

The Knowns and the Known Unknowns of Capital Requirements for Market Risks

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Abstract

A new era is beginning for bank intermediation in financial markets. Under the leadership of the Trading Book Group of the Basel Committee, the calculation of risk weighted assets (RWAs) associated with market and trading book risks is being upended. The present reforms are a subtle compromise. On the one hand, they perpetuate the autonomous function for monitoring risks within banks, under the control of bank supervisors. On the other hand, they set up a safety net to avoid any drift linked to self-regulation. The emphasis here is placed on the uncertainties linked to the final calibration of the new framework and the implications for economic banking models and market intermediation. The article stresses operational issues linked to piloting this transformation process for regulated banks.

Introduction

A new era is beginning for bank intermediation in financial markets. Under the leadership of the Trading Book Group of the Basel Committee, the calculation of risk weighted assets (RWAs) associated with market and trading book risks is being upended. The Fundamental Review of the Trading Book (FRTB) led to the publication of a set rules in January 2016.² It should be recalled that risk weighted assets are the denominator of the solvency ratio.

In the first part of this text, the FRTB is situated in the vast movement that has reinforced regulatory and prudential requirements.

The present reforms are a subtle compromise. On the one hand, they perpetuate the autonomous function for monitoring risks within banks, under the control of bank supervisors. On the other hand, they set up a safety net to avoid any drift linked to self-regulation.

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² See in particular “*Minimum capital requirements for market risk*”, <http://www.bis.org/bcbs/publ/d352.pdf>. For a brief introduction see also the Basel Committee document, again published in January 2016, entitled “*Explanatory note on the revised minimum capital requirements for market risk*”, http://www.bis.org/bcbs/publ/d352_note.pdf

The emphasis here is then placed on the uncertainties linked to the final calibration of the new framework and the implications for economic banking models and market intermediation, namely:

- The reduction in financial market banking intermediation will benefit managers of bond funds and insurance companies which are less regulated than banks.
- The fall in over-the-counter derivative trading will confirm the rising strength of standardised markets in futures and swaps³. The development of new market infrastructures is associated with new issues of financial stability, including the creation of systemic nodes and clearing houses that have to be regulated and supervised. This will not occur without consequences for final users, who will continue to want to use customised products. They will have to take on “basis risks” or face extra costs charged by banks.⁴

Lastly, the article will stress operational issues linked to piloting this transformation process for regulated banks, which are facing a lot of uncertainty.

1. Market regulation

The future rules for weighted averages of trading books are part of the new regulatory framework. Nearly 10 years after the 2008 financial crisis, the broad outlines put forward at the G20 summits in 2009 and by the Financial Stability Board (FSB),^{5,6} the work on bank regulation (by the Basel Committee on Banking Supervision (BCBS), or simply the Basel Committee), the markets and financial infrastructures (Committee on Payments and Market Infrastructures or CPMI) are taking shape.

The main aim is to improve financial stability and to eliminate incentives to create risks which are costly to taxpayer. But reforms must not penalise economic growth, the granting of loans or the management risk functions carried out by markets and financial intermediates.

The range of new regulations for banks and markets is vast, and the regulation process is particularly ambitious and complex. This article focuses on measuring market risks and credit risks of trading books. But other issues include:

- a) The reinforcement of the quantity and quality of equity capital required for risk.

³ See Litan (2010), Duffie (2013), Rosenberg and Massari (2013).

⁴ The new regulations relating to OTC derivative products will have major consequences for end-users, especially companies. The latter may be led to changing the risk profile of rates on their debts, via profiled asset swaps according to the bonds issued. These non-standard products are not cleared centrally. The cost of managing financial risks to companies is thus increased, either directly through a rise in intermediation margins on asset swaps, or indirectly through an increase in “basis risks”, if companies decide to take out insurance cover using standardised products. Culp and Miller (1995) illustrate the importance of basis risks in the case of Metallgesellschaft.

⁵ See for example, “*The financial crisis and information gaps*”, published October 2009

<https://www.imf.org/external/np/g20/pdf/102909.pdf>

⁶ “*A Coordination Framework for Monitoring the Implementation of Agreed G20/FSB Financial Reforms*”, October 2011, http://www.financialstabilityboard.org/wp-content/uploads/r_111017.pdf

- b) The role played by “risk based” solvency ratios relative to leverage ratios and the use of stress tests by supervisors, especially in the United States.
- c) An examination of liquidity transformation.
- d) An examination of OTC bank intermediation for derivative products.⁷

In banking, Basel III has profoundly modified regulations concerning bank solvency.⁸ Changes include: the increase in solvency ratios; more restrictive definitions of equity capital relative to risks, a stronger framework relating to internal models for banking book risks (in terms of loans and securities); stricter regulation of counterparty risks and higher leverage ratios. The redesigning of ways for calculating average weighted assets for their trading book risks is only one aspect of this whole set of measures.

- **Higher solvency ratios (CET1/RWA)**

The minimum Core Equity Tier One (CET1) solvency ratio has increased from 2% to 7% (4.5% + 2.5% for a “conservation buffer”). There is a supplementary buffer that can run to 3.5% for globally-systemically important banks (G-SIBs): in practice this means 1% to 2.5% for the banks in question.⁹ Apart from increases already adopted, there are further plans to implement counter-cyclical buffer reserves of up to 2.5% of risk weighted assets, as well as a buffer of possibly up to 5% for systemic risk: the latter is specific to the European regulatory framework. This is mentioned in CRD IV, as well as in the Basel rules. The aim is to prevent the emergence of speculative bubbles. In this case, the solvency ratio could rise from 2% under Basel II to a maximum of 18% under Basel III.

- **A more restrictive notion of prudential equity capital (CET1) as the numerator of solvency ratios**

Prudential capital equity is obtained by subtracting from booked equity capital a certain number of elements which do not have the required “loss absorption capacity”.¹⁰ These

⁷ This includes:

- The obligation for transactions in the simplest derivative products to be booked through clearing houses, with the aim of reducing the counterparty risks on these products. The clearing houses have been placed at the heart of the new market architecture for derivative products. For more detail on this matter, see the contribution by Marco dell’Erba on the regulatory framework applied to clearing houses (chapter 9).
- The introduction of bilateral initial margins (guarantee deposits) for derivative products that are not centrally cleared, again in view of reducing counterparty risks and contagion via derivative products.
- The improvement of pre- and post trade transparency.
- The use of trading platforms (Swaps Execution Facilities, SEFs).

⁸ See “A brief history of the Basel Committee”, October 2014, <http://www.bis.org/bcbs/history.pdf> and Blundell-Wignall & Atkinson (2010) for a first assessment of Basel III.

⁹ See <https://www.bis.org/bcbs/gsib/> for the criteria classifying systemically important banks.

¹⁰ Apart from the capacity to absorb losses, the Basel Committee has set out precise criteria for defining Core Equity Tier 1 capital, as a function of its capacity to absorb losses, its permanency and flexibility for payments. These latter two points have led to the exclusion of certain hybrid securities from CET1.

include non-eligible minority interests,¹¹ dividends to be paid, intangible assets, goodwill, and deferred tax assets on losses carried forward. Similarly, adjustments for risks to equity capital, especially elements of Debit Valuation Adjustment (DVA) that affect the evaluation of the fair value of derivative products, are deducted from equity capital. Lastly, a certain number of filters are applied to obtain fair value. These are Additional Valuation Adjustments (AVAs) that have been introduced within the European framework.¹² Such valuation adjustments take into account especially market price uncertainty (MPU), the costs of liquidation or close-out costs, model risks and concentrated provisions. Apart from reserves that are already accounted for by banks concerning the preceding factors, the AVAs lead to further deductions in equity capital. In presenting its results for Q1 2014, Deutsche Bank valued the impact of these adjustments to its equity capital at €2 billion.¹³

- **Improved monitoring of counterparty risks**

In addition, Basel III has increased charges on capital linked to counterparty risks on derivative products, including the introduction of a charge on capital linked to the variability of CVA and capital requirements for bank exposures to central counterparties (CCP).¹⁴ Lastly, specific measures have been taken to discourage interbank exposure: for example, increases in risk weighted assets to cover exposure to large financial sector entities or to unregulated financial entities.¹⁵

- **Leverage ratio acting in principle as a backstop**

¹¹ In December 2009, the Basel Committee (<http://www.bis.org/publ/bcbs164.pdf>) proposed deducting minority shareholdings in subsidiaries from equity capital because they cannot cover losses at consolidated group level. The handling of minority interests has subsequently evolved. The reader may refer to the following documents by the Basel Committee concerning the definition of equity capital:

- Basel III: A global regulatory framework for more resilient banks and banking systems, June 2011, <http://www.bis.org/publ/bcbs189.pdf> (the first version was published in December 2010, the June 2011 version introduced an equity capital charge for variations in Credit Valuation Adjustment (CVA);

- The press release in January 2011, <http://www.bis.org/press/p110113.pdf>

The FAQ available on the Basel Committee website (last update October 2011):

<http://www.bis.org/publ/bcbs211.htm>.

¹² Capital Requirements Regulation (CRR) and the technical document of the EBA on prudent valuation <https://www.eba.europa.eu/documents/10180/642449/EBA-RTS-2014-06+RTS+on+Prudent+Valuation.pdf>

¹³ https://www.db.com/ir/de/images/Deutsche_Bank_1Q2014_results.pdf_page_6

¹⁴ See the Basel Committee documents “Review of the Credit Valuation Adjustment Risk Framework” issued in July 2015, <http://www.bis.org/bcbs/publ/d325.pdf>, “Reducing variation in credit risk-weighted assets – constraints on the use of internal model approaches”, issued in March 2016, <http://www.bis.org/bcbs/publ/d362.pdf>, “Capital requirements for bank exposures to central counterparties - final standard”, April 2014, <http://www.bis.org/publ/bcbs282.pdf> and the contribution by Marco dell’Erba on the regulatory framework applied to clearing houses (chapter 9).

¹⁵ See for example

<http://www.allenoverly.com/SiteCollectionDocuments/Capital%20Requirements%20Directive%20IV%20Framework/IRB%20Approach%20to%20credit%20risk%20in%20the%20Banking%20Book.pdf>)

For the Basel Committee, the solvency ratio, with risk-sensitive based capital ratios as the denominator, is the dominant indicator. The leverage ratio should only serve as a safeguard (Estrella, Park and Peristiani (2000), Blum (2008)). The Americans, however, do not see things like this, and have a different approach to regulation. In the United States, there has for long been a leverage ratio based on US accounting standards (US GAAP). In order to ensure consistency with the Basel framework,¹⁶ a Supplementary Leverage Ratio (SLR) was introduced in September 2014: the enhanced SLR (eSLR).¹⁷ This indicator concerns the eight major US banks identified as G-SIBs, and essentially makes the new US leverage ratio comparable to that applied by European banks. Both, overall, broadly comply with Basel III. The new minimal leverage ratio is 5% for major systemically important banks, and 6% for their subsidiaries managing deposits (Insured Depository Institutions). This compares to only 3% set out in Basel III. The work on setting out the methods for calculating leverage ratios should be completed in 2017, for effective implementation in 2018. Until then, the banks must publish their leverage ratio every quarter. As of the beginning of 2015, the major US banks were already implementing ratios above those required (by US regulations of course). Market discipline has led European banks to follow US norms, which have therefore become *de facto* extraterritorial. This doubles the constraints induced by the Basel leverage ratio. If at the end of the day, the constraint associated with the leverage ratio becomes binding, then there will no longer be much point in banks investing in tools to monitor market risks.

The preceding rules complete the measures relating to the ordered liquidation of systemically important financial institutions, with the aim of protecting depositors and avoiding the commitment of public monies in saving banks that are too-big-to-fail.

The revision of the principles and method of calculating risk weighted assets is thus only one part of a whole set of measures.

2. The Reasons for Overhauling the Calculation of Risk Weighted Assets on Trading Books

The Fundamental Review of the Trading Book (FRTB) is part of the implementation of the new prudential standards under Basel III, initiated at the G20 summits in London and Pittsburgh in 2009 and by the Financial Stability Board (FSB).

The project builds on previous Basel rules.¹⁸ The document updating the processing of market risks under Basel II was released in July 2009.¹⁹ It addresses certain shortfalls in the previous regulations, highlighted by the crisis in 2008, including:

¹⁶ US accounting standards are different from IFRS standards in terms of netting repo activities and Security Financing Transactions (SFTs). Deutsche Bank showed that the size of its balance sheet according to US GAAP was twice as weak when compared to calculation based on international accounting standards, this being due essentially to the way repos are processed. The Basel ratio is the result of a compromise between international and US practices. It should be noted that the denominator of the leverage ratio (the Exposure Measure) includes off-balance sheet items, especially credit derivatives, as well as the exposure to risk on derivative products.

¹⁷ See for example <http://www.usbase3.com/docs/Final%20SLR%20Visual%20Memo.pdf>.

¹⁸ The Market Risk Amendment of 1996 (<http://www.bis.org/publ/bcbs24.pdf>), see also the Basel Committee's document entitled "*International Convergence of Capital Measurement and Capital*

- The inclusion of Stressed VaR (Value at Risk) in calculating risk weighted assets. This is a calibrated measure of market risk throughout a period of instability. Previous measures of risk did not include such events in their calculation (Dowd et al. (2011)). This could lead to an underestimation of risk, when current volatility is weak.
- Taking into account risks of bankruptcy and migration (i.e. a change in ratings) within a trading portfolio, via an Incremental Risk Charge (IRC). Under Basel II, credit risks in such trading portfolios only showed up in the risks of credit margin variations. As its name indicates, IRC aims to complete previous regulation which neglects such risks.
- The specific processing of portfolio correlation, including especially corporate CDOs (Comprehensive Risk Measure or CRM). If internal models can be used, a regulatory floor calculated using the standard approach (CRM floor) has *de facto* become an active constraint.

Regulators have nevertheless found it useful to go further and to carry out profound reforms for calculating risk weighted assets. The so-called Basel 2.5 rules, whatever their usefulness, were designed under emergency conditions, and did not benefit from the same preparation and formulation that went into the various ingredients of Basel III. The relevance of this revision in ways of calculating risk weighted assets for trading book risks is discussed below. Several underlying principles of the new regulatory framework are also set out, namely the supervision of internal models, and the development of a standard approach whose own principles converge on internal models.

It should be first recalled that the Basel Committee has put forward three criteria for assessing risk models: the capacity to measure risks effectively (risk sensitivity), simplicity and comparability.²⁰

The regulation of trading book risks seeks to structure better the methods used by banks in calculating risks, and hence their risk weighted assets. This will favour the comparability of results across banks and should prevent drift in practices. It is useful to start with a historical overview in understanding the proposed changes.

Basel II was not applied uniformly internationally. Since this agreement, solvency ratios – the levels of equity capital required to carry out banking activities – have been determined according to risks, and less in the flat-rate way which existed previously. This especially concerns the Advanced Internal Ratings Based Approach (IRBA) used by large banks to take into account credit risks in their banking books. Some important aspects in calculating

Standards” (<http://www.bis.org/publ/bcbs128.pdf>), published in June 2006 as a consolidated version.

¹⁹ <http://www.bis.org/publ/bcbs158.pdf>, see also “*Analysis of the trading book quantitative impact study*” (<http://www.bis.org/publ/bcbs163.pdf>), published in October 2009.

²⁰ “*The regulatory framework: balancing risk sensitivity, simplicity and comparability*”, <http://www.bis.org/publ/bcbs258.pdf>. Other references include the speech by the Secretary General of the Basel Committee in February 2013 (<http://www.bis.org/speeches/sp130226.pdf>) and a document by the Fed and the OCC relating to risk models, which has become the reference text for US supervisors: “*Supervisory Guidance on Model Risk Management*” (<https://www.federalreserve.gov/bankinforeg/srletters/sr1107a1.pdf>). We also refer to Aikman et al. (2014).

exposure, such as the dependency between default events, are controlled by the Basel Committee. Yet banks have a certain latitude in determining default probabilities and recovery rates.

The 1996 amendment for taking into account market risks was a supplementary step. Regulated institutions were henceforth able to calculate their market risks (risk weighted assets) using internal models for assessing extreme losses (risk distribution quantiles or Value at Risk).

This led to a paradigm shift based on:

- the emergence of quantitative models for measuring risks, such as Value at Risk; and
- the possibility for banks to develop internal models to measure risks, with regulators only setting out general principles and supervisors ensuring their correct implementation.

The characteristics retained for measuring risks (Value at Risk or VaR) in the present regulatory framework have often been criticised (for example by Danielsson et al. (2015)):

- In certain cases, though seldom, the capital required for a diversified portfolio may be greater than the sum of capital required for the components of the portfolio (there being no benefits from diversification).
- Other criticisms concern the liquidation horizon (10 days), which is insufficient, especially for concentrated positions due to the proportionality between portfolio size and risk measures.
- This concerns microprudential regulation which does not take into account the systemic effects linked to the accumulated exposure of large, regulated institutions (De Long et al. (1990), Lowenstein (2000)). The regulation is held to be pro-cyclical (Danielsson, Shin and Zigrand (2004), Gordy and Howells (2006), Rochet (2008)), as regulated capital requirements increase with the price volatility of assets, which may lead to forced sales in times of market tensions (see for example Adrian and Shin (2013) on banks' deleveraging).

The underlying theoretical concepts of credit risk assessment (VaR) and Expected Shortfall are simple (see Acerbi and Tasche (2002), Tasche (2002), Yamai and Yoshiba (2002)): VaR is a quantile associated with the distribution of losses over a given horizon; Expected Shortfall is the average loss beyond VaR. Their implementation is not, however, easy or transparent (see Jackson and Perraudin (2000), Pérignon and Smith (2010), Alexander and Sarabia (2012)), as:

- internal bank models for valuing risks are complex, and hence difficult for supervisors to audit;
- their specific nature to each bank makes comparisons difficult;
- excessive detail in identifying risks is associated with instability in determining correlations and so poor assessment of the benefits of diversification;
- by contrast, a lack of detail means that some risks are underestimated; and
- lastly, adjustments to take into account the persistent character of high volatility or extreme risks imply delicate modelling choices which may be more or less arbitrary.

The Basel Committee has set up procedures of “backtesting” risk models, in order to ensure that effective market losses are not abnormally frequent. This involves a “traffic light” approach in which internal models are distributed across three categories (green, yellow and red), according to whether the number of days or trading losses were greater to the measure of risks during the preceding twelve months.²¹ This approach entails incentives: above a certain threshold which corresponds to entry into the yellow zone, abnormally high losses lead to increased requirements in terms of equity capital. The procedures retained by the Basel Committee can be improved at the margins. It is however difficult to invalidate a poorly-specified Value at Risk model, due to the relative scarcity of the abnormalities considered (see for example Kupiec (1995)).

From a positive point of view, a set of techniques and good practices has been progressively put into place over twenty years, both for the entities being regulated as well as for the supervisors (see Ediz, Michael and Perraudin (1998) Jorion (2002), Liu, Ryan and Tan (2004), Barakova and Palvia (2014)).

By contrast, it has been argued that the complexity of models for measuring risks favours large banking institutions, given the scale of their resources available when compared to supervisory bodies. This asymmetry provides banks with margins of manoeuvre (see for example, Groeneveld et al. (1999), Jones (2000), Blum (2008), Pérignon, Deng and Wang (2008), Pérignon and Smith (2010), Behn et al. (2014), Colliard (2015), Mariathasan and Merrouche (2014) or Begley, Purnanandam and Zheng (2016)). In the so-called “London Whale” scandal involving JP Morgan, the internal models for measuring credit risks were being revised at the same time as the bank was taking out important positions in the market for credit default swaps, as part of its main balance sheet management. The revision contributed largely to hiding the scale of excessive risks being taken on by the bank.

Comparability studies of hypothetical portfolios, carried out under the auspices of the BIS²² and the EBA (European Banking Association (EBA)),²³ have revealed significant variations in risk weighted assets. For different types of portfolios, especially portfolios actually held by banks, it is difficult to identify if banks are underestimating their RWAs. The studies nevertheless demonstrate that the use of internal models is far from providing a uniform vision of bank risks. The International Monetary Fund (IMF) has published a study showing the large variation in risk weighted assets density (Le Leslé and Avramova (2012)). Such variations may be explained by different banking cultures, as well as the varying relative importance of financial markets in Europe and the United States. The latter never applied Basel II, and the US approach to regulation has traditionally favoured leverage ratios rather than capital requirements relative to risk.

²¹ This approach and terminology were initially described in a Basel Committee document entitled “*Supervisory framework for the use of ‘backtesting’*”, published in January 1996 <http://www.bis.org/publ/bcbs22.pdf>.

²² Documents in 2013: <http://www.bis.org/publ/bcbs240.pdf> and <http://www.bis.org/publ/bcbs267.pdf>, document submitted to the G20 in 2014: <http://www.bis.org/bcbs/publ/d298.pdf>.

²³ December 2013, <https://www.eba.europa.eu/documents/10180/15947/20131217+Report+on+variability+of+Market+RWA.pdf>, May 2014 <https://www.eba.europa.eu/documents/10180/711669/EBA-CP-2014-07+%28CP+on+RTS+and+ITS+on+benchmarking+portfolios%29.pdf>.

The analysis of market losses by banks relative to their risk profile (VaR) indicates that internal models smooth out volatility estimates. As a result, VaR was a poor indicator of banking difficulties during the crisis in 2008 (see for example Haldane and Madouros (2012)). It also discriminated little between banks. This is clearly problematic from a prudential point of view.

Banking supervisors need to be vigilant, be they the OCC, the Fed LISC (Large Institution Supervision Coordinating Committee), the New York Fed in the United States, the Single Supervisory Mechanism (SSM) and national regulators in the Eurozone, or the Prudential Regulatory Authority (PRA) in the United Kingdom. The credibility of instruments for calculating risk weighted assets does not depend on banking regulation, but on the capacity of supervisors to audit internal models developed by banks. This is a challenge. In the case of the US, the culture of banking supervision and the inappropriate nature of its formalism were recently called into question relating to JP Morgan's Chief Investment Officer following the London Whale scandal (mentioned above).²⁴ The fact that the significant intellectual resources available to central banks have actually been focussed on the methods for quantifying risks can only be strongly applauded, as can the fact that supervisory teams have been reinforced by experts from the financial services industry. It is also desirable that regulated banks provide extra information (disclosure, the third Basel "pillar", <http://www.bis.org/bcbs/publ/d309.pdf>) concerning internal models of risk calculation.

3. The present state of reforms in the calculation of risk weighted assets on trading books

The first consultative document by the Basel Committee concerns the fundamental review of the trading book, published in May 2012.²⁵ Two further documents were distributed in October 2013, and December 2014 respectively.²⁶ These consultative documents have led to many responses, mainly from the financial services industry, notably through ISDA, IIF and GFMA channels.²⁷ Furthermore, Quantitative Impact Studies (QISs) in February 2015 and July 2015 include updates of the preceding documents.²⁸ Lastly, the official rules were published in January 2016, on the basis of the July 2015 impact study.²⁹

²⁴ See for example the summary of the report by Fed's Office of Inspector General (<http://oig.federalreserve.gov/reports/board-supervisory-processes-jpmorgan-chase-oct2014.pdf>), the Senate report (<http://www.hsgac.senate.gov/download/report-jpmorgan-chase-whale-trades-a-case-history-of-derivatives-risks-and-abuses-march-15-2013>) and numerous other commentaries in the press.

²⁵ "Fundamental review of the trading book: A revised market risk framework", Basel Committee on Banking Supervision <http://www.bis.org/publ/bcbs265.pdf>

²⁶ "Fundamental review of the trading book - second consultative document", Basel Committee on Banking Supervision <http://www.bis.org/publ/bcbs265.htm>, "Fundamental review of the trading book: outstanding issues", Basel Committee on Banking Supervision <http://www.bis.org/bcbs/publ/d305.pdf>

²⁷ The Basel Committee has published its responses: see for example, <http://www.bis.org/bcbs/publ/comments/d305/overview.htm> for the third consultative document.

²⁸ https://www.bis.org/bcbs/qis/biiiimplmoninstr_feb15.pdf, https://www.bis.org/bcbs/qis/instr_impact_study_jul15.pdf

²⁹ "Minimum capital requirements for market risk", <http://www.bis.org/bcbs/publ/d352.pdf>. See also "Explanatory note on the revised minimum capital requirements for market risk" (http://www.bis.org/bcbs/publ/d352_note.pdf) published in January 2016 by the Basel Committee,

It should be noted that recommendations by the Basel Committee are not legally binding and need to be transposed into national legislation, as for example in the European Union with the CRD IV, the CRR regulation, the Regulation Technical Standards (RTS) and the Implementation Technical Standards (ITS) of the EBA or of the European Supervisory Authorities (ESAs). Divergences in interpretation and the actual effective implementation within different jurisdictions of the Basel Committee rules are not without negative consequences. The United States never wanted to implement Basel II fully, and implemented its own rules with the Dodd-Frank Act, prior to recommendations of the Basel Committee. As for the European Union, it has applied favourable treatment to sovereign exposures, even though these have created real problems for the Union. The Basel Committee checks the compliance of national regulations. However, nothing guarantees geographical convergence, given the lack of political will. The negative consequences of regulatory fragmentation are not insignificant: compliance costs with multiple standards that are sometimes contradictory, the absence of a “level playing field” which allows competition to function normally (see Acharya (2003)). The result is competition to weaken regulation, in order to favour national champions, as well as geographical fragmentation. This fragmentation is detrimental to global management of excess savings, financing needs and services provided to global companies.

The rise of standardised approaches

The new regulatory project does not challenge the Internal Models Approach (IMA) for quantifying market risks. It nevertheless confirms the increasing strength of standardised approaches in which risk models are stipulated by regulators.

- The eligibility criteria of trading desks with respect to internal models (backtests and above all explanations of profits and losses by models monitoring risks (P&L attribution tests) have been strengthened considerably. Much uncertainty remains concerning the share of trading activities which are eligible for inclusion in internal models. Otherwise, desks that do not qualify for inclusion are subject to standard requirements, which potentially use up much more equity capital.
- The publication of risk measures using the standard approach is compulsory in order to facilitate the comparison of results published by banks.
- The use of regulatory floors for the outputs of internal models. The calculation of regulatory equity capital requirements cannot be less than the percentage of the result provided by the standard formula. The higher this percentage is, the smaller the scope for applying internal models. In many cases, the formula applicable will simply be a percentage of risk weighted assets, calculated using the standard approach.
- The application of a “residual risk add-on” capital charge that is proportional to the notional value of exotic instruments.
- The risks associated with Credit Valuation Adjustments (CVAs) for which the standard approach is prescribed.
- Correlation Trading Portfolio (CTP) instruments including CDOs are also excluded from the perimeter of internal models.

which provides some information on the origin of rules published the same month, and on the impact of new measures.

These moves towards standardised approaches result from scepticism of numerous regulators and economists concerning the pertinence of self-evaluation models of market risks used by banks.

The standard approach has changed a lot since the first consultative document published by the Basel Committee in May 2012, following feedback and interaction with the financial services industry after its Quantitative Impact Studies (QISs). The standard approach has been designed as a credible alternative to internal models. As an approximate order of magnitude, it involves around 5,000 risk factors.³⁰ Processing the concavity associated with option positions is included in the Basel Committee document. Nevertheless, essentially the standard approach to market risks is linked to preservation shocks on risk factors and to correlations prescribed by the Basel Committee. At first sight, this involves a parametric VaR (or Expected Shortfall).

The sensitivities to risk factors defined by the Basel Committee continue to be calculated on the basis of each bank's internal pricing models.³¹ It is therefore important that the audits of the model, such as the Asset Quality Review in the Eurozone, are followed up and extended to other jurisdictions, in order to ensure good comparability for outputs using the standard model. This assumes that supervisors have adequate resources and that priorities are clearly defined, though it should be noted that stress tests like the CCAR in the United States are very time-consuming. The preceding remark applies to tools for "mapping" sensitivities to risk factors used in front office "pricers" with sensitivities to risk factors defined by the regulator. The role of supervision (see Agarwal, Lucca, Seru and Trebbi (2014), Eisenbach et al. (2015)) will therefore remain crucial and benchmarking exercises may be carried out on hypothetical portfolios to establish zones of divergence concerning the calculation of sensitivity and whether it should be remedied.³²

Given the high fixed costs involved in the compliance of internal models, certain so-called tier two banks could opt for the standard approach.³³

A bank's choice (which is indeed optional) for calculating market risks using the standard approach eliminates uncertainty associated with trading desks no longer deemed qualified for inclusion in the internal model. The capital charges linked to the standard approach seem to be clearly higher than those associated with internal models, given the present state of

³⁰ The level of granularity of internal models by banks is more detailed (typically including several tens of thousands of risk factors).

³¹ More specifically, the risk factors are the finite differences from which it is possible to quantify the scale of directional positions (the "deltas") and negative convexity (negative Gamma or "curvature risk" in Basel terminology).

³² The valuation models used for interest rate options differ from one bank to another, particularly as regards the sensitivity to interest rates. This raises the question of whether to harmonise models, albeit at the expense of innovation. It is also possible that the reconciliation exercises, which should be conducted with the establishment of bilateral initial margins for derivatives that are not centrally cleared, lead spontaneously to such convergence.

³³ It has also been suggested that higher fixed costs due to compliance could constitute an entry barrier.

projected regulations and their implementation by banks. The failure of a desk to meet eligibility criteria for using the internal model could imply a leap in the overall capital charge.

Risks to a bank's reputation can also be mentioned, if its internal model is invalidated for some of its major trading activities. Lastly, this will affect decisions in allocating the bank's assets, with marginal costs being different according to standard approaches and internal models. Moreover, despite its numerous merits, the standard approach is not entirely adapted to measuring risks associated with certain positions on options. For example, the purchase of out-of-the-money options does not represent a major risk, as the losses are limited to the option premium. In this case, the standard approach could overvalue real risk. If the internal model is well specified, the ratio of charges between the internal model and the standard approach will be abnormally high. This will set off false alarms with supervisors and audits of models or inappropriate use of regulatory floors.

It is important to remember the truly Herculean task that the Basel Committee has had to deal with over the 2012-2016 period. Proposing a standardised approach for measuring market risk to big banks has been a substantial challenge, which has been met to a large extent. However, the generalisation of the use of standardised approaches has not gone ahead without raising serious questions:

- Apart from the overall capital equity requirements (see below), the relative costs of different risks changed a lot from the project distributed to banks for the monitoring exercise at the end of 2015 and the final rules set out in January 2016. Yet these costs determine banks' optimal portfolio allocations. This leads to two questions: i) have these relative costs been determined correctly by the regulator (the calibration methodologies were not made public, and so far there are no available academic studies concerning the pertinence of the standard approach); and ii) do they lead to good incentives? This is all the more important given that the uniformity resulting from a wider scope of application for the standard approaches will show up in banks' allocation of resources. This greater parallelism is not without consequences for financial stability (exposure to common factors and heightened pro-cyclicality).
- The detail of the risk analysis with the standard approach is less than in internal models. Risk buckets, especially for equity and credit, draw together very heterogeneous risks. For example, credits risk on sovereign debt only fall into two categories: Investment Grade and other risks. As a result, there is a possibility of risk drift within the categories set out by the Basel Committee. Moreover, exiting the Investment Grade category is extremely costly in terms of capital. Therefore, while the standard approach is calibrated in an acyclical way, there is in fact the risk of a sharp rise in equity capital requirements in times of crisis, given threshold effects. This could lead to a contraction of balance sheets and the amplification of exogenous shocks via the credit channel.
- Two mechanisms have been implemented as far as option contracts are concerned: i) treatment of negative curvature risks limited to parallel shocks on all risk factors taken together (idiosyncratic Gamma); and ii) a residual risk add-on for exotic options. Exotic options here are options for which the underlying assets have particularly low liquidity, and options which do not correspond to combinations of calls and puts (i.e., which are not so-called "plain vanilla" options). For second order risks, crossed risks are not taken

into account. Risks associated with hybrid products and spreads options are not therefore correctly taken into account. In defence of the Basel Committee, it must be said that an exhaustive approach would have been largely impractical. Concerning “residual risk add-on”, difficult questions are likely to arise over the definition of notional values and the perimeter of products covered. The Basel framework sets general rules, whose transposition into different jurisdictions could *de facto* lead to quite different treatments.

The main problem with the standard approach is that it is a compromise. It satisfies neither the proponents of leverage ratio, who are deeply resistant to the very notion of risk weighted assets and risk-sensitive capital ratios,³⁴ nor those actors who believe in the necessity for banks to carry out sufficient investments needed to measure their risks effectively:

- The standard approach meets the goals of comparability of risk weighted assets and a better sensitivity to risks. But this comes at the price of a certain complexity, which is contrary to the initial aims of the regulators, including the simplicity of models.
- Excessive recourse to the standard approach, for example in terms of constraining floors, could have negative implications, such as the renunciation of the development and use of internal risk models.

The reformulation and supervision of internal models

The transition from the Basel 2.5 framework to Basel III (or 3.5 or even IV – no trademark seems to have been deposited for this!) shows itself in changing risk metrics. Recall that under Basel 2.5, risks calculated using internal models are the sum of VaR and stressed VaR, calculated over a 10-day horizon with a 99% confidence level (the issue of multipliers applied to quantities, as well as temporal smoothing effects are set aside). The new framework considers Expected Shortfall, calculated during the stressed period at a confidence level of 97.5%. The horizon is variable according to the liquidity of the risk factors in question. Moreover, for validation purposes, banks are asked to calculate, among other things, VaRs with a one-day horizon and at the 97.5% and 99% confidence levels.

Differentiated liquidity horizons and the limits to benefits from diversification

There is a large literature about the relative merits of VaR and Expected Shortfall, the favoured tool henceforth for regulators when it comes to measuring market risks. Expected Shortfall makes it possible to take into account the scale of losses beyond VaR.³⁵ While this debate may stimulate theorists of risk measures and statisticians, it is not sure that it is very important from the point of view of financial stability... That said, the Basel Committee has

³⁴ See for example the presentation by Anat Admati,

<https://www.gsb.stanford.edu/sites/default/files/research/documents/Slides.pdf>

³⁵ Expected Shortfall is a sub-additive measure in contrast to VaR. This makes it possible to remedy the fact that the benefits of diversification are not taken into account. This new risk indicator however is not unanimously supported. It is criticised for being overly dependent on a few extreme events (a lack of statistical robustness), the theoretical problems of carrying out backtesting. Eventually, the measured risks are proportional to positions, without taking into account the negative impact of concentrated positions.

introduced a new concept of “partial” Expected Shortfall, which is calculated on sub-sets of risk factors (and not on portfolios). Furthermore, the Basel Committee has implemented limits on the “benefits of diversification”, though situations can be found in which the mechanism put forward operates in a way opposite to the laudable aims of its designers, for example with hybrid products. Similarly, the introduction of differentiated liquidation horizons by risk factor and not by financial product is based on pertinent economic and financial intuitions. But its mathematical formulation is not beyond criticism. The rules have in fact been amended to limit perverse effects. The calculation of the regulatory metric stems from rationale in which profitability has a Gaussian distribution and is independent. For the informed reader, this will limit the impact of the preceding debate on the choice of risk metric. Overall, “Expected Shortfall” is really the name given by regulators to a new concept, but it should not be confused with the term which has the same, academic meaning. Again, no trademark has been declared in financial mathematics!

Default risks in the trading book

Turning to default risks in the trading book, the possibility of using internal models to calculate risk weighted assets have been confirmed by the Basel Committee: securitisations are excluded, for which the standard approach is prescribed. The treatment of default risks for securitisations in the trading book is explicitly linked to the banking book (according to the new reference text on the subject: “Revisions to the securitisation framework », <http://www.bis.org/bcbs/publ/d303.pdf>, released in December 2014 by the BC). This excludes correlation portfolio trading which was already covered specifically by Basel 2.5, via the Comprehensive Risk Measure (CRM). Hopefully, the new regulations will facilitate the marketisation of credit risks, though avoiding the excesses which occurred during the previous crisis.³⁶ As for other risks, the quality of supervision is of primary importance, even given an appropriate regulatory framework.

Regarding the risk of default outside securitisations, the changes are not to be underestimated either, though the principles of Basel 2.5 have been preserved. The Incremental Risk Charge (IRC) has been replaced by a Default Risk Charge (DRC). The new charge does not explicitly take into account the risk of migration (which was not a major factor in the IRC, but which is now included in the charges on changes in credit margins, via lengthened liquidity horizons). A number of changes should be noted:

- The introduction floors on default probabilities (at 3 basis points), which will not be without problems in the European Union, where there is not yet a capital charge for sovereign risk.
- The use of default probabilities and recovery rates based on internal models, which is again associated with the challenges in terms of data quality and consistency with the data used for the banking book.
- The inclusion of equity risk in the perimeter: in case of default, the share price is expected to fall to zero, with a horizon of three months, compared to one year for other classes of products, shares or credit derivatives.

³⁶ On the issue of securitisation, see the chapter by Daphné Héant in the third part of this volume.

For a more technical presentation of the new Default Risk Charge and the theoretical and implementation issues, the reader may refer to Wilkens & Predrescu (2015) or Laurent Sestier & Thomas (2015).

In addition to market and credit risks, a new class of risk has appeared on the regulators' monitor. Credit Valuation Adjustment (CVA) is related to value adjustments for the counterparty risk of derivative products that are not cleared centrally. The rise in counterparty risks during the financial crisis were the source of significant losses in the trading portfolios of some banks, mainly through the increase in CVA. A capital charge for the risks in variations of CVA was introduced in the Basel framework in 2011 (<http://www.bis.org/publ/bcbs189.pdf>). This was also reflected in European law (see for example Section 381 of the CRR for a definition of the CVA), or in the rules adopted by US regulators in July 2013. In spring 2016, the Basel Committee decided that from 2019 onwards the capital charges for the variability of the CVA would be calculated using the standardised approach. The text of January 2016 gives guidelines for the methodology based on other categories of risk.

Capital charges for counterparty risks are not covered here. These charges will largely diminish due to the establishment of bilateral initial margins and the rise of the central clearing for derivative trades.³⁷

It should be noted that banks' preparation for the new rules applicable from 2019 has mobilised significant resources for several years, even though the previous work programme – for Basel 2.5 – is still being finalised: the expensive developments being undertaken to ensure compliance with capital charges for CVA variability will expire while barely finalised.

4. Future trends

The implementation of the new recommendations by the Basel Committee and their transposition into national law are planned for 2019. For Europe, this should result in an amendment of the Capital Requirements Regulation (CRR). This ensures direct and uniform implementation across the EU. In addition, the European Banking Authority (EBA) has been delegated to edit technical standards. It is possible that Community law will deviate on some important points from the Basel Committee's recommendations, such as the treatment of sovereign risks.

Improving the qualitative content of risk weighted assets in the trading book is the cornerstone of the new prudential framework, and the best response to the sensitivity deficit concerning risks of leverage ratios.³⁸ The Quantitative Impact Studies (QISs) and "monitoring exercises" are designed to quantify the impact of the new rules for calculating RWAs in the portfolios of participating banks. These impact studies and "monitoring exercises" also allow banks to prepare for the operational implementation of the new

³⁷ This is not however the case for sovereign risks, given the exemption margins from which they benefit.

³⁸ See for example Kim & Santomero (1988) for an illustration of the distortions in the allocations of assets and the destabilising incentives induced by the leverage ratio effect. See also Lautenschläger (2013) for a critical presentation of this ratio.

regulations. They are an opportunity for exchanging views between the Basel Committee and the National Regulatory Authorities (NRAs) on the one hand, and the financial industry and banks on the other hand. The Basel Committee has decided, as part of the redesigning of RWA calculations for trading books, to get involved in concrete, pragmatic and precise engineering of banks' risk management: in short, the Basel Committee is getting its hands dirty. However, the complexity of measuring risk in trading books and the many exchanges between regulators and the financial industry will undoubtedly fuel prejudices.

The credibility of the new methods of calculating risk weighted assets will also depend on the quality of supervision. Recall that even under the standard approach, model inputs include sensitivities to risk factors, calculated using banks' internal pricing models. The supervision of market risks therefore implies audits of such pricing models. These audits should not be limited to an analysis of compliance, but should also focus on the relevance of the models used. This requires that supervisors have top level capacities in quantitative risk engineering, the qualitative understanding of the business models of banks' trading activities and finally that they interact effectively with regulated entities, by maintaining a high level of expertise and intellectual independence. In addition to these high demands, the main risk lies in the excessive standardisation of internal models (which will become *de facto* standards); the destabilising effects (any model error is multiplied and behaviours also tend to standardise); and limited incentives for vigilance. There are also dangers in risk measurement methods being frozen and little-adapted to emerging risks, such as counterparty risks to clearing houses. Compliance with norms could become the one and only guarantee against prosecution for bank losses. Some commentators have jokingly welcomed the return of "boring banking". It is to be hoped that the overseers of bank risk do not take them at their word...

At present, some quantitative information is available about the impact of the new rules on equity capital requirements. The impact study published in November 2015 deserves attention. It relates to trading positions at 31 December 2014.³⁹ Another study was published in January 2016,⁴⁰ while benchmarking exercises were conducted by ISDA in October 2015 and April 2016.⁴¹ The results are derived from using rules published in January 2016, applied to trading positions at 31 December 2015. They allow the issues at stake to be better identified, and further studies will be conducted on positions at 30 June and 31 December 2016.

The mandate of the Trading Book Group of the Basel Committee was not to increase the overall amount of risk weighted assets, but to improve their quality and information content, as well as the comparability of risk weighted assets. However, there is no evidence that

³⁹ "Fundamental Review of the Trading Book – interim impact analysis"

<http://www.bis.org/bcbs/publ/d346.pdf>

⁴⁰ http://www.bis.org/bcbs/publ/d352_note.pdf on the database, June 2015.

⁴¹ "Industry FRTB QIS Analysis", 22 October 2015, <https://www2.isda.org/functional-areas/risk-management/>

ISDA/GFMA/IIF published the industry FRTB QIS analysis, 18 April 2016,

https://www2.isda.org/attachment/ODM00A==/QIS4%202015%20%20FRTB%20Refresh%20Report_Spotlight_FINAL.pdf

recalibration of the rules in January 2016, or of the introduction of regulatory floors will not lead to an increase in RWAs for trading portfolios. Furthermore, to know what rules will ultimately be applicable, it will be necessary to await the final arbitrations made by the regulators within the Basel Committee, in conjunction with other bodies (the Group of Governors and Heads of Supervision (GHOS) and the Financial Stability Board (FSB)) sometime in 2017. Moreover, these will be followed by various transpositions of the Basel framework into national jurisdictions.

The QIS are based on existing portfolios, constituted according to previous regulatory requirements. The new rules for calculating RWAs will induce changes in the compositions of trading portfolios, and hence in the amount and composition of RWAs. Banks will monitor more inventory costs of market making activities (Cheshire, 2015), for example for bond trading. The reduction in volumes of activity and numbers of participants in the market for corporate Credit Default Swaps (CDSs) is a concrete sign of the changes underway. It is unclear whether institutional investors will return as counterparties in sufficient scale to offset the reduction in market bank intermediation.⁴² Erratic movements in bond prices and credit spreads are to be feared during times of turbulence (stress) in the markets.⁴³

5. Rethinking banks' capital markets activities

It is hard to comment on the implications of the new rules for calculating RWAs, but one can examine the evolution of bank profitability in capital market activities. This issue must be looked at comprehensively. Indeed, the new solvency ratio has seen the rules for calculating its denominator – RWAs – change. Yet, it is mostly expected for this ratio to increase, and therefore for capital requirements to rise. At the same time, the perimeter of regulatory

⁴² A study entitled “*Has corporate bond market liquidity fallen?*”

<https://bankunderground.co.uk/2015/08/27/has-corporate-bond-market-liquidity-fallen/> published on the blog of the Bank of England by Yuliya Baranova, Lousia Chen & Nicholas Vause concludes that, “*These findings support the claim that the market-making capacity of dealers has fallen in recent years, reducing secondary market liquidity*”. It may be hoped that funds develop contrarian strategies and/or develop market-making activities to provide the market with liquidity. De Long et al. (1990) instead emphasise the dangers of pro-cyclical and destabilising investment strategies. To get an idea of inventory costs under the new framework, in a letter sent in October 2015 to Mario Draghi (in his capacity as Chairman, Group of Governors and Heads of Supervision (GHOS)), and to Stefan Ingves (as Chairman of the Basel Committee on Banking Supervision (BCBS)), the financial services industry indicates that about €1 of capital is needed (using the standard approach) for every €1 invested in 30-year, German government bonds (the letter is available on the ISDA site). The total lack of any leverage effectively means that banks in practice have become investment funds. This situation far exceeds the 20% to 30% equity capital ratios put forward by Anat Admati <https://www.gsb.stanford.edu/sites/default/files/research/documents/Slides.pdf>. Alex Brazier, Executive Director for Financial Stability Strategy at the Bank of England indicated in March 2016 that “*after a point, another unit of capital buys a much smaller fall in the probability of bank failure. There may be seriously diminishing returns. And at the same time, it’s possible that ever more bank capital may not best serve the real economy*” (speech entitled “*A macroprudential approach to bank capital: Serving the real economy in good times and bad*”, <http://www.bankofengland.co.uk/publications/Documents/speeches/2016/speech887.pdf>).

⁴³ On this subject, see the study published by PWC in August 2015, “*Global financial markets liquidity study*”, <https://www.pwc.se/sv/financial-services/assets/global-financial-markets-liquidity-study.pdf>

equity capital required to cover bank losses (Common Equity Tier 1 and the numerator of the ratio) has been greatly restricted, in order to enhance its quality and “loss absorbing” character. These new equity capital requirements induced by Basel III have in fact been applied by banks in anticipation of regulation. As a result, banks should amend the products they offer, their pricing and their strategic positioning for market activities.

The new regulations will primarily penalize the least profitable banks and those whose market share is insufficient to absorb the fixed costs associated with the new constraints. Banks’ structures will also be shaped by their internal rules for determining the cost of capital, as well as the new expectations of financial analysts in these areas.

The implementation and compliance costs of internal models will increase. This may be limited by some cost sharing, be it for databases for model calibration, or methods and structures allowing banks to harmonise their tools for risk calculation. Nevertheless, the effectiveness of such instruments and measures can be doubted, as:

- the largest banks have no interest in such mutualisation;
- governance tools such as pooling structures are difficult to implement; and
- the most complex risks are very specific to each bank.

These implementation costs relate on the one hand to data, and on the other hand to the alignment between pricing models and representations of front office risk, as well as to the costs of teams modelling risks internally.

Regarding the quality of data, the risk factors included in the internal models may be considered as Modelling Risk Factors (MRFs). Otherwise, the corresponding risks are subjected to detrimental processing under stress scenarios. The latest QIS or “monitoring exercises” have shown up considerable capital charges associated with Non-Modelling Risk Factors (NMRF). The idea of the regulator is that risks eligible for inclusion in internal models should be associated with “real” markets for which transaction prices or “committed quotes” are available. Since the price manipulation scandals in the money and foreign exchange markets, there have indeed been legitimate suspicions about data formed by market consensus, based on the opinions of banks. This is a major operational project. It is important to rethink the organisation, collection and governance of data, and the notion of risk factors (the so-called “representations of risks”), even at the level of front office tools.

A second major constraint lies hidden in the jargon of “P&L attribution tests”. It involves ensuring the consistency between the models actually used by the front office and internal models of risk calculations. This concerns both the alignment of the definition of the perimeter of risk factors and the methods for revaluing portfolios following shocks to these risk factors. The third element of the new regulatory arsenal lies in tracking models used at trading desks (in the order of several dozen per bank). At first glance, the thresholds of acceptable anomalies (the number of days when the losses exceed VaR) are not very constraining. Yet in practice, they will highlight the operational weaknesses of risk models. Overall, Basel Committee is asking banks wishing to continue using internal models to do work that is far from being trivial.

Banks must rethink their overall architecture for managing their internal data and their internal models. There is a move towards a greater integration of data and pricing tools. This involves heavy operational projects and structural choices for banks that want their trading desks to remain eligible for internal models.

Banks are thus faced with significant operational issues. More conceptual questions are nestled within these practical considerations, and include: the choice of calculation methods (historical or Monte Carlo), methods for revaluing portfolios, pricing models, representations of risks, costs of capital and portfolio allocation.

The new regulation of market risk is leading to strategic choices, with banks facing choices of whether to abandon some activities that have become insufficiently profitable and/or move to “bank 2.0” operations. This would not involve banks outsourcing their vital functions. They must reconcile agility, quality and cost control by transforming and thinking intelligently about existing internal tools. Otherwise, banks will be engulfed by the current regulatory wave and will no longer be able to control their business processes. Only some market players will have the force to imagine themselves operating in this new world, even as intermediation in OTC derivative markets is likely to decrease.

As regards financial stability, the better integration of front office tools and risks needs to be managed appropriately, if this trend persists. It is indeed necessary to maintain the principles of i) risk management which is independent from the front office (though independence does not mean isolation); and ii) of governance, based on practices like the independent audit of models.

Finally, to assess the impact of the new regulations of market activities, it is also necessary to be able to quantify changes in expected profitability (ROE, or return on tangible equity) and to risk premiums (and therefore betas). Many banks have already announced a reduction in their ROE target, which makes sense when leverage has decreased. However, more precise responses are difficult to establish. In terms of financial theory, increasing capital ratios lowers the costs of financial distress and the value of implied guarantees made by governments to depositors. This is difficult to quantify and differs between regimes of business recovery and liquidation, the credibility of governments and central banks in terms of bail-out exclusions and the intrinsic profitability of banks.

Conclusion

The Fundamental Review of the Trading Book (FRTB) began in May 2012 and led to the “Minimum capital requirements for market risk” document, which was published by the Basel Committee in January 2016. The new rules will have considerable but unquantifiable consequences for the capital requirements for trading activities. The calculation of the denominator of the solvency ratio (risk weighted assets or RWAs) for the trading book will be changed greatly. As of 2019, the new rules will replace the 1996 amendment to market risks, as well as the “add-ons” introduced after the financial crisis, which are commonly known as Basel 2.5.

The draft regulation on the calculation of risk weighted assets for market risks comes on top of a set of measures which have themselves not been finalised. These include: the

composition of equity capital in the numerator of the ratio (especially prudential value adjustments in the balance sheets, the so-called Additional Valuation Adjustments, or AVAs); the leverage ratio for derivatives and securities financing activities; regulatory floors, constraints on the modelling choices concerning the banking book; the calculations of capital surcharges for systemic institutions, etc.

The intellectual and practical consistency of this comprehensive package of measures is far from assured. Nearly a decade after the great financial crisis, the coming years will be marked by regulatory uncertainty and major operational difficulties, as the effective implementation of the new rules is complex. The banks themselves have underestimated implementation costs: instead of focusing on the development of new services to the economy as well improving existing counterparty services and providing liquidity, a large share of banks' intellectual and financial resources will be devoted to the implementation and management of new prudential regulations. The issues related to international harmonisation and the transposition of Basel rules into national law, along with the real ability of supervising risks are also underestimated.

Global governance of the transformation process of the prudential framework is clearly a problem. This is the result of fundamental differences of analysis among the architects of the new international financial system (the Financial Stability Board (FSB), the GHOS, the Basel Committee and its various working groups, regulatory and supervisory agencies, major central banks, as well as European Commission). As the French theologian and moralist Jacques-Joseph Duguet observed long ago with reference to governance and public goods, "the worst of all parties is to take none".⁴⁴ Outstanding questions thus remain:

- What role should be given to the leverage ratio relative to "risk-based" solvency ratios? For some, mainly European regulators, the leverage ratio should not be the binding constraint, but a "backstop". For US systemic banks, the Supplementary Leverage Ratio SLR, which is quite close to the Basel ratio in the principles of its calculation, is set at 5%, compared to 3% for the Basel rules. Yet this 5% level seems to have become the standard for financial analysts.
- To what extent can the internal models developed by banks to measure their risks and the ability of supervisors to "monitor" these models be trusted? Is it even desirable or reasonable to delegate to banks the responsibility for assessing their own market risks? Opinions differ radically on these issues.
- Should the level and the proportion of equity capital set aside to deal with market risks be increased or not? Without going into a long analysis of statements by regulators, objectives fluctuate between targeting a stable level of equity capital, its resizing based on the total risk weighted assets (10% set aside to cover market risks?), or the absence of any objective, with capital targets based just on the application of established rules.

⁴⁴ Jacques-Joseph Duguet (1649-1733), *Institution d'un prince, ou traité des qualitez, des vertus et des devoirs d'un souverain*, published posthumously in 1739.

- What is the accepted social function assigned to “customised” risk management products (OTC derivatives)? The direction given to the regulation and calibration rules varies fundamentally according to *a priori* views.
- What should be the main tool for supervising large banks? Solvency ratios, which are the main subject of this article, or stress tests (CCAR), as is now the case in the United States.

As of mid-2016, it is not possible to quantify realistically the impact of these new measures, despite numerous consultative documents issued since 2012, impact studies and “monitoring exercises”, as well as the interactions between regulators and the financial services industry. This is true for overall capital requirements for market risks, and more so when breaking down assessments by categories of risk (interest rates, foreign exchange rates, shares, credit, raw materials/commodities). The operational nature of impact studies already conducted is illusory and it is impossible for financial institutions to perform any strategic management of their market activities:

- these impact studies are conducted on the basis of existing portfolios, even though the new rules will result in significant reallocations of exposure, or indeed significant cutbacks in market activities;
- the quality of banks’ contributions to impact studies is highly variable; and
- most of all, the rules are not determined. In particular, the calibration of regulatory floors constraining the use of internal models, or the interpretation of the Basel texts concerning the criteria for implementing and validating internal models could change the very philosophy of the new rules.

The economic models of Corporate and Institutional/Investment Banking (CIB) need rethinking and depend crucially on the regulatory framework which is developing, sometimes in an opaque and unpredictably way. The new prudential rules will determine the comparative costs and benefits of bank intermediation in financial markets, compared to non-regulated actors (pension funds and hedge funds). The markets for OTC derivatives will be affected depending on the amount of equity capital required, the transformations related to the automation of transactions, and the specific rules relating to the organisation of these markets (bilateral initial margins and geographical fragmentation). There is great uncertainty about changes in overall business volumes, the perpetuation of market intermediation in several asset categories, the level of sophistication of the products sold by banks, the degree of concentration of financial industry, the value of banking franchises and the creation of shareholder value. It is probably only with time and experience will be possible to determine the extent of the reconfiguration of banking intermediation in financial markets.

The new prudential regulations have a worthy goal: making banks safer. However, the effectiveness of the new system is not guaranteed from the point of view of financial stability (see Veron (2014) for similar remarks), due to complexity, geographic fragmentation, and the lack of risk sensitivity in the standardised approaches.

With respect to services rendered to the economy, increased use of standardised derivatives could push “basis risks” and liquidity risks onto final players: for example, the use of “plain vanilla” swaps or futures contracts instead asset swaps in managing the risks of rates on corporate bond liabilities.

It may be asked whether the new equity capital requirements will reduce the ability of the banking system to ensure market-making functions. This cannot be ruled out. The rise of players which are less regulated than banks testifies to this: insurance funds and companies have developed their consultancy activities in the field of capital markets and now offer price quotes for the purchase and sale of derivatives.⁴⁵

Is this outsourcing desirable? Yes, if one is willing to consider that only sight deposits and not long-term savings should be protected, that insurance companies or big fund managers do not pose any systemic risk⁴⁶, and that problems of moral hazard cease at the frontiers of the banking world. Also, it is important that systemic risks associated with new nodes (clearing houses) are well quantified and monitored. The new regulatory environment for banks is leading to this kind of outsourcing. Regulators have developed sophisticated banking supervision tools. The regulated banks have embarked on expensive developments in terms of compliance and monitoring market risks. Yet the risks will have moved to less supervised areas⁴⁷.

So has something been gained in terms of asset price stability? It is possible, for example, to have doubts about the evolution of the depth of bond markets. The fleeting nature of liquidity was well illustrated by the sharp rise in long term rates observed in the European markets for public debt markets in 2015, or the “taper tantrum” in the United States in 2013 (Neely (2014), Fisher (2015)). These are warning signals.⁴⁸ So too, have been the repeated warnings about the development of bond bubbles (de Larosière (2016)).

The prudential regulation of market risks must meet diverse goals that are hardly compatible.⁴⁹ This regulation involves firstly ensuring financial stability and bank solvency, which in turn implies an adequate level of equity capital. Yet such capital serves only as short-term guarantees. Longer term, it is the profitability of banking activities which guarantees the viability of the banking system. Changes in Price to Book ratios, which give an idea of the value creation associated with new business, are probably worth considering. Krugman (2010) illustrated the importance of banking franchises for financial stability with a

⁴⁵ For example, BlackRock Solutions <https://www.blackrock.com/aladdin/blackrock-solutions> or the Multi Asset Client Solutions services provide by Axa IM Corporate.

⁴⁶ As mentioned by Hansen (2012), systemic risk is uneasy to define. We refer to the review paper of Benoit et al. (2016) for comments about the systemic point of view on banking regulations.

⁴⁷ See the FSB reports, “*Shadow Banking: Strengthening Oversight and Regulation*” (2011), http://www.fsb.org/wp-content/uploads/r_111027a.pdf and “*Strengthening Oversight and Regulation of Shadow Banking*” (2013), http://www.fsb.org/wp-content/uploads/r_130829a.pdf

⁴⁸ As mentioned in the study reported on the blog of the Bank of England (cited above), this reduction in market depth, which is specific to over-the-counter markets, is hardly measured by the usual liquidity metrics. In a document published by Blackrock, *The liquidity challenge*, in June 2014, (<http://www.blackrock.com/corporate/en-mx/literature/whitepaper/bii-the-liquidity-challenge-us-version.pdf>), Peter Fisher (Senior Director of the BlackRock Investment Institute) states that, “The whole system relies on liquidity illusion”. The International Monetary Fund in its *Global Financial Stability Report* of April 2015 (<http://www.imf.org/external/pubs/ft/gfsr/2015/01/pdf/text.pdf>) provides the same analysis. The reader may refer to Elliott (2014) or Fender & Lewrick (2015), or more generally to the lively debate on the evolution of liquidity in the bond markets.

⁴⁹ See for example the summary presentation by Krugman (2010), <http://krugman.blogs.nytimes.com/2010/04/18/six-doctrines-in-search-of-a-policy-regime/>

maxim: “do not kill the cash cow that kept laying golden eggs”.⁵⁰ It is desirable that increased equity capital requirements and higher compliance costs do not penalise excessively the profitability of market activities (a reduction of market intermediation could reduce the ability of banks to absorb risks), nor the financing of the economy. The degree of substitutability between banks and other unregulated market participants also needs to be controlled. In short, we are conducting a full-scale experiment and time will tell which of the very different views on this subject are closest to the truth.

Bibliography

Acerbi, C., & Tasche, D. (2002). Expected shortfall: a natural coherent alternative to value at risk. *Economic notes*, 31(2), 379-388.

Acharya, V. V. (2003). Is the international convergence of capital adequacy regulation desirable?. *The Journal of Finance*, 58(6), 2745-2782.

Adrian, T., & Shin, H. S. (2013). Procyclical leverage and value-at-risk. *Review of Financial Studies*, hht068.

Aikman, D., Galesic, M., Gigerenzer, G., Kapadia, S., Katsikopoulos, K. V., Kothiyal, A., & Neumann, T. (2014). Taking uncertainty seriously: simplicity versus complexity in financial regulation. *Bank of England Financial Stability Paper*, (28).

Allen, F., & Gale, D. (2000). *Comparing financial systems*. MIT press.

Alexander, C., & Sarabia, J. M. (2012). Quantile Uncertainty and Value-at-Risk Model Risk. *Risk Analysis*, 32(8), 1293-1308.

Agarwal, S., Lucca, D., Seru, A., & Trebbi, F. (2014). Inconsistent regulators: Evidence from banking. *Quarterly Journal of Economics*, 129(2), 889-938.

Barakova, I., & Palvia, A. (2014). Do banks' internal Basel risk estimates reflect risk?. *Journal of Financial Stability*, 13, 167-179.

Begley, T. A., Purnanandam, A. K., & Zheng, K. K. (2016). The strategic under-reporting of bank risk. *Ross School of Business Paper*, (1260).

Behn, M., Haselmann, R. F., & Vig, V. (2014). The limits of model-based regulation.

Benoit, S., Colliard, J. E., Hurlin, C., & Pérignon, C. (2016). Where the risks lie: A survey on systemic risk. *Review of Finance*, rfw026.

Blum, J. M. (2008). Why 'Basel II' may need a leverage ratio restriction. *Journal of Banking & Finance*, 32(8), 1699-1707.

Blundell-Wignall, A., & Atkinson, P. (2010). Thinking beyond Basel III. *OECD Journal: Financial Market Trends*, 2010(1), 9-33.

⁵⁰ See the revealing article by Calomiris & Nissim (2014), the analyses by Keeley (1990), Allen & Gale (2000), Hellmann, Murdock & Stiglitz (2000), Repullo (2004) about bank franchises, and that by Gorton (2012) on “quiet banking”. Unfortunately, the regulators only look at tangible equity, and not the market value of shares, for the reason that intangible assets cannot be ceded easily in case of liquidation. However, such arguments cannot be applied to incentives or moral hazard.

- Calomiris, C. W., & Nissim, D. (2014). Crisis-related shifts in the market valuation of banking activities. *Journal of Financial Intermediation*, 23(3), 400-435.
- Cheshire, J. (2015). Market Making in Bond Markets. *RBA Bulletin, March*, 63-73.
- Colliard, J. E. (2015). Strategic Selection of Risk Models and Bank Capital Regulation. Available at SSRN 2170459.
- Culp, C. L., & Miller, M. H. (1995). Metallgesellschaft and the economics of synthetic storage. *Journal of Applied Corporate Finance*, 7(4), 62-76.
- Danielsson, J., Embrechts, P., Goodhart, C., Keating, C., Muennich, F., Renault, O., & Shin, H. S. (2001). An academic response to Basel II.
- Danielsson, J., Shin, H. S., & Zigrand, J. P. (2004). The impact of risk regulation on price dynamics. *Journal of Banking & Finance*, 28(5), 1069-1087.
- DeAngelo, H., & Stulz, R. M. (2013). *Why high leverage is optimal for banks* (No. w19139). National Bureau of Economic Research.
- Bradford de Long, J., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1990). Positive feedback investment strategies and destabilizing rational speculation. *the Journal of Finance*, 45(2), 379-395.
- Dowd, K., Cotter, J., Humphrey, C., & Woods, M. (2011). How unlucky is 25-sigma?. *arXiv preprint arXiv:1103.5672*.
- Duguet, J. J. (1743). *Institution d'un prince, ou Traité des qualitez, des vertus et des devoirs d'un souverain [par M. l'abbé Duguet]*. chez J. Nourse.
- Duffie, D. (2013). Futurization of Swaps.
- Ediz, T., Michael, I., & Perraudin, W. (1998). The impact of capital requirements on UK bank behaviour. *Economic Policy Review*, 4(3).
- Edwards, F. R. (1999). Hedge funds and the collapse of long-term capital management. *Journal of Economic Perspectives*, 13, 189-210.
- Eisenbach, T. M., Haughwout, A., Hirtle, B., Kovner, A., Lucca, D. O., & Plosser, M. C. (2015). Supervising large, complex financial institutions: What do supervisors do?. *FRB of New York Staff Report*, (729).
- Elliott, D. J. (2014). Bank Liquidity Requirements: An Introduction and Overview. *The Brookings Institution*.
- Estrella, A., Park, S., & Peristiani, S. (2000). Capital ratios as predictors of bank failure. *Economic policy review*, 6(2).
- Fender, I., & Lewrick, U. (2015). Shifting tides-market liquidity and market-making in fixed income instruments. *BIS Quarterly Review March*.
- Fischer, S. (2015). The federal reserve and the global economy. *IMF Economic Review*, 63(1), 8-21.
- Gordy, M. B., & Howells, B. (2006). Procyclicality in Basel II: Can we treat the disease without killing the patient?. *Journal of Financial Intermediation*, 15(3), 395-417.
- Gorton, G. (2012). *Misunderstanding financial crises: Why we don't see them coming*. Oxford University Press.

- Groeneveld, H., Hancock, D., Jones, D., Perraudin, W., Radecki, L., & Yoneyama, M. (1999). *Capital requirements and bank behaviour: the impact of the Basle Accord* (No. 1). Bank for International Settlements.
- Haldane, A. G., & Madouros, V. (2012). The dog and the frisbee. *Revista de Economía Institucional*, 14(27), 13-56.
- Hansen, L. P. (2012). *Challenges in identifying and measuring systemic risk* (No. w18505). National Bureau of Economic Research.
- Hellmann, T. F., Murdock, K. C., & Stiglitz, J. E. (2000). Liberalization, moral hazard in banking, and prudential regulation: Are capital requirements enough?. *American economic review*, 147-165.
- Jackson, P., & Perraudin, W. (2000). Regulatory implications of credit risk modelling. *Journal of Banking & Finance*, 24(1), 1-14.
- Jones, D. (2000). Emerging problems with the Basel Capital Accord: Regulatory capital arbitrage and related issues. *Journal of Banking & Finance*, 24(1), 35-58.
- Jorion, P. (2002). How informative are value-at-risk disclosures?. *The Accounting Review*, 77(4), 911-931.
- Keeley, M. C. (1990). Deposit insurance, risk, and market power in banking. *The American Economic Review*, 1183-1200.
- Kim, D., & Santomero, A. M. (1988). Risk in banking and capital regulation. *The Journal of Finance*, 43(5), 1219-1233.
- Krugman, P. (2010, April). Six Doctrines in Search of a Policy Regime. In *speech at the 19th Annual Hyman Minsky Conference (April 2010)*.
- Kupiec, P. H. (1995). Techniques for verifying the accuracy of risk measurement models. *The J. of Derivatives*, 3(2).
- de Larosière, J. (2016). *Cinquante ans de crises financières*. Odile Jacob.
- Laurent, J. P., Sestier, M., & Thomas-Simonpoli, S. (2015). Trading book and credit risk: how fundamental is the Basel review?. Available at SSRN 2678834.
- Lautenschläger, S. (2013, October). The leverage ratio-a simple and comparable measure. In *Speech at the evening reception of the Deutsche Bundesbank/SAFE Conference "Supervising banks in complex financial systems", Frankfurt am Main, 21 October*.
- Le Leslé, V., & Avramova, S. Y. (2012). Revisiting risk-weighted assets.
- Litan, R. E. (2010). *The Derivatives Dealers' Club and Derivatives Markets Reform: A Guide for Policy Makers, Citizens and Other Interested Parties*. Initiative on Business and Public Policy at Brookings.
- Liu, C. C., Ryan, S. G., & Tan, H. (2004). How banks' value-at-risk disclosures predict their total and priced risk: Effects of bank technical sophistication and learning over time. *Review of Accounting Studies*, 9(2-3), 265-294.
- Lowenstein, R. (2000). *When genius failed: the rise and fall of Long-Term Capital Management*. Random House Trade Paperbacks.

- Mariathasan, M., & Merrouche, O. (2014). The manipulation of basel risk-weights. *Journal of Financial Intermediation*, 23(3), 300-321.
- Miles, D., Yang, J., & Marcheggiano, G. (2013). Optimal Bank Capital. *The Economic Journal*, 123(567), 1-37.
- Neely, C. J. (2014). Lessons from the taper tantrum. *Economic Synopses*, (2).
- Pérignon, C., & Smith, D. R. (2010). The level and quality of Value-at-Risk disclosure by commercial banks. *Journal of Banking & Finance*, 34(2), 362-377.
- Pérignon, C., Deng, Z. Y., & Wang, Z. J. (2008). Do banks overstate their Value-at-Risk?. *Journal of Banking & Finance*, 32(5), 783-794.
- Pérignon, C., & Smith, D. R. (2010). Diversification and value-at-risk. *Journal of Banking & Finance*, 34(1), 55-66.
- Repullo, R. (2004). Capital requirements, market power, and risk-taking in banking. *Journal of Financial Intermediation*, 13(2), 156-182.
- Rochet, J. C. (2008). Procyclicality of financial systems: is there a need to modify current accounting and regulatory rules?. *Financial Stability Review*, (12), 95-99.
- Rosenberg, G. D., & Massari, J. R. (2013). Regulation through Substitution as Policy Tool: Swap Futurization under Dodd-Frank. *Colum. Bus. L. Rev.*, 667.
- Tasche, D. (2002). Expected shortfall and beyond. *Journal of Banking & Finance*, 26(7), 1519-1533.
- Véron, N. (2014). The G20 financial reform agenda. Bruegel Policy Contribution Issue 2014/11, September 2014.
- Wilkins, S., & Predescu, M. (2015). Incremental Default Risk (IDR): Modeling Framework for the 'Basel 4' Risk Measure. Available at SSRN 2638415.
- Yamai, Y., & Yoshida, T. (2002). On the validity of value-at-risk: comparative analyses with expected shortfall. *Monetary and economic studies*, 20(1), 57-85.