribution of the reviewed portfolio. Loss distribution can be predicted based on historical data or by means of the Monte Carlo simulation. While the former evaluates the future risk of the portfolio based upon losses realised in the past, the Monte Carlo simulation can be used to model any "projected" future scenario.

Whichever method is used to calculate the loss distribution function, estimating the ES requires the "plotting" of the range of losses at the tail of the curve shown above. Although the probability of these extreme losses is low, they can create enormous problems if they do materialise, as demonstrated by the latest crisis. An adequate estimation of extreme losses requires a large number of loss outcome estimates. Suppose that the available sample pertaining to the possible values of future losses and their respective probabilities is composed of 1,000 data items. If the ES is to be estimated with a probability of 95 (99) percent, then we can only calculate with 5 (1) percent of the data at the tail of the distribution; in other words, the ES value must be calculated on the basis of 50 (10) data items. It is a commonly known fact that estimates based on a small sample size yield questionable results. In modelling, the small number of sample elements renders the use of simulation nearly inevitable, and the fact that the type of the distribution needs to be specified poses a further challenge. This process typically involves randomly selected parameters and subjective elements.

It can be stated, therefore, that modelling the tails of distribution curves plays a prominent role in the precision of ES estimates. In the case of an inadequate model, the ES may be rather misleading, as it is far more sensitive to estimation errors (*Sarykalin et al. 2008*). At a given confidence level, VaR estimates tend to be more stable than ES estimates. The difference is most pronounced for heavy-tailed distributions and negligible in the case of near-normal distributions. According to *Yamai and Yoshiba (2002)*, a larger sample size increases the accuracy of ES estimation. However, in general, no adequate sample size can be provided for estimates relying on historical data.

The most important properties of the VaR and the ES risk measures are summarised in *Table 1.*

Table 1.
VaR versus ES: a comparison

Criterion	VaR	ES
Basic characteristics	Loss-based, absolute downside risk measure	
Definition	The highest possible loss	The expected value of losses exceeding VaR
	at a given confidence level and time interval.	
Compliance with ADEH axioms	non-coherent	coherent
Treatment of extreme losses	It does not account for losses exceeding VaR (it disregards extreme losses).	It accounts for losses beyond VaR (it takes extreme losses into account).
Application to portfolios	It may hurt	It complies with
	the principle of diversification, i. e. the risk of a portfolio measured by VaR / ES	
	may be higher	cannot be higher
	than the sum of the risk of its components.	

Source: Authors' work

3. Inadequacy of the VaR in the Basel regulatory framework

Researchers and risk specialists have voiced concerns about the application of VaR as a reliable risk measure since the beginning of the 2000s. Numerous studies have pointed out the problems of the VaR; indeed, in 2002 the *Journal of Banking and Finance* dedicated a special issue to the statistical and computational problems in risk management. *Szegő (2002)* provocatively entitled the editorial to the issue "No more VaR (this is not a typo)".

The Basel Committee on Banking Supervision (BCBS) made continuous efforts to revise the original recommendations, in view of the experience gained with respect to the Basel II regulatory framework. As a result of these efforts, numerous revisions were made to the calculation method of market risk, including, in particular, the requirement of subjecting the VaR calculation to stress testing *(BCBS 2006)*.[1] These, however, did not yet entail a radical revision of the VaR methodology.

Stress testing incorporates methods that focus on changes in the value of bank portfolios under extreme conditions. Sensitivity analysis and scenario analysis are two basic types of stress testing. Large banks are required to perform both, while small banks need only perform the former. Sensitivity analysis examines the effect caused by a change in a selected factor, leaving the remaining factors unchanged.

[1] This document is the comprehensive, revised version of the Basel II recommendations published in 2004.

Drawing on past (historical) or expected future (hypothetical) time series, scenario analysis is used to examine changes in bank portfolios resulting from an unexpected market event (*Madar 2010*).

Numerous studies have been devoted to the frequent adaptation of the trading book revisions proposed by the new Basel II regulatory framework, including *Kane (2006)*, *Dardac and Grigore (2011)*, *Alexander et al. (2012), Rossignolo et al. (2013).*

There is general consensus among the authors of these papers that the VaR-based calculation of the regulatory capital requirement severely understates the needed level of the capital buffer and would not provide an adequate safety net in the event of unexpected losses. This confirmed that, rather than "tinkering around the edges" of the VaR-based risk calculation, market risk estimation in the Basel regulation should be based on a different risk measure altogether.

The studies of *Lucas (2001)* and *Kane (2006)* confirmed that regulatory gaps allow banks – especially those estimating their regulatory capital on the basis of internally developed models – to under-report their VaR-based capital requirements to the regulatory authority. They can do this because the backtesting procedures prescribed by the supervisory authorities are unfit to detect "bad" models. The purpose of these procedures is to evaluate the performance of the models (i.e. whether the risk arising from the use of the specific model remains below the acceptable level) (*BCBS 1996*).

In addition to the evaluation difficulties of the models, *Lucas (2001)* pointed out that even when there is clear evidence of purposeful under-reporting of VaR, the sanctions typically applied by the Basel regulatory framework are not severe enough to dissuade banks from intentionally understating VaR.

4. Changes envisaged in the Basel regulation of market risk measurement

4.1 Antecedents to the replacement of the risk measure

Below we present an overview of the changes envisaged in the Basel regulatory framework in the aftermath of the 2007 crisis. In keeping with the purpose of this study, we focus on the definition of the market risk capital requirement related to the trading book. *Table 2* provides an overview of the main milestones leading to the new regulation.

Table 2.
Main milestones of the Basel regulation related to market risk

	Year of publication	Document name
Basel I	1988	International Convergence of Capital Measurement and Capital Standards
Basel I consultative proposal	1993	The Supervisory Treatment of Market Risks
Basel I revised proposal	1995	An Internal Model-Based Approach to Market Risk Capital Requirements
Basel II revised framework	2004	International Convergence of Capital Measurement and Capital Standards: A Revised Framework
Basel II revised framework, comprehensive version	2006	International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version
Basel II revision	2009	Revisions to the Basel II market risk framework
Basel III	2010	Basel III: A global regulatory framework for more resilient banks and banking systems
Basel III consultative document	2012	Fundamental review of the trading book - Consultative document
Basel III revised framework	2013	Fundamental review of the trading book: A revised market risk framework - Consultative document
Basel III consultative document	2014	Fundamental review of the trading book: Outstanding issues - Consultative document

Source: Authors' work based on the BCBS website

Table 2 presents a list of the titles and publication dates of the documents relevant to the regulation of market risk. In the following, we address the most important elements concerning the new Basel III regulation.

Although in July 2009 – in response to the sub-prime mortgage market crisis – the Basel Committee on Banking Supervision admitted the need to review the models proposed for the measurement of market risk calculation in the Basel II recommendations, it still recommended the use of VaR as a risk measure (*BCBS 2009b*). In 2010, the need for revision of the recommendations of Basel II was expressed under the name Basel III (*BCBS 2010*). In relation to the implementation of Basel III, *Nout Wellink (2011)*, Chairman of the Basel Committee on Banking Supervision, alluded to the necessity of a potential revision of the VaR method.

Prospective revisions to the trade book – as envisaged in the 2012 consultative document – represented an important breakthrough compared to the events

listed above. "A number of weaknesses have been identified with using value-at-risk (VaR) for determining regulatory capital requirements, including its inability to capture 'tail risk'. For this reason, the Committee has considered alternative risk metrics, in particular expected shortfall (ES)" (*BCBS 2012:3*). Besides recognition of the necessity of the move, the years of procrastination can be attributed to the serious difficulties arising in connection with implementation of changes. These included, for example, containing model risks through robust backtesting of the ES model's performance, which is expected to pose a challenge for the financial mathematicians and statisticians whose input has been requested (*BCBS 2012; Embrechts et al. 2014*).

Despite doubts about the introduction of the ES system, the Basel Committee on Banking Supervision expressed optimism regarding the future, as confirmed by the following statement in the 2012 consultative document: "The Committee recognises that moving to ES could entail certain operational challenges; nonetheless it believes that these are outweighed by the benefits of replacing VaR with a measure that better captures tail risk" (*BCBS 2012:3*).

4.2 Main elements of the proposed recommendations and consultative documents discussing the switch to ES

The consultative document issued in 2013 *(BCBS 2013)* discusses in detail the technical parameters related to the application of ES as the new risk measure. Instead of the 99 percent confidence level applied previously for calculating VaR, the draft proposes a confidence level of 97.5 percent for estimating the ES measure. It was verified that, for certain distribution types, ES provides more reliable results at the 97.5 percent confidence level than VaR at the 99 percent confidence level. In the case of heavy-tailed distributions, the use of ES gives more conservative results and, hence, prescribes higher regulatory capital requirements. For light-tailed and near-normal distributions, ES yields equivalent results (*Embrechts 2014*).

The Basel Committee took a firm stand on calibrating the ES model according to a stress-based methodology. This is intended to ensure the sufficiency of regulatory capital to hedge risk positions, not only under normal market conditions but also under extreme scenarios (e.g. crises, significant price fluctuations). The correct definition of the stress period entails further challenges in the case of products included in the investment portfolio but having different liquidity characteristics. The expectation regarding the application of the stress methodology is in line with the previous findings of *Embrechts et al. (1999)* and the risk management practice of large banks in that possible losses are classified into three categories: expected loss, unexpected loss and stress loss. While the traditional risk management framework was prepared to tackle the first two loss categories, which are incurred under normal business operations, the third category – highly improbable, extreme loss incurred under extraordinary conditions – proved to be devastating for numerous institutions in the banking sector, occasionally resulting in defaults.

The 2014 consultative document *(BCBS 2014a)* published in response to the previous one focused on three outstanding issues in relation to the trading book. These are the following: ensuring a more objective regulatory boundary between the trading book and banking book; developing a sensitivity-based methodology in the revised standardised approach; and incorporating the concept of liquidity horizons in market risk measures.

In accordance with previous recommendations and practices, in identifying the regulatory capital requirement for market risk the Basel Committee allows the use of two methods: the standard model and the internal model. The standard model defines the capital requirement on the basis of detailed guidelines, thereby providing a fallback in the event that a bank's internal model is deemed inadequate. Banks relying on internal models are allowed to develop and apply their own risk evaluation methods with a view towards calculating their respective capital requirements. This more flexible option is only available if the methods developed internally comply with the relevant Committee criteria and are also approved by the regulatory authorities. One of the concerns voiced even in relation to the VaR-based risk measurement framework was that, owing to significant additional infrastructure and the need to set up an independent risk management division, the resulting regulatory capital requirement tended to be higher than the values yielded by the standard model, which called into question the justification of selecting the more sophisticated methodology (*Kondor 2004*).

Regarding the enhancement of the standard model, two possible options were considered: the aforementioned sensitivity-based approach and the so-called cash flow-based method. Based on the feedback received in response to the consultative documents and recognising the complexity of the latter, as well as its cost and time implications, policymakers rejected the use of the cash flow-based method, and at present they are concentrated on working out the details of the sensitivity-based regulation.[2]

As regards the use of internal models, the 2014 consultative document introduced a significant change: consideration of the liquidity horizon for the purposes of measuring market risk has changed. The Committee defined five different liquidity horizons (10, 20, 60, 120 and 250 days) for individual risk factors (interest rate, equity price and foreign exchange rate volatility, price changes of commodities). The draft requires institutions to identify the risk factors affecting individual portfolio elements and to classify them into corresponding liquidity categories. Institutions subject to the regulation are expected to treat the specified liquidity horizons as a

[2] Details of the draft recommendation regarding the standard model are beyond the scope of this study; however, they are available in *BCBS* (*2014a*).

floor (lower threshold), but they are permitted to use longer liquidity horizons at their discretion, subject to approval by the supervisory authority.

For compliance with the regulatory criteria, bank-level ES values must be calculated on a daily basis. Similarly, ES should be calculated with a daily frequency for all trading desks included in the internal model. In line with previous plans, ES is to be calculated at a confidence level of 97.5 percent. As a first step, ES is to be defined over a 10-day base horizon in consideration of all relevant risk factors. The aforementioned different liquidity horizons will be considered for the purposes of ES calculation in such a way that the ES value calculated for the base horizon is scaled to the corresponding time horizon. The final, liquidity-adjusted regulatory ES value is calculated from the components above by using a formula defined by the Committee. It should be emphasised that the calculation of the ES should be based on a sample containing loss/profit profiles realised in stress periods.

Instead of simply adding up the ES components, estimated as described above, the draft proposes the aggregation of ES measures by using the square root of the sum of squares to calculate the ES value of the entire trading book. By doing so, not only does the draft disregard the risk-reducing effect of diversification; in fact, it exhibits an even more prudent attitude. This attitude may reflect the fact that the experiences of the crisis demonstrated that certain risk types may not only weaken, but also strengthen each other's effects. In the latter case, the regulatory capital requirement calculated by simply adding up the risk components corresponding to individual portfolio elements – as suggested by the method that does not recognise the risk-reducing effect of diversification and, hence, was originally deemed conservative – could prove to be insufficient (*BCBS 2009a; BCBS 2011*).

Financial institutions relying on internal models can flexibly select or develop the models used for the estimation of the ES; the Committee does not specify any regulations in this regard. Supervisory authorities may approve the application of both historical methods and the Monte Carlo simulation, as long as the backtesting and P&L analyses used for the evaluation of the models verify the accuracy of the risk calculation.

4.3 Significance of market risk, expected effects of the regulation

For the purposes of this study, we performed an estimate to determine the regulatory capital requirement for market risk, based on the audited data of the MNB pertaining to credit institutions at the end of 2014 (*MNB 2015*). We limited the entire credit institution sector to large banks operating as companies limited by shares. This category includes institutions whose balance sheet total is at least 3 percent of the consolidated balance sheet total of credit institutions operating in the form of companies limited by shares. This reduction of the sample size was primarily justified by data availability difficulties; however, it was also confirmed

by the fact that, based on the MNB's data at the end of 2014, the eight banks under review represented 73.5 percent of the regulatory capital of the entire credit institution sector and 72.5 percent of the sector's total risk exposure. Under these circumstances, capturing the large banks operating in the form of companies limited by shares appeared to be an adequate approach.[3]

The analysis of the composition of the regulatory capital requirement was hindered by the fact that those entities subject to submitting individual supervisory reports regarding the capital requirement calculation to the MNB compile their reports in accordance with Hungarian accounting regulations. However, detailed data could be accessed, primarily from consolidated reports prepared according to IFRS and risk reports. Consequently, our further calculations were based on the consolidated reports of the eight large banks (*Budapest Bank 2015; CIB Bank 2015; Erste Bank 2015; K&H Bank 2015; MKB Bank 2015; OTP Bank 2015; Raiffeisen Bank 2015; UniCredit Bank 2015*).

Our calculations showed that the regulatory capital requirement held for market risks by the eight large banks accounted for 0–5 percent of the total regulatory capital requirement. On average, 83 percent of the total capital requirement of the eight banks under review served credit risk purposes, while 14 percent and 3 percent were earmarked for operational risks and market risks, respectively. Domestic banks' typical focus on lending plays a role in the modest share of regulatory capital held for market risk purposes. As regards foreign institutions, the share of the capital buffer held for market risk purposes may well exceed 10 percent of the total regulatory capital (see, for example, *Deutsche Bank 2015*, *Credit Suisse 2015*). Consequently, stakeholders are looking forward to the revision of the standards.

The Basel Committee on Banking Supervision strived to gauge the impact of the scheduled changes from the start of the consultations, and in its 2013 consultative document it pledged to perform two quantitative impact studies (QIS). The studies were intended to perform an impact analysis of the proposed revision to the market risk regulation relative to the regulation currently in effect.

The first quantitative study performed in early 2014 was based on 35 hypothetical portfolios created specifically for this purpose with the voluntary participation of 41 banks from 13 countries. The analysis found that moving from VaR to ES was expected to increase the calculated risk measure by 62 percent. We wish to

[3] As of 31 December 2014, the regulatory capital (own funds) of the eight large banks amounted to HUF 2,357 billion and the total risk exposure amount (RWA) stood at HUF 12,055 billion. Accordingly, the banks' Pillar I total capital adequacy ratio based on the CRR/CRD IV regulation in effect from 1 January 2014 was 19.6 percent (*MNB 2015*).

emphasise that the study was based on portfolios created specifically for testing purposes (*BCBS 2014b*).

The results of the quantitative impact analysis performed in relation to the trading book revision on the basis of real portfolio data were published in November 2015 (*BCBS 2015*). The analysis was conducted on a sample of 44 banks (the sample did not include Hungarian banks). Participating banks performed a simulation to examine what would have happened if the proposed regulatory framework for market risk had been in full effect on 31 December 2014.

The impact analysis found that changes in the regulatory capital requirement for market risks would have generated a 4.7 percent increase in the consolidated Basel III capital requirement (including credit, operational and market risks). Focusing exclusively on market risk, the proposed market risk framework would result in a weighted average increase of 74 percent[4] in aggregate market risk capital charge. When measured as a simple average, this increase in the total market risk capital requirement is 41 percent. For the median bank in the same sample, the capital increase is 18 percent.

Upon examining the two alternative models for market risk separately, as a simple average the capital requirement under the internal model approach is 54 percent higher compared to the internal model currently in use. For the median bank, the corresponding increase is 13 percent. The differences were far more striking in the case of the standard model: the capital requirement under the proposed standardised approach is 128 percent higher on average, compared to the 51 percent observed for the median bank (*BCBS 2015*).

It is important to note in relation to the results that all changes envisaged in the market risk regulation were considered collectively for the purposes of the impact analysis. The substantial increase, therefore, cannot be attributed solely to the shift to ES; indeed, the analysis examines the consequences of certain changes that are outside of the scope of this paper. It is clear, however, that institutions applying the standard model should expect a higher increase in their capital requirement.

4.4 Feedback related to the revision

In our opinion, the development and selection of the correct backtesting methods are still problematic, and all the more so as supervisory authorities assess the adequacy and accuracy of internally developed and applied risk analysis models on this basis. Although some studies have recently been devoted to this topic (for example, *Acerbi-Székely 2014; Du-Escanciano 2015*), the enhancement and evaluation of these methods continue to pose significant challenges.

[4] The weighting was based on market risk-weighted assets.

It remains to be seen whether the positive expectations about ES prove to be justified. Indeed, the latest piece of academic literature cited in this study presents efforts aimed at the identification and practical interpretation of an alternative which eliminates the flaws of the ES system (*Embrechts 2014*).

Even though *Stefan Ingves (2014)*, chairman of the BCBS, recognised the aforementioned revisions to the trading book to be of strategic importance, final consultations in this regard are still in progress. Consultations on the recommendation proved to be a protracted process, which may be attributed to the fact that the feedback of market participants was requested in relation to three consultative documents published in the period of 2012–2014. The processing of the feedback led to a revision of the original ideas and timelines and, accordingly, in his speech in May 2015 (*Ingves 2015*) Ingves announced that the final text of the recommendations would be published by the end of the year. Yet, the publication was still not released by the time of this study. Implementation of the Basel III regulatory package is a gradual process, and is expected to be fully completed by 2019.

It should be borne in mind that the fundamental revision of a complete framework involves a substantial amount of responsibility, requiring not only the fine-tuning of technical details, but also the continuous consultation of stakeholders. In our view, this implies considerable work and poses serious challenges for the future.

5. Summary

The purpose of this study was to examine the revisions necessitated by the 2007 crisis to the Basel regulatory framework in terms of the trading book positions exposed to market risk. Critical considerations regarding the inadequacy of the VaR-based risk measurement approach constituted the starting point of the overview.

The literature alerted to the flaws of VaR as early as the turn of the millennium, and the crisis only confirmed the inadequacy of the previous system. Nevertheless, the issue of moving the Basel regulatory framework to a new risk measure was put on the agenda after a lag of 10 years. In recent years, a series of consultative documents have been dedicated to exploring the possibility of moving from the value-at-risk methodology to an expected shortfall framework. These efforts are aimed at the reduction of systemic risks in the banking sector.

The study also discussed problems arising in relation to the application of the proposed new risk measure, with special regard to the testing difficulties of the new model. Although the fundamental reform of the regulation is a daunting task, the steps taken so far – as well as those envisaged – are undoubtedly commendable.

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