

# INTELLIGENT RISK

knowledge for the PRMIA community



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Professional Risk Managers' International Association



# PROFESSIONAL RISK MANAGERS' INTERNATIONAL ASSOCIATION

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## editor introduction



### Steve Lindo

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### Nagaraja Kumar Deevi

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The January 2019 issue of *Intelligent Risk* has special significance, as 2018 drew to a close on a global panorama where both new and old risks are in a high state of flux. We received a broad range of articles, each with a unique value. This issue features articles that focus on: The Basel IV Bomb, Cash vs. Cashless Society: The Risks and Opportunities, Supplementing Cyber Risk Discussion with an Actuarial Perspective, Managing the Downside Risks of Digitalization in Corporations, and Low Probability Sovereign Default Modeling. In addition, our publication includes special articles from Bloomberg and Fiserv, this issue's generous sponsors, as well as PRMIA volunteers. We hope you enjoy reading these thoughtful and articulate pieces as much as we did editing them.

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## the Basel IV bomb – profound changes in the banking regulations on the horizon

by **Vikram Nath**

In December 2017, the final phase of the post-crisis reforms was published under the Basel III framework. The Basel Committee on Banking Supervision (“BCBS”) developed the Basel III framework in response to the global financial crisis. Together with the requirements already published in 2015 and 2016, the Basel committee changes all approaches for the calculation of Risk Weighted Assets (“RWA”) and the corresponding Pillar III<sup>1</sup> disclosure rules. The quantum of these changes is so mammoth that this package of new standards is unofficially called Basel IV.

Basel IV standards are set to be implemented in a phase wise manner starting from January 1st, 2022. The effect of these changes will be felt heavily by most commercial banks, as the cost of capital will increase substantially. In response to this, the commercial banks will need to increase the proportion of high margin business (such as capital markets, advisory fees, market-making activities, etc.) to supplement their core lending business revenues. With the publication of the final phase in December 2017, this topic has been very relevant for the commercial banks in 2018, and the importance of this subject will only increase as we approach 2022.

### the Basel Committee on Banking Supervision (BCBS) and Basel accords – a quick recap

BCBS is one of the six committees under the aegis of Bank of International Settlement\* (BIS) and has officially issued three Basel accords so far as summarized below:

**Basel I (1988):** Basel I introduced a standardized approach to risk-based capital by grouping all assets into five categories (or risk weights) as depicted in the chart below. Under Basel I, banks that operate internationally are required to have risk weight of 8% or less<sup>2</sup>.

Basel I Risk Categories and Risk Weights	
Risk Category	Risk Weight
Cash, central bank and government debt and any OECD government debt	0%
Public Sector Debt	0%, 10%, 20%, or 50%
Development bank debt, OECD bank debt, OECD securities firm debt, non-OECD bank debt, non-OECD public sector debt, cash in collection	20%
Residential Mortgages	50%
Private sector Debt, non-OECD bank debt, real estate, plants and equipments, capital instruments issued at other banks	100%

Source: <http://www.baselcompliance.net/basel-i.htm>

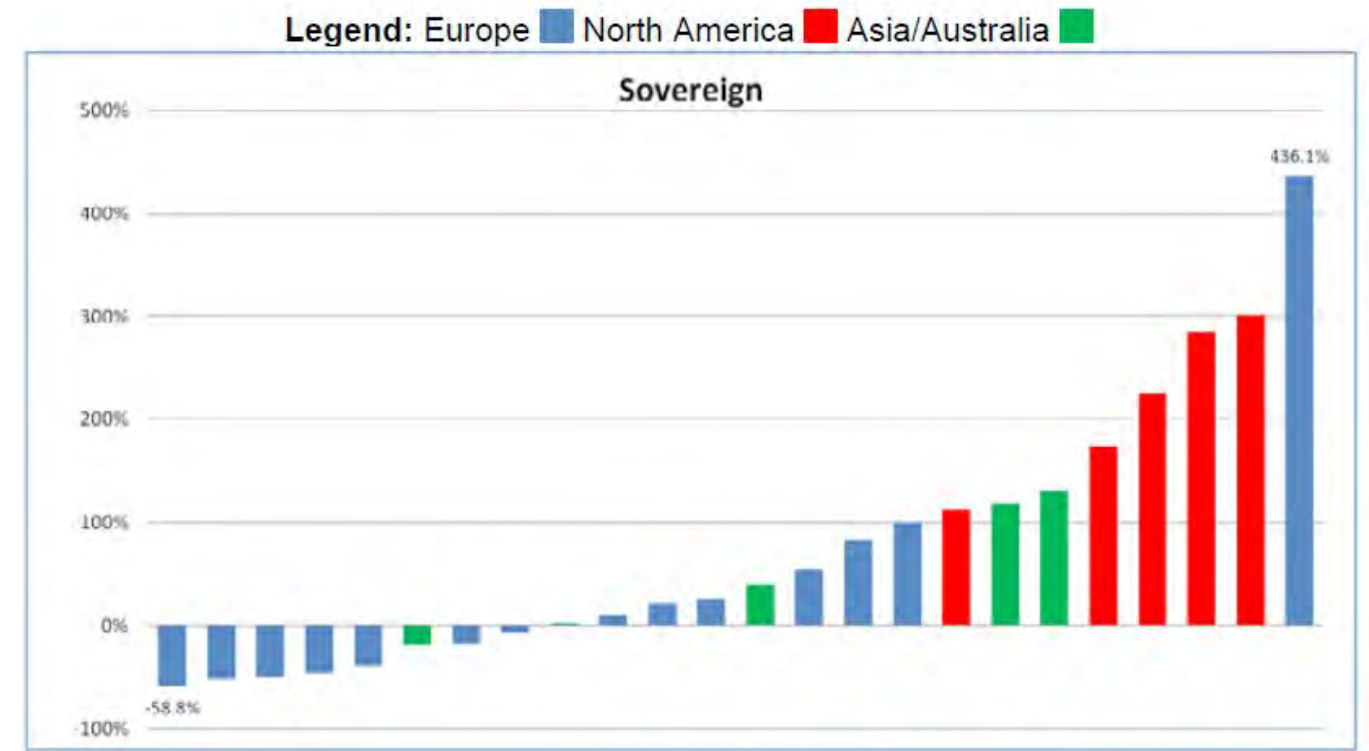
**Basel II (2004):** Basel II Accord was an attempt to address the shortcomings of Basel I Accord by introducing a new Internal-Ratings Based (“IRB”) approach that employed internal risk model to calculate risk-based capital. Basel II also focused on supervisory review and effective use of disclosures to strengthen market discipline and encourage sound banking practices.

**Basel III** (introduced in 2010 but still into implementation): Mostly a continuation of Basel II and in response to the financial crisis. Basel III introduced additional requirements and safeguards on top of Basel II.

**Basel IV:** Basel IV is an unofficial term which is used to describe the changes made to Basel III Accords specifically in 2016 and 2017.

### the need for Basel III and Basel IV

The overarching goal of the comprehensive Basel III reforms (including the Basel IV changes) is to minimize the variability in the measurement of RWA by different banks and improve the comparability of their respective capital ratios. Before we delve deeper into these reforms, the chart below demonstrates the issue of variability/comparability amongst banks on the risk weights of different banks in a hypothetical sovereign portfolio compared to the average value of all banks considered.



Source: <https://www.bis.org/publ/bcbs256.pdf>, Chart 11

\* The Bank of International Settlements is an international organization headquartered in Basel, Switzerland. It is owned by 60 member central banks and monetary authorities from around the world that includes Board of Governors of the Federal Reserve System (USA) and European Central Bank (ECB).

The above variability stems from assigning different Probability of Default (“PD”) and Loss Given Default (“LGD”) by each of the individual banks to the same hypothetical portfolio<sup>3</sup>. Per Basel II, the banks were free to choose between two different approaches for quantification of credit risk: Standardized Approach and Internal Ratings Based (“IRB”) Approach. The IRB approach was further broken down into (i) Foundation (F-IRB) which permitted the banks to use own estimates for PD but using other risk parameters from the Standardized Approach (ii) Advanced (A-IRB) which permitted the banks to use own estimates for all risk parameters. The freedom to choose some or all of the risk parameters led to inaccurate and inconsistent calculation of the RWAs.

## Basel IV mechanism and methodology

The Basel IV norms present a major overhaul of the IRB Approach to address the issue of RWA variability. This would be achieved by<sup>4</sup>:

- i. eliminating the use of A-IRB approach for certain asset classes,
- ii. providing input floors for PD and LGD to make sure a minimum level of conservatism in model parameters for asset classes where IRB approaches remain available, and
- iii. providing greater specification of parameter estimation practices to reduce RWA variability.

The chart below summarizes the changes in the available approaches under Basel II and Basel III.

Revised Scope of IRB Approaches for Asset Classes Under Basel III (including Basel IV)		
Asset Class	Basel II: available approaches	Basel III: available approaches
Large and mid-sized corporates (consolidated revenues > EUR 500 million)	A-IRB, F-IRB, SA	F-IRB, SA
Banks and other financial institutions	A-IRB, F-IRB, SA	F-IRB, SA
Equities	Various IRB approaches	SA
Specialized lending	A-IRB, F-IRB, slotting, SA	A-IRB, F-IRB, slotting, SA

Source: [https://www.bis.org/bcbs/publ/d424\\_hlsummary.pdf](https://www.bis.org/bcbs/publ/d424_hlsummary.pdf) (Table 2)

The chart below summarizes the various input floors for each of the risk parameters under Basel III/IV. As mentioned above in (ii), Basel IV has set-up floors for PDs for both F-IRB and A-IRB banks/assets to reduce the variability in PD leading to a variability in RWA.

Minimum Parameter Values in the Revised IRB Framework					
Asset Class	Probability of Default (PD)	LGD		Exposure at Default (EAD)	
		Unsecured	Secured		
Corporate	0.05%	25%	Varying by collateral type: - 0% financial - 10% receivables - 10% commercial or residential real estate - 15% other physical	EAD subject to a floor that is the sum of (i) the on-balance sheet exposure; and (ii) 50% of the off-balance sheet exposure using the applicable Credit Conversion Factor (CCF) in the SA	
<b>Retail Classes</b>					
Mortgages	0.05%	N/A	0.05%		
QRRE transactors	0.05%	50%	N/A		
QRRE revolvers	0.10%	50%	N/A		
Other retail	0.05%	30%	Varying by collateral type: - 0% financial - 10% receivables - 10% commercial or residential real estate - 15% other physical		

Source: [https://www.bis.org/bcbs/publ/d424\\_hlsummary.pdf](https://www.bis.org/bcbs/publ/d424_hlsummary.pdf) (Table 3)

## output floor

The notion of an ‘Output Floor’ for capital consumption has been in existence since Basel II. As Basel II permitted the banks to use internal models for risk parameters, an Output Floor was established to avoid gaming of the system. This Output Floor (called Basel I capital floor) insured that even when the internal models are used, banks had to maintain a certain minimum amount of capital. The Basel I capital floor for banks using internal models (pursuant to Basel II) was set at 80% of Basel I RWA. However, the implementation of Basel I floor varied across the countries due to Basel I implementation variability and because many jurisdictions did not implement Basel I at all.

The concept of Output Floor in Basel IV is along the same lines as in Basel I, but with more conservatism incorporated into it. The Basel IV Output Floor is now based on RWAs calculated using the Standardized Approach as incorporated and defined in Basel IV. Per the new Output Floor norms, banks’ RWA would be higher of:

- i. RWA calculated using the banks’ internal ratings based approach (duly approved by the respective banking supervisor), and
- ii. 72.5% of the total RWA calculated using only the Standardized Approach. Note that the use of Standardized Approach is not only applicable to credit risk RWA, but also applicable to Credit Valuation Adjustment (“CVA”) risk, Market Risk, Operational Risk etc. A discussion of these risks is outside the scope of this article.

## impact of Basel IV norms

The impact of Basel IV norms would be felt by almost every bank. However, the extent of the impact would vary depending on the size of the bank, its business model and to the extent the bank uses IRB approach for RWA calculations. Also if a bank has had big losses related to Operational Risk in the past (i.e. Rogue Trading, etc), its capital costs related to Operational Risk will be higher than what it used to be.

In general, the maximum impact is expected to be felt by large European Banks as they have been using the IRB approach extensively. Ironically, the Basel Committee did a Quantitative Impact Study<sup>5</sup> of Basel III and concluded that the implementation of Basel III accords would not result in any significant increase in overall capital requirement. As depicted in the chart below, Group 1 banks (banks with a Tier 1 capital of more than €3 billion and are internationally active) would have a shortfall of €90.7 billion. All other banks (Group 2 banks) would not have any shortfall at all.

Basel III / IV Capital Impact per BCBS Quantitative Impact Study (December 2017)		Change in Tier 1 MRC at the target level (%) <sup>1</sup>		Change in CET1 capital ratio (percentage points)	Capital shortfalls combined (EUR billions)		
	Number of Banks	All	of which: risk-based		CET1	Tier 1	Total
Group 1 banks	71	-0.5	0.2	0.2	27.6	56.4	90.7
Of which: G-SIBs	27	-1.4	-0.9	0.3	27.6	55.4	85.7
Group 2 banks	42	3.8	0.9	0.1	0.3	0.8	1.4

<sup>1</sup> As a percentage of overall basis Minimum Required Capital ("MRC") at the target level, i.e. combining risk-based as well as leverage ratio capital requirements and including capital conservation buffers and G-SIB surcharges where respectively applicable.

Source: <https://www.bis.org/bcbs/publ/d426.pdf> (Table 1)

The above study has been strongly criticized by experts from the banking industry including supervisors and experts. The strongest criticism stems from the data quality issues and the fact that this study focused on the impacts of the changes published in December 2017. To get a full picture, the study must have taken into account the holistic changes that will be introduced by the full Basel III package.

Another study<sup>6</sup> (dated Oct 4, 2018) was conducted by European Banking Authority ("EBA"), and it concluded that the weighted average change in total T1 MRC is 16.7% across all 101 banks. The chart below presents a summary of the study conducted by EBA. The Output Floor and Operational Risk frameworks are the two major drivers of MRC increase across all banks.

Basel III / IV Capital Impact per EBA Quantitative Impact Study (published Oct 2018) (Results are as percentage of the overall base MRC due to the full implementation of Basel III (2027))								
	Credit Risk	Market Risk	CVA	Operational Risk	Output Floor	Total Risk-based	Revised LR	Total
All banks	4.5	2.0	3.3	5.7	6.3	21.8	-5.1	16.7
Group 1	4.1	2.3	3.8	6.4	6.5	23.0	-4.3	18.7
of which G-SIBs	4.7	3.4	5.4	7.5	5.4	26.4	-1	25.4
Group 2	6.7	0.6	0.4	1.4	5.3	14.4	-10.6	3.8

Source: <https://www.eba.europa.eu/documents/10180/2380948/2018+Basel+III+Monitoring+Exercise+Report.pdf> (Table 1)

Reputable consulting companies (PWC, Deloitte, KPMG and others) have also conducted numerous independent studies to assess the impact of Basel III / IV on the largest banks in Europe. PWC estimates<sup>7</sup> that the Basel IV norms would lead to an aggregate expected increase in RWA of €1.0 trillion to €2.5 trillion, or an increase of 13% to 22% for the largest banks in Europe. Deloitte conducted its own study<sup>8</sup> on two fictitious Dutch banks that used Standardized Approach and A-IRB approaches for their respective RWA calculation. For the bank that uses Standardized Approach, Deloitte estimated a 3.4% increase in its RWA as it migrates from Basel III to Basel IV. However, for the bank that uses A-IRB approach, the increase in RWA was 80%. This increase in RWA was primarily attributed to the Output Floor that was set as part of Basel IV norms.

## implementation timeline

The chart below depicts the implementation timeline for Basel III/IV standards.

Implementation Timeline for Basel III / IV Norms	
Revision	Implementation Date
Revised standardized approach for credit risk	January 1st, 2022
Revised IRB framework	January 1st, 2022
Revised CVA framework	January 1st, 2022
Revised operational risk framework	January 1st, 2022
Revised market risk framework	January 1st, 2022
Leverage Ratio	Existing exposure definition: January 1st, 2018
	Revised exposure definition: January 1st, 2022
	G-SIB buffer: January 1st, 2022
Output floor	January 1st, 2022: 50%
	January 1st 2023: 55%
	January 1st 2024: 60%
	January 1st 2025: 65%
	January 1st 2026: 70%
	January 1st 2027: 72.5%

Source: [https://www.bis.org/bcbs/publ/d424\\_hlsummary.pdf](https://www.bis.org/bcbs/publ/d424_hlsummary.pdf) (Table 5)

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## references

1. <https://www.bis.org/bcbs/publ/d309.pdf>
2. <http://www.baselcompliance.net/basel-i.htm>
3. <https://www.bis.org/publ/bcbs256.pdf>
4. [https://www.bis.org/bcbs/publ/d424\\_hlsummary.pdf](https://www.bis.org/bcbs/publ/d424_hlsummary.pdf)
5. <https://www.bis.org/bcbs/publ/d426.pdf>
6. <https://www.eba.europa.eu/documents/10180/2380948/2018+Basel+III+Monitoring+Exercise+Report.pdf>
7. <https://www.pwc.com/sg/en/publications/assets/basel-iv-big-bang-or-endgame-of-basel-iii-201712.pdf>
8. <https://view.deloitte.nl/rs/834-ESS-180/images/deloitte-nl-basel-4-effect-on-dutch-banks.pdf>

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## author

### Vikram Nath

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Vikram Nath works in the Houston, Texas, office of Natixis. Natixis is the corporate & investment banking (“CIB”) arm of Group BPCE, one of the largest banking franchise in Europe. In Houston, Vikram supervises the oil and gas portfolio team that is responsible for managing a multi-billion dollar loan and commodity derivatives portfolio. Apart from portfolio management, Vikram specializes in Reserve Based Loan (RBL) financing in the energy upstream sector, midstream financing and acquisition financing within the energy space. Vikram has an MBA from Rice University, Houston as well as an engineering degree from Indian Institute of Technology (IIT) Delhi. Vikram is an avid golfer and loves to watch movies and TV shows in his free time.

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## PRMIA member profile - Roger Chen

by **Adam Lindquist**, Director of Membership, PRMIA

Roger Chen, a Chief Risk Officer (CRO) from New York Life Insurance Company, shares his perspectives on the year in review and on the opportunities ahead that many risk professionals share. I would like to thank Roger and the New York Life team for being open to share these ideas with the PRMIA network.

**Adam** Roger, let's start with some information on you. What is your role and how long have you been in risk management?

**Roger** I am Chief Risk Officer – Retail Life, Marketing, Retail Annuities, Agency, and Service at New York Life. I am responsible for risk management and oversight of the individual life insurance and annuity businesses within New York Life and its subsidiaries and their supporting distribution and service functions. I am fortunate to have been in risk in some form or fashion really my entire professional career. I started my career in credit risk modeling and then spent several years in risk consulting advising bank, insurance, and government clients. Now as a business CRO, I manage all aspects of financial, operational, and business risks for the businesses that I oversee. My career has allowed me to experience an amazing diversity in risk and experience the challenges and changes to the markets and industry from many angles.

**Adam** What are you seeing in your industry today that you are paying close attention to?

**Roger** The risk trends we see in insurance have a lot in common with other industries. We are paying attention to risk issues that have potential to arise from transformational shifts in how business services and technology solutions are provided. Cybersecurity has our attention, as we, like many, increasingly rely on third parties and cloud-based vendor services rather than hosting data or applications on premises. That has required us to build up a whole new kind of governance and oversight capability of our critical vendors and third parties.

There's also a lot of focus on consumer privacy, data privacy, and compliance with the evolving legislative and regulatory landscape. I partner closely with teams and specialists that are on the front lines and keep an eye on emerging trends and concerns. One such area is our well established governmental affairs function that maintains active engagement on the most significant legislative and regulatory issues at both the federal and state level. They do top-notch work that is critical to our business.

Finally, another area we watch closely are the evolving fiduciary and best interests standards that may impact our sales practices. Although the Department of Labor Fiduciary Rule was officially vacated under the current administration, we are monitoring activity by the SEC and by the states which may issue their own fiduciary/best interests standards.

**Adam** When it comes to thinking about risk and planning for the coming year – do risk directives for you come from the board, from strategy, or from past experience?

**Roger** All of the above. Certainly, past experience is a starting point. We receive directives from the board on certain priorities. To some extent, board expectations and regulatory drivers dictate the non-discretionary portion of our risk initiatives. Then we have what I would consider more discretionary risk initiatives for which we aim to align with business strategy. Our goal is to stay focused on risks that could hinder the achievement of strategic objectives.

A key part of what our team does is work with our business partners to help identify and assess the top risks to our strategic objectives. I focus on continually earning my seat at the senior leadership table and acting as a trusted advisor to the business. If we are doing our jobs effectively as risk officers, we come to agreement with our business stakeholders on the prioritization of our risk mitigation initiatives for the coming year.

**Adam** It sounds like you have a well-defined process. What are the key skills you look for to achieve these goals?

**Roger** Continuous learning is essential, as is the ability to partner with specialists. In practice, many risk issues we face today are multi-faceted, and the solutions require a diverse set of subject matter expertise and industry insights. Our role is to serve and advise the business, while maintaining a certain level of independence to be able to provide effective challenge—to ask the questions that aren't being asked and identify blind spots. In order to do this effectively, it is essential that we build strong relationships and mutual trust with our business partners.

I think to continually be effective and grow professionally as a risk manager, you need to constantly be open to learning. You need to be a continual student of the business and continue to maintain your professional toolkit. A risk manager's fundamental responsibility is to protect and defend an institution against the key risks that could cause it to fail against strategic objectives. To do that, you need to understand fundamentally how the business model works and the strategic objectives of the business. From understanding comes insight, and insight should inform the meaningful prioritization of risk initiatives.

We have been PRMIA Corporate Members for many years, and the advanced learning is valuable for the professional development of our team. The PRM is a critical tool for my team, as are the other various certifications and trainings that PRMIA offers to keep our skills sharp.

**Adam** Thank you for your time, Roger.

interviewee

**Roger Chen**



## meeting FRTB's internal model approval

by Eugene Stern

As the landscape for regulatory compliance evolves, sell-side market risk managers must focus on the current requirements of Basel 2.5, while also paving the way for their banks to comply with new regulations that will go into effect soon. In particular, many firms are undertaking a substantial effort to overhaul the market risk technology stack in preparation for the Fundamental Review of the Trading Book (FRTB), and the significant impact it will have on their business.

The Basel Committee on Banking Supervision's (BCBS) Market Risk Group is currently finalizing the FRTB, with implementation slated for January 2022. One of the focal points of the new rules is to address shortcomings that are evident in the Basel 2.5 revisions from 2009. FRTB will amend the Basel 2.5 framework and introduce stricter rules for the treatment of market risk across jurisdictions.

While a 2022 deadline for implementation may seem far into the future, firms that are adopting an Internal Models Approach must run their models for a year in advance in order to be approved by the regulators. With that requirement in mind, banks must target the middle of 2020 as an essential milestone on the path to FRTB implementation.

By making the right choices in preparing for FRTB now, firms can prevent costly, long-term mistakes. That's why it is critical for all firms to understand the key differences between Basel 2.5 and FRTB, anticipate the changes and resulting impact to their business, and identify the tools and partners they will need to help them achieve a successful implementation.

### migrating from Basel 2.5 to FRTB

The Basel 2.5 Internal Models Approach (IMA) calculates market risk capital in terms of Value-at-Risk (VaR) and stressed VaR, with backtesting of the model required in order to gain regulatory approval. The FRTB introduces a more stringent IMA, backed up by a significantly more risk-sensitive Standardized Approach (SA). The SA calculation is driven by risk sensitivities, risk weights, and multi-level formulas based on bucketing and netting rules that are specified in detail by the Basel Committee.

Looking at the differences in approach, the FRTB IMA replaces VaR with expected shortfall (ES), and also requires proof that the risk factors used in the model are derived from sufficiently liquid instruments.

This is known as "modelability." In addition, banks must demonstrate that their risk models are sufficiently aligned with their front office models by passing a set of P&L attribution tests that the Basel Committee is still finalizing.

Firms that cannot meet the IMA criteria must calculate their FRTB capital based on the Standardized Approach alone. However, the capital requirements are expected to be much higher for desks that rely on SA, rather than IMA. Therefore, evaluating the pros and cons of each approach is critical for each desk and the firm as a whole.

### meeting IMA requirements presents correlated challenges

Maintaining IMA approval brings uncertainty, particularly for firms with fixed income desks:

- The modelability of the underlying risk factors can be difficult to prove, especially where a significant number of underlying risk factors require additional data (e.g. fixed income).
- Reducing the granularity of the risk factor set can help with modelability, but may lead to a failure of IMA P&L attribution tests. These tests require two different measures, the **Risk Theoretical P&L** and the **Hypothetical P&L**, to be calculated and compared.

The P&L attribution tests are meant to ensure that the way each instrument is represented in the capital calculation does not diverge too far from how it is represented on the trading desk and marked-to-market.

In this context, **Risk Theoretical P&L** is a proxy for realized P&L, based on: (a) the market model implemented for the IMA risk calculation, and (b) moves in the risk factors used in the model (using data taken from the middle office risk system). **Hypothetical P&L** is a proxy for realized front office P&L, taken from front office pricing models.

The P&L tests are calculated on a monthly basis and reported prior to the end of the following month. If a desk falls into the "red zone," it will be required to move from the IMA to the SA; this may result in a significant increase in capital requirements. Adding to the complexity, the precise methodology used to compare the two P&L measures is still being finalized by the Basel Committee, with measures of correlational and distributional similarity (Kolmogorov-Smirnov or Chi-squared metrics) **now apparently being preferred**.

Regardless of the precise form the P&L attribution tests eventually take, a high degree of alignment between front and middle office data and analytics is important. If there are significant differences between front office analytics and middle office analytics, there is a high probability of failing one or both of these tests. Consistency will be the key.



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## FRTB and fixed income

Fixed income is one of the most difficult asset classes to model for IMA obligations. This is due-in part-to the following issues:

- Each bond price needs to be mapped to a significant number of risk factors (FX, risk-free curves, risky curves).
- There may be additional inputs (OAS or Z-spreads).
- Credit Default Swap (CDS) curves have reduced availability and liquidity since 2008, which may significantly impact modelability for fixed income and credit trading.
- The use of different systems and/or methodologies between the front office and the middle office may cause variations in results.

While the situation with FRTB in general, and fixed income in particular is daunting, tools and technologies are available to assist in the process before, during, and after implementation in 2022.

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## reducing the regulatory burden

As the financial services industry prepares for the challenge of meeting the upcoming FRTB requirements, firms are fundamentally rethinking their workflows and technical architecture. An essential part of this undertaking is evaluating the tools already at hand that may lessen the inherent disruption and costs.

Firms like Bloomberg can provide flexible options for firms to achieve deeper integration and faster implementation, within their existing workflows and systems. Whether using a “plug and play” analytics solution, or adopting solutions to help pass the P&L attribution and NMRF tests for the FRTB IMA approval process, banks that already have their positions in systems such as Bloomberg TOMS can benefit greatly from a comprehensive, scalable solution designed to help address the regime changes posed by FRTB implementation.

To learn more, head to page 44 for [Horizon risk & FRTB: insight from Europe's risk leaders](#).

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## author

### Eugene Stern



Eugene Stern is head of market risk product at Bloomberg, working on the firm's enterprise risk services business, which ties together market and reference data, instrument-level analytics for both risk managers and the front office. He helped start the business and has held a number of different leadership roles in product management, implementations, and client services. Previously, Eugene spent ten years at RiskMetrics where he started as a quant researcher, building models for market and credit risk, and eventually moved to the business side, leading product management team and overseeing all offerings across the risk business. Eugene holds a Ph.D. in Math from UC Berkeley, and worked at the University of Pennsylvania as a lecturer in mathematics before leaving academia to work in risk.

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## supplementing cyber risk discussions with an actuarial perspective

by **Jasvir Grewal**

The incidence of major cyber events making international headlines on a regular, and increasingly frequent, basis has seen cyber security rise to the top of many companies' agendas over the last few years; cyber incidents have been cited as the clear winner of Allianz's Annual UK Risk Barometer for the third consecutive year.

With well-publicized cyber-attacks ranging from those where the indiscriminate and geographical reach of cyber took the world by surprise (Wannacry, NotPetya) to those with significant financial/reputational implications (TalkTalk, British Airways), dealing with cyber security is starting to become a question framed as how to protect against losses when, rather than just if, an event occurs.

Unfortunately, despite the increased awareness of cyber security matters in recent times, risk management practices have struggled to match this trend. The Cyber Security Breaches Survey 2018 is an official statistic which looks at how UK organisations are approaching cyber security matters. The 2018 survey found that, although 74% of business categorised cyber security as a priority for their organisation's senior management, only 27% of businesses had a “formal cyber security policy or policies”.

Why then, has the increase in board-level appreciation for cyber risk not resulted in tangible actions in the form of cyber security policies and strategies?

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## current risk management practices

Adopting best practices such as ensuring software updates take place, configuring firewalls, the use of safe password practices and multifactor identification are necessary but certainly no longer sufficient when it comes to protecting against cyber risk today. Companies need to ensure that they are assessing and addressing cyber risk adequately; for example, this may be through effective response planning or penetration planning.

An obvious part of the reason behind any current risk management deficiencies may be due to the challenging business conditions. Cyber risk management is limited by budgets set aside to deal with the risk as well as the level of access to adequately trained resource an entity has.

Another explanation may be that executives have insufficient knowledge of the threat landscape to make effective decisions relating to cyber security policies and budgets. Cyber attacks come in many forms (e.g. malware, phishing, DDoS, MitM) as do potential losses (e.g. incident response costs, business interruption, regulatory fines). It may be this variation coupled with the ever-evolving characteristics of the cyber world, with its increasing number, loss amounts and sophistication of cyber-attacks, that acts as a further hindrance when developing meaningful cyber risk management.

There are a number of standards available which can assist with cyber security, the NIST Cybersecurity Framework and ISO/IEC 27001 to name just a couple. These standards offer best-practice information and controls which can be implemented in an organisation to help with preventing, detecting, responding and recovering from cyber-attacks. However, the in-house use of such standards also requires resource allocation, and, for some companies, Boards may need to be convinced prior to additional budget being allocated.

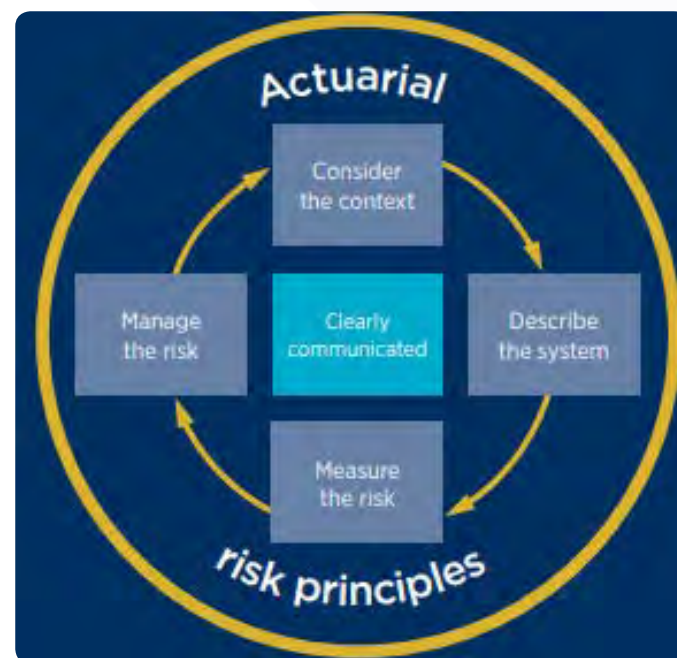
## actuarial risk principles

Dealing with emerging risks is something that actuaries are experienced in and well equipped for, which makes cyber risk management an area where actuaries are starting to add value. A general summary of an actuarial approach is captured by the Actuarial Risk Principles, which were launched by the Institute and Faculty of Actuaries (IFoA) last year. A cyber risk case study was also considered at the time, and the reader is directed to the references for further details.

The diagram shows a simplified version of the framework that actuaries use when dealing with risk management. Such a framework can help to add value, particularly in the case of a situation where there is uncertainty as is the case when faced with the evolving cyber threat landscape.

**Considering the context**, with the potential for cyber events to generate significant financial losses, organisations need a robust analysis of what could occur and what their options would be.

This is also an area which the IFoA's Cyber Risk Investigation working party has been working on. The working party proposes a framework, based on the NIST framework and the cyber risk CRO Forum Concept Paper, with which to develop cyber operational risk scenarios.



In particular, the working party will soon be releasing their sessional paper which includes three worked examples **describing and measuring the risk** using the proposed framework; these examples include detailed breakdowns of the various potential sources of losses, associated approximate loss amounts (and rationale behind any figures) as well as potential mitigation options.

The value of different approaches to **managing the risk** will clearly vary depending on the entity and the specific risks involved, but the paper provides useful food for thought; examples range from “good housekeeping practices” such as electronic monitoring and network security to other more sophisticated considerations such as proactive security intelligence gathering.

The value in purchasing a cyber insurance policy should also not be underestimated since, even in cases where entities have relatively robust cyber security/risk management practices, there will always be residual cyber risk. As with any insurance contract, care should be taken to understand what cover is being purchased and which exclusions are in place.

It is through the development of such detailed and tailored cyber scenarios that we can illustrate cost-benefit analysis of mitigation approaches and start to bring board-level cyber risk discussions to life. With the cyber landscape advancing at such a rapid pace, work must be done to ensure that cyber risk is **clearly communicated** and given the attention it demands when it does appear in front of executives and other business decision making personnel. This will help to not only drive awareness for the scale of cyber risk exposure but also help companies to identify where any vulnerabilities in cyber security policies lie so that actions can be taken before a company faces a cyber attack rather than in the aftermath.

## references

1. Actuarial Risk Principles: <https://www.actuaries.org.uk/news-and-insights/public-affairs-and-policy/evolving-risks-and-future-insurance/actuarial-risk-principles>
2. Cyber Risk Working Party: <https://www.actuaries.org.uk/practice-areas/risk-management/risk-management-research-working-parties/cyber-risk-investigation>

## authors

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Jasvir Grewal is a Fellow of the Institute and Faculty of Actuaries (IFoA) as well as a Chartered Enterprise Risk Actuary. She has a keen interest in cyber risk/risk management and has been involved in several IFoA working parties. Jasvir has several years of actuarial experience, particularly in capital modelling. She is a general insurance actuary working at Arcus 1856, which is a Lloyd's syndicate backed with funds managed by Credit Suisse's ILS team. She holds a master's degree in Mathematical Modelling and Scientific Computing from the University of Oxford.

## 📌 women in risk spotlight

Interviewed by Mihaela Capra, Assistant Vice-President (AVP) Model Risk Management, Sun Life Financial

### with Kathryn Fric

**Mihaela** How did you get into the field of Risk Management?

**Kathryn** I only entered the field a little over 2 years ago. Prior to that my career was within investments, primarily public fixed income. When the opportunity came to move into risk I saw it as a real chance to use all the skills and relationships I'd built up over the years in ways that would have a lot more influence within SLF. I was excited to learn from different perspectives within the organization and was ready to take on a new challenge.

**Mihaela** What do you enjoy most about what you do?

**Kathryn** I really love the breadth of the job. Within the Investment area, I'm now involved in one way or another in everything we're doing. Whether it's looking to invest in new asset classes or geographies, reviewing how we're managing our liquidity or hedging strategies, or considering how we're going to build out our institutional investment business over time. The biggest change though is the range of activities I'm now involved in outside of Investments. I attend a lot of meetings across the business groups, and with our Executive Team. As a result I'm getting the opportunity to really understand our whole business and the issues we're dealing with. I also get to play a role in, or watch other senior leaders, work through complex decisions and challenge each other which is providing me with great learning opportunities.

**Mihaela** What do you see as future trends in the field? What changes do you foresee?

**Kathryn** Risk management is only getting more complex. Interconnections continue to build and strengthen, with new risks we couldn't even imagine 20 years ago now being ones that we talk about daily whether its cyber crime or climate change. As a result, the need for good risk managers will grow as well as for them to come from a variety of backgrounds and skillsets. There is, of course, a growing need for new technology to challenge the frailties of human thought processes, for example our tendency to underestimate the odds of "tail events", find those interconnections, or our attachment to the past decisions we've made. This requires more data analytics and predictive models which in and of themselves create more and different risks than we have seen in the past. Finally, the recent movement towards regulators taking a more client centric approach is also one that will continue to grow in importance over the next decade.

**Mihaela** What are the biggest challenges faced by someone in your role?

**Kathryn** The biggest challenge for me is choosing where to best spend my time. There are so many things going on that I have to pick and choose carefully where I believe the company will benefit most from my involvement. It's also a constant balancing act when you're in risk of ensuring that you're putting enough tension on decisions being made that we're coming to better, more robust decisions vs. just slowing things down or impeding good decisions. And finally with my role, anything that comes up in the news economically or geopolitically is a question that can come my way!

**Mihaela** How do you feel about the opportunities for women in risk management?

**Kathryn** It's interesting in that for the first time in my career I'm working with a lot of other senior women, some of them in risk management and some of them in other fields. In fact my direct boss, our Chief Risk Officer, has more female direct reports than male. So from my perspective it's a field with tons of opportunity, and a great place to get experience as you really do gain a perspective there that can help you no matter what role you go onto next.

**Mihaela** What is your advice for women just entering risk management careers?

**Kathryn** Most importantly, find a company that you feel supports your career, truly values diversity and puts actions behind those statements, and a firm's culture that suits you. When I first started working, I went through three different employers in six years. Then I started working for Sun Life and I've been here for over 15 years for a reason. I enjoy the environment and the people I work with, and I've always felt like I had an equal voice. They've taken a lot of a chances on me over the years, even at times encouraging me strongly to take opportunities that I didn't feel ready for, then supported me as I adjusted to the new role. Secondly, recognize that the peer relationships you're developing now could very well be with you the rest of your career. Once you get to a senior level you'll discover that you get nothing done without your peer's help and vice versa. And finally, and most importantly, don't believe that you have to change who you are to get ahead. I believe that the days of women being told that to get ahead in business you need to learn to act like a man are thankfully behind us. There are many times that your differences are your biggest strengths and the more you learn to leverage off of those the more successful you can be.

### interviewee



#### Kathryn Fric

Kathryn Fric is the Senior Vice President & Chief Credit Risk Officer for Sun Life Financial. She leads a team that is responsible for oversight of the investment risk profile of Sun Life's portfolio as well as other investment related activities.

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## think big (and small) to develop an effective AML strategy

by **Andrew Davies**

**In today's rapidly changing world consumer expectations for speed, ease and convenience permeate every aspect of their lives, including financial services. At the same time, criminals are continually evolving their methods of attack, ready to take advantage of any chinks that emerge. Financial institutions are at the crossroads, responsible for balancing customer experience with security. This responsibility is best executed with a combination of broad insights and specific tactics.**

One way institutions are combatting fraud is by continuing to bolster their anti-money laundering (AML) efforts and following stricter risk-based procedures for conducting ongoing customer risk profiling and suspicious activity monitoring.

This increased scrutiny can drive criminal activity detection; however, it can also lead to an overload of alerts and false positives that require time-consuming investigations. There is also a greater chance of institutions unnecessarily inconveniencing customers who have done nothing wrong.

With improved detection techniques, greater visibility and more fine-tuned procedures, financial institutions can ensure they have the correct data to better understand customers' activity patterns and gauge money laundering risks. Financial institutions can improve efficiency with an AML strategy that focuses on a comprehensive view of customer risk and data, more precise alerts and more accurate pinpointing of criminal activity.

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### seeing a full picture

Many financial institutions face a knowledge gap in that they only see bits and pieces of each customer's behavior patterns and financial activity. Fortunately, data collected within an organization and from industry groups through a combination of Customer Due Diligence (CDD) and Transaction Monitoring (TM) can provide financial institutions with complete customer profiles. With this information, institutions can see a full picture, allowing them to better spot the unusual behavior that typically indicates money laundering, tax evasion, human trafficking and fraud.

Additionally, this data can provide the basis for more precise and valuable alerts and better decision making. Financial institutions can refine alerts based on pre-determined detection scenarios and alert definitions, as well as peer group activity and historical profiles. Such fine-tuning will lead to fewer false positives and improved operational efficiency.

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### keeping score

Constant changes in how customers manage their money and interact with financial institutions creates an imperative for financial institutions to fully understand customer behavior, regardless of their preferred channel, device or location.

AML solutions that automatically collect and analyze know your customer (KYC) data enable financial institutions to evaluate customers through a scorecard system to quantify the AML risk associated with each customer. These checks typically happen as financial institutions are onboarding customers and help identify immediately if those customers should continue with the onboarding process or if they should be flagged as high risk. It is also important to carry out due diligence and look for any unusual activity throughout the customer life cycle to ensure that a specific customer should continue to be deemed low risk or high risk depending on the ongoing perspective.

As regulations require the capture of more detailed ownership and controlling person information, AML solutions become more vital. Financial institutions can use these tools to aggregate transaction data for regulatory reporting and expose complex ownership tendencies. Through the use of machine learning, banks can identify patterns of behavior from large data sources, which is vital for the prevention of financial crime. By analyzing and monitoring a number of data sources, financial institutions can better understand consumer behavior and work out what is normal vs. suspicious behavior, improving fraud detection and reducing false-positive rates.

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### benefitting from better recognition

Early recognition empowers financial institutions to prevent money laundering and reduce operational costs and minimize the chance of being subject to enforcement actions. By monitoring activity across any account, in any country, it is easier to identify something which looks suspicious or out of the norm.

A common infrastructure that displays customer-level risk data allows financial institutions to pinpoint and tackle increasingly sophisticated criminal activity. This allows legitimate customers to enjoy their banking experience without disruption, while simultaneously directing more exact alerts to money laundering investigators.

The combination of CDD and TM creates a comprehensive view of customers and their behaviors. Financial institutions can then identify and flag unusual behavior, regardless of customer location, resulting in money laundering activity being detected more quickly and accurately. By going the extra mile to "know their customers", financial institutions can reduce the effects of money laundering, while also elevating customer trust, protecting their own reputation and supporting the moral imperative to do the right thing.

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### authors

#### Andrew Davies



Andrew Davies is the Vice President of Global Market Strategy for the Financial Crime Risk Management business at Fiserv. In this role, he works with Fiserv customers around the world to develop and deploy effective risk management and financial crime mitigation solutions. Andrew has more than two decades of software industry experience, where he has supported many of the world's largest financial institutions. He is a certified anti-money laundering specialist, respected industry speaker and author.

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## cash vs cashless society: the risks and opportunities

by **Alex** Marinov

We define cash as anything that we can use to buy or sell goods and services. That definition might seem clear-cut, but over the ages a lot of things fit into that description of “cash”.

Did you know that shells and copper were used as cash?<sup>1</sup> Hopefully, next time when you go to your local supermarket they would accept them. All jokes aside. Throughout human history we have accepted and used copper, bronze, silver, gold and most recently paper money as a form of cash to use as a form of currency to pay for goods and services. Some coins still utilize, for example, copper in combination with zinc and other metals.

What is happening now? Now our society has been increasingly moving to operating without the need of physical money. But what does that mean?

As technology progressed we have been increasingly moving to a cashless society i.e. no physical embodiment of money.<sup>3</sup> The current and future state of a cashless society could involve utilizing your credit card, fob, wearable band, phone or even a small chip in your skin to pay for goods and services.<sup>3</sup>

Does this sound fantastic? There would be no need to carry your wallet, go to the ATM every other day for cash, to worry about being robbed, and it could be easier for tax authorities and regulators to detect tax evasion and potentially money laundering.<sup>4</sup>

It seems that as we are moving to a more cashless society, many of society’s issues associated with cash would be gone as people start adopting cashless transactions as the norm. Adopting cashless transactions could move society towards a bright and sunny future.<sup>5</sup> However, there are a few caveats to the notion that a completely cashless society is good for the economy.

Cashless society means that all your transactions within your life would be tracked and stored. The records would exist in some server, somewhere in the cloud, which can be accessed at any time. Why you ask? That information would be valuable not just for banks but different companies - marketing and advertising, retailers to potentially political campaigns. That way they could create a digital profile based on your purchases and transactions and determine what they could sell you, for how much, how effective their campaign would be, and what messages would resonate more with their audience.<sup>6</sup> Just imagine that you have had an infection and you had to buy a medicine? That transaction would be there. What about that bar next to work, where you go with your colleagues every Friday? Yes, that transaction would be stored. What about going to a show with your friends? Yes, that transaction would be there. FOREVER! Not just one day, or one year, but FOREVER.

That causes concern because of the risk associate with the transactions, which could include blackmail, abuse and other types of criminal behavior if it were to fall into the hands of a criminal organization.

Going completely cashless would be a bad idea given the ever increasing risks of hacking. Nowadays hacking has turned into a very profitable and highly lucrative criminal activity, where personal information, bank details and other sensitive information is sourced via illegal means and traded over the dark web. In order to avoid detection, hackers have started utilizing cryptocurrencies as an easy way to launder these funds with impunity,<sup>7</sup> thereby allowing them to move these funds easily and without border restrictions, oversight and impunity. Going completely cashless doesn’t sound that good now does it?

Moving away from cash to cashless would also spark an alternative economy. This has happened before in history. When times are hard and there is no clear medium for money, people could revert to bartering if for some reason the system or systems of cashless payments fail.<sup>8</sup> There are numerous examples where bank systems failed and people couldn’t access their accounts for a day or even months, which resulted in some of those funds being stolen. Imagine not being able to pay your bills, food, medicine, fuel, healthcare, childcare or for any other good/service. That could be a very dark future.<sup>9</sup>

As an example, since 2008 more than 4,000 branches have been closed throughout the UK. These closures make it more difficult for people living in rural areas to access cash, which meant increasing reliance on cashless transactions.<sup>10</sup> Leading the way are the Nordic countries followed by Canada, where cashless transactions are now close to 57% of the total. Another example is China, where QR codes and contactless transactions have been picking up for some time and have become quite popular and have affected the whole society. A notable feature is the ease of use and speed of completing those transactions - by just scanning a QR code people pay for their grocery shopping, providing tips for waiters, taxi, even paying street performers for entertainment. The possibilities are endless.<sup>11</sup>

Finally, cash has its benefits and so does going cashless. None is without risk or opportunities. In the current environment it is better that they both function in parallel. Some things are better with cash and other with cashless - convenience vs hassle; freedom vs oppression; untraceable vs uneraseable. The consumer has the opportunity to make a choice.

Before moving to a completely cashless society, one should carefully analyze the pros and cons, as well as keep in mind that there is absolutely no incentive in going completely cashless. Such transactions have their benefits but foregoing traditional channels, where goods and service could be easily exchanged, only poses significant risk to the real world should things turn for the worse.

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## references

1. <https://copperalliance.org.uk/about-copper/applications/coinage/>; <https://www.nbbmuseum.be/en/2007/01/cowry-shells.htm> ; [https://www.britishmuseum.org/pdf/MoneyInAfrica\\_Presentation.pdf](https://www.britishmuseum.org/pdf/MoneyInAfrica_Presentation.pdf)
2. <https://www.bbc.co.uk/news/business-41095004> ; <https://www.dutchnews.nl/news/2018/06/dutch-central-bank-warns-about-the-rise-of-the-cashless-society/> ; <https://www.dutchnews.nl/news/2018/03/cashless-payment-trend-moves-to-dutch-town-halls-ombudsman-calls-for-choice/> ; <https://www.independent.co.uk/news/business/comment/payments-cash-cashless-society-debit-cards-visa-tsb-it-meltdown-uk-finance-banks-sweden-a8404836.html> ; <https://www.telegraph.co.uk/money/future-of-money/10-cashless-countries-world-does-uk-rank/>
3. <https://www.thisismoney.co.uk/money/cars/article-4843594/DS-turns-car-keys-cashless-credit-debit-cards.html>
4. <https://www.bpay.co.uk/> ; <https://www.apple.com/uk/apple-pay/> ; <https://www.samsung.com/uk/samsung-pay/> ; <https://www.samsung.com/uk/samsung-pay/>
5. <https://medium.com/livenpay/how-a-cashless-society-benefits-both-merchants-and-users-a1e882791d01> ; <https://www.actuaries.org.uk/documents/cashless-society-benefits-risks-and-issues> ; <http://www.bbc.com/capital/story/20180427-does-a-cashless-society-benefit-everyone> ; <https://www.cnbc.com/2017/04/20/going-cashless-to-battle-financial-crimes-.html>
6. <https://worldpaymentsreport.com/> ; <https://www.cnbc.com/2017/10/09/digital-payments-expected-to-hit-726-billion-by-2020-study-finds.html> ; [https://www.bis.org/publ/qtrpdf/r\\_qt1803g.htm](https://www.bis.org/publ/qtrpdf/r_qt1803g.htm) ; <https://www.theguardian.com/money/2018/feb/19/peak-cash-over-uk-rise-of-debit-cards-unbanked-contactless-payments>
7. <https://www.theguardian.com/business/2018/sep/21/cashless-retail-stores-new-jersey-law> ; <https://www.thetimes.co.uk/article/amazon-plans-3-000-cashless-stores-z8tpbvprx> ; <https://usa.visa.com/dam/VCOM/global/visa-everywhere/documents/visa-cashless-cities-report.pdf> ; <https://edition.cnn.com/2018/10/03/tech/amazon-go/index.html> ; [http://www3.weforum.org/docs/WEF\\_The\\_future\\_of\\_financial\\_services.pdf](http://www3.weforum.org/docs/WEF_The_future_of_financial_services.pdf)
8. [http://www3.weforum.org/docs/WEF\\_The\\_future\\_of\\_financial\\_services.pdf](http://www3.weforum.org/docs/WEF_The_future_of_financial_services.pdf) ; <https://www.cnbc.com/2018/04/06/hospital-ceo-forced-to-pay-hackers-in-bitcoin-now-teaches-others.html> ; <https://www.bankinfosecurity.com/hackers-demand-770000-ransom-from-canadian-banks-a-11050> ; <https://www.theguardian.com/business/2015/oct/01/experian-hack-t-mobile-credit-checks-personal-information> ; <https://www.theguardian.com/business/2018/sep/07/ba-british-airways-customers-hacked-credit-card-details-dark-web>
9. <https://www.bbc.co.uk/news/business-44370802> ; <https://www.theguardian.com/money/2012/jun/29/natwest-fiasco-what-happens-now> ; <https://www.theguardian.com/money/2018/jun/19/visa-admits-5m-payments-failed-over-a-broken-switch>
10. <http://researchbriefings.files.parliament.uk/documents/SN00385/SN00385.pdf> ; <https://www.bbc.co.uk/news/business-44483304> ; <https://www.independent.co.uk/news/business/news/uk-bank-branch-closures-which-research-natwest-hsbc-a8399041.html>
11. <https://www.bankingtech.com/2017/10/infographic-the-worlds-most-cashless-countries/> ; <https://www.telegraph.co.uk/money/future-of-money/10-cashless-countries-world-does-uk-rank/> ; <http://uk.businessinsider.com/alipay-wechat-pay-china-mobile-payments-street-vendors-musicians-2018-5> ; <https://www.scmp.com/business/companies/article/2130400/china-moves-further-towards-cashless-society-payment-giants>

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# managing the downside risks of digitalization in corporations

by **Vivek Seth**

In the last decade, corporate institutions both international and domestic, have experienced phenomenal changes in the way they operate business due to evolving technological advancements. Irrespective of the business sector the organizations operate in, Information Technology (IT) plays a crucial part in terms of storing database information, communication with stakeholders, transactions payments and other exchange of information over networks. The pace at which companies are investing in automation of manual tasks has gained a tremendous momentum driven by goals of cost management and process efficiency, as well as staying competitive in the industry.

According to the PwC's Global Artificial Intelligence Study<sup>1</sup>, 45% of total economic gains by 2030 will come from product enhancements attributed to Artificial Intelligence (AI) marked with greater product variety and increased personalization. AI, along with system automation and customer experience digitalization are the disruptive innovations that are compelling organizations to make strategic commitments towards digital transformation.

This new era of adopting innovative technologies is filled with the optimism of quantum leap in customer experience, significant reduction of process inefficiencies and a multi-fold increase to the firm's bottom line. However, organizations should also keep in mind that such benefits may bring with them the possibility of negative consequences, as some of the technological risks may not become apparent until such technological innovations are used on a wider scale and over a long period of time. The flip side of the digitalization could be the amplification of its side effects to the people, systems and corporate social environment.

Outlined here are the strategies that organizations worldwide are adopting in the spirit of digital transformation. While doing so, the Board of Directors and Senior Management should keep in mind the inherent risks associated with these technological advancements and ensure that adequate controls are in place to limit the potential downsides of innovative practices:

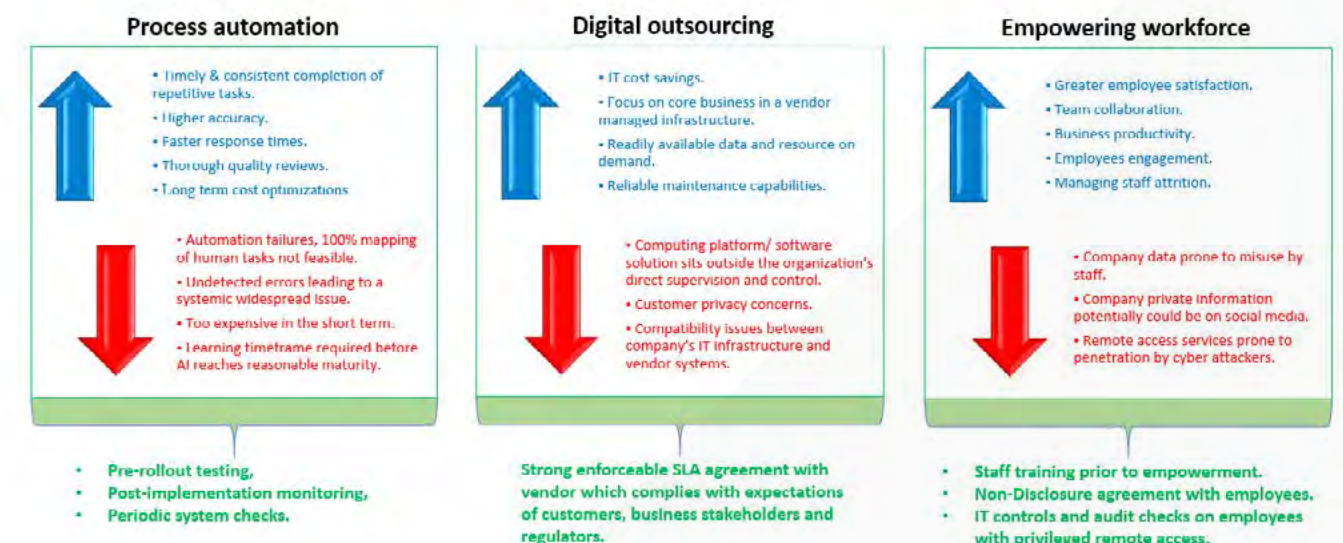
## Process automation:

Robotic process automation is widely being adopted with the objective of timely & consistent completion of repetitive tasks such as system data entry, data reporting, lifting of cargos, etc. Carefully planned automated tasks such as batch production in manufacturing and high-level decision making in production environment can bring along higher accuracy, faster response times, and thorough quality reviews.

However, organizations should also be aware that such automation attempts are relatively new, and automation failures may occur due to reasons such as software bugs, obsolete system in use, adequate intrusion prevention system not in place against cyber-attacks etc. Additionally, in absence of careful planning, 100% mapping of human tasks could be missed out in system implementation. Even in cases with due planning, previously undetected errors may lead to a systemic widespread issue across the business process & system data, thus resulting in amplified losses. Using Artificial Intelligence sometimes have limitations of being too expensive in the short term and sufficient learning timeframe required before AI reaches reasonable maturity.

Corporations should ensure as part of process automation that the system deployment plan include meticulous pre-rollout testing and post-implementation monitoring. Periodic system checks should also include high-level human assessment in timely identifying process inefficiencies, data quality issues and adopting remediation measures with minimum impact. Automation should be understood as a means to achieve process efficiency and not a cure-all alone by itself.

## Managing the downside risks of Digitalization in Corporations



## Digital outsourcing:

Outsourcing of IT infrastructure capabilities are becoming an increasing phenomenon in corporations as it brings along advantages like IT cost savings, readily available data and resources on demand, and more reliable maintenance capabilities. Outsourcing organizations benefit by focusing on their core business in a vendor managed infrastructure. With the right SLA agreements, the time required for IT Infrastructure procurement is minimized offering a competitive advantage to companies.

While adopting outsourcing solutions including Cloud Computing, Grid Computing, or Peer to Peer Computing, it should be kept in mind that all or part of the computing platform and/or software solution now sits outside the organization's direct supervision and control.

<sup>1</sup> / Source: "PwC's Global Artificial Intelligence Study: Exploiting the AI Revolution", ([link](#)).

Key issues with such outsourcing solutions include potential leak of organization data, customer privacy concerns, not meeting regulatory expectations on SLA management as well as compatibility issues between the company's IT infrastructure and vendor systems. Third party service offering could also at times become an issue due to technical outages, vendor IT upgrade downtime and connectivity issues. Such distributed IT architecture can also give rise to system exploits, loopholes and system data compromises.

Companies exploring such digital outsourcing solutions should ensure that a strong enforceable SLA agreement is in place with the vendor which complies with the expectations of customers, business stakeholders and regulators. Periodic KPI reports on data security and service offering should be reviewed across governance forums in order to remain vigilant against cyber threats.

### **Empowering workforce:**

With the aim of upskilling its workforce, more and more organizations are adopting alternative working strategies such as remotely working from home, flexible working hours, using BYOD (bring your own device) and enabling employees to access organizational data outside office premises. As part of marketing and offering friendly working environment, employees are encouraged to use social media platforms. Such work environment is aimed at increasing employee satisfaction, team collaboration and business productivity. Offering the flexibility of working outside the traditional corporate boundaries is a strategy wisely adopted amongst corporations for keeping employees engaged, tapping into their creativity and thus keeping a check on staff attrition.

The flip side of offering such remote access avenues is the ease of access with which company confidential information, client data, and personnel statistics can be misused by company staff, both accidentally and intentionally. It becomes challenging to enforce good cyber security etiquettes on an individual employee level, and an unpatched remote access device could potentially become a base of attack by cyber attackers. An uninformed staff could as well unintentionally post company private information on social media. In an age where job retrenchments & reorganization are becoming standard work phenomenon, the risk of a disgruntled employee deliberately compromising the institution has become more probable than ever.

While offering such remote access and employee empowering features, corporations should keep in mind that such features in wrong or uneducated hands can pose serious financial & reputational impact to institutions. Organizations should ensure that employees are educated via training and that a non-disclosure agreement is signed prior to offering remote access features to staff. More importantly, additional IT controls and audit checks should be enforced as part of periodic review of employees with privileged remote access.

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## bringing it all together

As part of digital transformation, organizations should be aware of the potential downside risks that come along with technological advancements. The emerging technology innovations including artificial intelligence, robotic automation and workforce digitalization carry implications whose impacts can be dramatic to the corporate's bottom line and long-term sustainability. While adopting these digital innovation strategies, new technological risks may emerge that need to be timely identified and controlled. Organizations that adequately harness the power of digital transformation while enforcing checks on its side-effects would be the ones to emerge as successful enterprises of the future.

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### author

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Vivek Seth is a Singapore citizen, working in the Risk Management discipline in Banking for about 15 years. Currently working in Dubai Financial sector, his past work experience extends across Singapore and Australia, along with business assignments carried out in Hong Kong and Switzerland. He holds an M.B.A. and also the PRM™ professional certification. This article presented here represents author's personal views and not that of his current/previous employers or any professional bodies he is associated with.



# never forget the law of statistical entropy<sup>1</sup>

by **David M. Rowe, Ph.D.**

At the heart of most risk analysis techniques developed starting in the mid-1980s lies the methods and assumptions of classical statistics. Central to these methods is the assumption of a “stable random process”. In such a process, the value of any single draw is unknowable in advance but sizable samples will exhibit broadly similar characteristics such as:

- the mean,
- the dispersion (standard deviation),
- the degree of symmetry or lack thereof (skewness),
- the tendency for probability in the tails to dwindle rapidly or slowly (kurtosis).

Given the assumption of stable randomness, the larger the sample size, the more nearly identical will such characteristics be across randomly selected sets.

Classical statistical analysis recognizes that sampling techniques can never produce fully exact values for these characteristics and has developed measures for the uncertainty of such estimates. The most common of these is the “standard error of estimate,” which is simply the standard deviation of the implied distribution of possible values for the true underlying parameter.

What is vital for general business executives to remember, however, is that these errors of estimate assume stability of the underlying stochastic process. This is often a realistic assumption when dealing with physical processes. It is virtually never the case, however, in a social scientific setting. Structural change is the constant bane of econometric forecasters. Such changes are driven by a wide variety of influences including technological advances, demographic shifts, political upheavals<sup>2</sup>, natural disasters and, perhaps most importantly, behavioral feedback loops.

Structural change creates a fundamental dilemma for socio-statistical analysis. Classical statistics argues that the more data the better since, assuming stochastic stability, this results in smaller estimation errors. For analysis based on time series, however, a larger data set implies incorporation of a greater variety of structural changes that undermine the practical relevance of the classical assumption of stochastic stability.

<sup>1</sup> / This essay is a slightly edited excerpt from the author's recently published book *An Insider's Guide to Risk Management – Relearning the Lessons of the Global Financial Crisis*. The printed book is available from both [www.amazon.com](http://www.amazon.com) and [www.barnesandnoble.com](http://www.barnesandnoble.com). It also is available as an iBook from the Apple App Store.

<sup>2</sup> / Sometime in the early 1980s I came across an old working paper entitled *An Econometric Model of Iran*. Unfortunately it had been written in 1978, a year prior to the Iranian Revolution! This is one of the most dramatic instances of being blindsided by structural change that I can recall.

This makes it all the more important for risk managers to focus obsessively on the law of “statistical entropy”. Like water, information can never rise higher than its source. In the case of information, that source is the set of data on which an analysis is based. In assessing the reliability of any risk estimate, including such things as credit ratings, always start with a review of the volume and quality of the available data. No amount of complex mathematical/statistical analysis can possibly squeeze more information from a data set than it contains initially. Indeed, in complex settings it is virtually impossible to extract 100% of the information that does exist. Something is always lost in the process of aggregating and summarizing. This is why I refer to the “Law of Statistical Entropy” rather than the “Law of the Conservation of Information,” drawing an analogy to the Second rather than the First Law of Thermodynamics.

A glaring example of failure to focus on the weakness of the available data was the way many banks and investors blindly accepted the AAA rating for senior tranches of subprime mortgage portfolios in the years preceding the onset of the Global Financial Crisis. Before the crisis, such holdings were often treated as equivalent to AAA corporate bonds. Rating agencies have about a century of experience in rating such bonds. This provides a wealth of experience and data to support the effort. Subprime mortgages were a fairly recent phenomenon, and their default experience had been dominated by a period of comparatively benign housing markets with stable to rising prices. Determining how much subordination was necessary to bring the chance of any failure of timely payment of principal or interest down to a target level required making an estimate of behavior deep into the tail of the default distribution.

A casual look at the available data for conducting this analysis should have made one thing clear. Any estimate of the required level of subordination would necessarily be surrounded by significant uncertainty. We know that this market was undermined by serious erosion in underwriting standards to meet the apparently insatiable appetite for these securities in 2005 and 2006. Even before consideration of this type of structural change, however, the limited volume of data supporting the original AAA rating alone should have made banks wary of building up uncontrolled volumes of such securities.

The fundamental lesson to take from this experience is always to ask how much uncertainty surrounds risk estimates given the volume and applicability of the available data. When such uncertainty is clearly excessive, be especially cautious in taking on corresponding exposures.

author

## David M. Rowe, PhD



David M. Rowe wrote the monthly Risk Analysis column in Risk magazine from 1999 through late 2015. He has over 40 years of experience at the interface between economic forecasting, finance, and risk management with the rapidly changing world of information technology. His professional career included years spent at Wharton Econometric Forecasting Associates, Townsend-Greenspan & Co., Security Pacific Bank, Bank of America, SunGard and Misys as well as his own small consulting firm. Dr. Rowe is also a former board member of PRMIA.

## Low probability default modeling using a neural network approach

by **Chris Cormack & David Kelly**

### a model driven by market demand and fragmented data

The drivers underlying development of the methodology described in this article are challenges posed by regulators, and the desire of asset and treasury managers to improve their portfolio investment decisions for low probability defaults (LPD) such as sovereigns, through improved forecasting methods.

LPD by definition happens infrequently, and the available data is restricted, as there are no more than two hundred sovereign issuers. Traditional statistical techniques that link disparate probability distributions are hampered by fragmented market data, with quality concentrated in developed country issuers.

Countries fail on their external obligations for many reasons, but there is a pattern of behavior that an analyst would look for in the anticipation that history does repeat itself. Examples include material expansion of external debt, ambitious infrastructure programs, autocratic or corrupt government, and low GDP per head of population. Market data such as yield curves provide a consensus of relative risk-reward from investors based on capital flows, but such data does not capture the whole and tends to understate the credit risk of sovereigns.

The expertise incorporated by the methodology designers combines industry credit risk knowledge, traditional analytical methods and deep understanding of Neural Network tools, to leverage off a wider selection of empirical data. The approach taken is to break down the thought process of a credit analyst who uses both market and non-market data indicators and replicate it using a model that provides a powerful, unbiased and potentially superior default predictor.

### how the model works

The development of the model starts with acquiring a wide set of data across several countries that are then refined to a minimum “Feature set” that becomes the key influencer driving the model. A Neural Network algorithm is deployed on the historical data of the Feature Set, as well as the prevailing rating, to understand the complex interplay of conditions that presage a rating migration or outright default.

A common pitfall in developing all machine learning solutions is to assume that the use of an ever-larger Feature Set means higher accuracy and better results. For sovereign debt, not all the countries have reliable historical data for all members of the Feature Set.

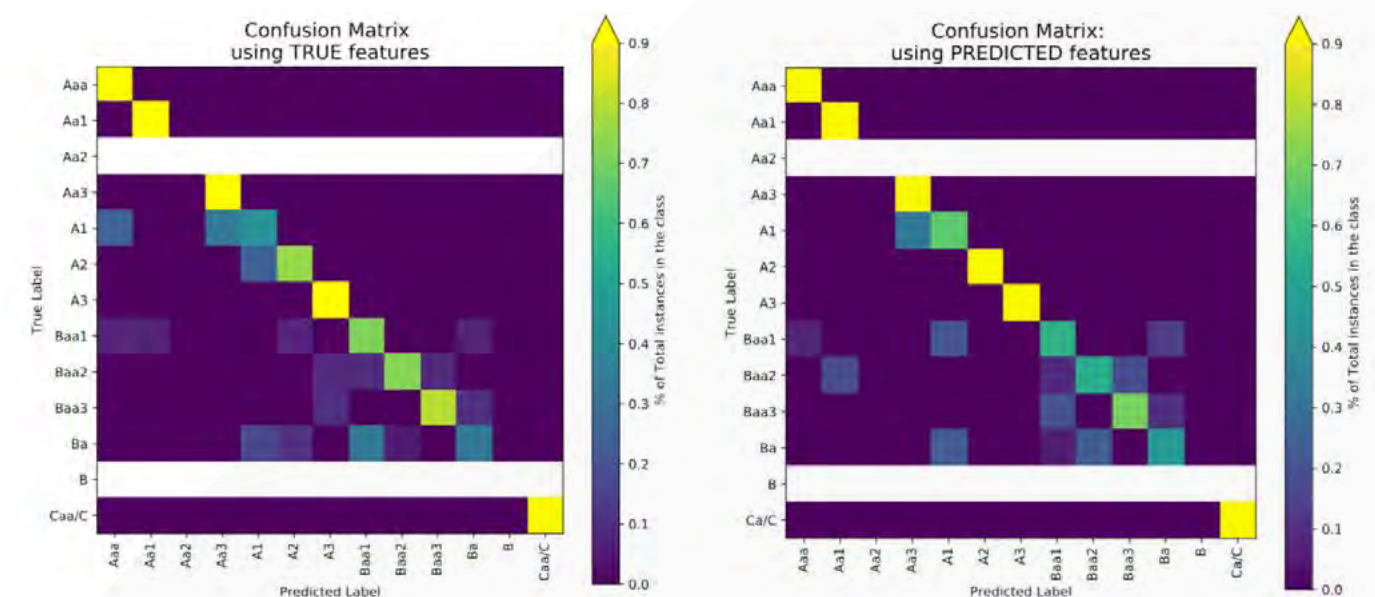
Increasing the Feature Set comes at the cost of dropping some countries for which accurate data is a challenge and increases the computation time. Considerable judgement is therefore applied to overcome variances in the quality of the historical dataset and find an elegant compromise for the Feature Set.

The appropriate learning algorithm - an enhanced gradient boosted (GB) algorithm in this case - can now be deployed to minimize the difference between the actual rating and the predicted rating. GB is an ensemble technique that combines multiple weak learning algorithms that individually are based on single decision trees. The key advantage of a GB algorithm lies in the fact that it learns from its errors and continues to refine its predictions until no further improvements can be made.

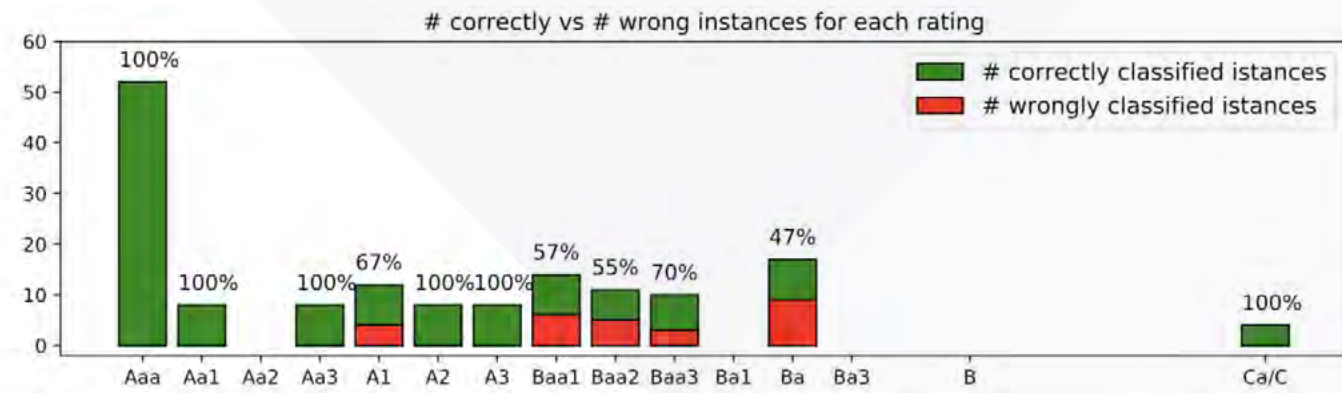
The model can now provide a probability estimate for how each issuer will migrate to each rating from AAA to D during each quarter in the coming year and weighs each member of the Feature Set by its ability to influence the outcome. Stability is checked by creating a forward simulation of the Feature Set and checking that the expected ratings don't flip on small changes in the data.

One of the biggest challenges is model explanation and interpretability, so having a tight Feature Set is critical. With Neural Networks it's tricky to understand how each member of the Feature Set influences the outcome. Given that GB grows iteratively like a tree, greater influence can be granted purely based on whether a member is present at the start of the simulation or the “root” rather than at the end or “the leaves”. The solution is to deploy a visualization algorithm that looks at the average difference in predictions by un-blinding the test data set - i.e. by mixing up which members are in the root and which are in the leaves. This approach provides a holistic measurement of how each member of the Feature Set influences the rating.

The confusion matrix below highlights the high concentration in the diagonal that indicates overall model accuracy and the enhanced predictive power around rating transitions.



The graph below shows the strength of the predictability of the model for highly-rated, and thus low-probability default countries and shows impressive performance. For the next phase of this model development, the plan is to capture the dynamics of cross-over movements, in particular Southern European members of the Euro that do not control their domestic currency, as well as using non-empirical data such as satellite imagery, that captures an assessment of the impact of prolonged drought.



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## conclusion

The use of a blend of credit knowledge, traditional modelling approaches and Machine Learning, together with a robust test framework compatible with SR11-7 guidelines, has improved the predictability of LPD where the prevailing data continues to be a challenge. The results show a step improvement in reducing bias in the credit analyst process and, given its level of automation, reduces overall cost of ownership.

## authors

### Chris Cormack



Dr Chris Cormack is co-founder and Managing Director of Quant Foundry. Chris was former Head of Market Risk with a good understanding of the issues and requirements of Market risk measurement. Experienced Market Risk methodology across all asset classes, advanced Operational Risk methodology implementation. Counterparty Credit Risk Time Series modelling specialising in Equity and Rates. Design and implementation of Novel Time Series models for CCR and Market Risk. Chris has lead quant teams for large methodology integrations. Chris was a lecturer in physics at Queen Mary University and holds a PhD in particle physics from Liverpool and a master's in mathematical finance from Oxford.

### David Kelly



David Kelly is co-founder and Managing Director of Quant Foundry. David has held a number of senior leadership and technical SME roles in the front office, market risk, model validation and counterparty risk. David has been instrumental in the application of Risk Architecture designs that lead to pragmatic delivery of advanced modelling solutions and system changes to requirements under regulatory directives including Basel 2.5, CVA, Stress Testing, IFRS9 and FRTB as well as developing several model risk governance frameworks and TRIM remediation programs. David read Pure Mathematics at Bristol and Part III at Cambridge.

## understanding basis risk in hedging transactions

by **Ira Kawaller**

When companies recognize the presence of a risk relating to interest rates, currencies, or commodity prices, the idea of hedging that risk reasonably follows. And while not all risks are necessarily hedgeable, if a derivative instrument that can reliably deliver something close to the desired offset can be identified, hedging is something to consider.

A derivative is a contractual agreement between two parties that generates a payoff dictated by some reference price, rate, or index that is external to the contract itself. To be considered as a reliable hedge, however, the derivative's underlying price should be closely correlated to the price pertaining to the risk exposure. If so, it's likely that a derivative transaction can be structured to mitigate some portion, if not all, of the preexisting risk.

In some cases, the choice of the derivative is obvious. For example, for a variable-rate borrower with debt tied to one-month LIBOR, exposed to the risk of rising interest rates, an obvious derivative choice is one that pays off when one-month LIBOR increases. In this example, the price underlying the risk exposure and the underlying price of the derivative are identical, so choosing this derivative is self-evident. When an identical match isn't available, however, finding an appropriate derivative might be a bit harder. To take an example from the commodities industry, the price exposure of a corn farmer who sells a grade of corn other than No. 2 yellow corn priced at par. In this situation it's unlikely that the farmer would be able to find a derivative that delivers a perfect offset. That is, any corn derivatives that are available are likely to generate close offsets, but not perfect offsets.

Regardless of the commodity in question, for purchasers, the risk is that the commodity price could rise; for sellers, the risk is that the commodity price could fall. In the general case, commodity derivatives tend to price with reference to some industry standard benchmark, but actual invoice prices tend to vary from this benchmark due to differences in quality and/or location or assorted mark-ups or surcharges. Still, as previously stated, if the exposure's invoice price is highly correlated to the price underlying the derivative, the hedge can reasonably be expected to work. To the extent that these two prices do not move in lock-step, however, the performance of the hedge will be somewhat uncertain.

## examples of basis risk in hedging transactions

The difference between the price that functions as the source of the exposure and the price that underlies the intended derivative is generally identified as the basis. Thus, when hedging a risk where the basis amount is uncertain, the hedging entity would be transforming the risk pertaining to the full price of the commodity to a much smaller exposure relating to the variability of the basis. In most situations, employing a hedge of this type would substantially lower the risk to the company.

The following exhibits show six possible hedging scenarios. Each one depicts the same objective of locking in the price of a forthcoming purchase of "widgets" using a widget forward contract. The starting conditions for all the scenarios are the same, with the spot price of widgets (i.e., market price for an imminent delivery of widgets) equal to \$750, and the widget forward contract priced at \$753.

**Exhibit 1** shows the first two scenarios. In the first, while starting at \$750, widget prices rise to \$900; in the second, they fall to \$600. In both cases, though, we observe convergence of the spot and forward prices. Such convergence would be expected at the expiration of the forward contracts only if the price paid for the physical widgets when acquired at the end of the hedge is exactly equal to the price of the forward contract at its expiration or liquidation. In both cases, despite large price changes in opposing directions, the hedge realizes an effective (post-hedge) price of \$753 – identical to the price of the forward at the inception of the hedge. This effective ex-post price follows from paying the then-prevailing spot market price for buying the widgets and either subtracting any hedge gains from that price (Scenario 1) or adding hedge losses (Scenario 2).

### Exhibit 1: Long Forward Hedge; Perfect Convergence

<u>Scenario 1</u>			
	at Start of Hedge	at End of Hedge	Gain (Loss)
Spot Widget Price	750	900	-150
Widget Forward Price	753	900	147
Basis*	3	0	-3
		<i>Physical purchase price</i>	900
		<i>Less gain on hedge</i>	-147
		<i>Effective ex post price</i>	753
<u>Scenario 2</u>			
	at Start of Hedge	at End of Hedge	Gain (Loss)
Spot Widget Price	750	600	150
Widget Forward Price	753	600	-153
Basis	3	0	-3
		<i>Physical purchase price</i>	600
		<i>Plus loss on hedge</i>	153
		<i>Effective ex post price</i>	753

\* Basis is defined as Futures Price minus Spot Price.

In the real world, the invoice price of the widgets would likely pertain to a commodity having quality or location differences from the benchmark commodity that underlies the derivative contract, in which case perfect convergence would not be anticipated.

Two additional scenarios showing imperfect convergence are presented in Exhibit 2. These two scenarios have been designed such that when the hedge terminates, the forward prices end up being at a premium of \$1 to their corresponding spot prices. Under these assumed conditions, rather than locking in a post hedge price of \$753, the example ends up realizing an effective price of \$752 – i.e., the starting forward price adjusted by the ending basis conditions.

**Exhibit 2: Long Forward Hedge; Imperfect Convergence**

<u>Scenario 3</u>			
	at Start of Hedge	at End of Hedge	Gain (Loss)
Spot Widget Price	750	900	-150
Widget Forward Price	753	901	148
Basis	3	1	-2
		<i>Physical purchase price</i>	900
		<i>Less gain on hedge</i>	-148
		<i>Effective ex post price</i>	752
<u>Scenario 4</u>			
	at Start of Hedge	at End of Hedge	Gain (Loss)
Spot Widget Price	750	600	150
Widget Forward Price	753	601	-152
Basis	3	1	-2
		<i>Physical purchase price</i>	600
		<i>Plus loss on hedge</i>	152
		<i>Effective ex post price</i>	752
* Basis is defined as Futures Price minus Spot Price.			

To complete this set of examples, Exhibit 3 shows another pair of imperfectly converging scenarios; but in this exhibit, the ending basis has the forward price being \$5 less than the ending spot price. And in these cases, the effective ex-post widget price is \$758 (= \$753 – (-5)).

**Exhibit 3: Long Forward Hedge; Imperfect Convergence**

<u>Scenario 5</u>			
	at Start of Hedge	at End of Hedge	Gain (Loss)
Spot Widget Price	750	900	-150
Widget Forward Price	753	895	142
Basis	3	-5	-8
		<i>Physical purchase price</i>	900
		<i>Less gain on hedge</i>	-142
		<i>Effective ex post price</i>	758
<u>Scenario 6</u>			
	at Start of Hedge	at End of Hedge	Gain (Loss)
Spot Widget Price	750	600	150
Widget Forward Price	753	595	-158
Basis	3	-5	-8
		<i>Physical purchase price</i>	600
		<i>Plus loss on hedge</i>	158
		<i>Effective ex post price</i>	758
* Basis is defined as Futures Price minus Spot Price.			

If, at the start of the hedge, the hedging entity correctly anticipates the ending basis amounts, the company will be able to correctly forecast the hedge's outcome. More likely than not, though, the best the hedger could expect to do is anticipate some prospective range for this ending basis; and an estimated hedge outcome could be made based on that presumed range. For example, if at the inception of the hedge the hedging entity thought that the possible ending basis might be as high as \$10 (i.e., the forward price ending up \$10 above the spot price) or as low as -\$7 (i.e., the forward price \$7 lower than the spot price), the day-one expectation would be for the hedge to deliver an effective price of widgets falling somewhere between \$743 (= \$753 – \$10) and \$760 (= \$753 – (-\$7)). Should the hedging entity mis-estimate the ending basis conditions, however, the expected hedge outcome will be equally off.

With this orientation, it is clear that the ex-post outcome of a hedge is wholly dependent on the size and direction of the ending basis – something that the hedging entity should appreciate from the start as being outside the scope of the hedge objective. Put another way, after the fact, the resulting effective price realized is fully understandable and attributable to (a) the initial derivative price and (b) the ending basis value. There are no price factors other than these two parameters.

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## accounting treatment of derivative hedges

All of the scenarios above assume a one-to-one hedge construction, where the volume or size of the underlying exposure is equal to the notional amount of the derivative contract. This sizing reflects an implicit assumption that the hedging entity is willing to accept the risk associated with basis variability. Put another way, the objective of the hedge would be to address only the portion of the risk that relates to the variability of the price of the benchmark commodity. Critically, in order to hedge this component exposure perfectly, the invoice price of the commodity must explicitly reference the underlying price of the derivative at the time the derivative is liquidated.

The Financial Accounting Standards Board (FASB) recognized the legitimacy of this kind of component hedging – albeit belatedly. That is, in FASB's initial release of its standard for accounting for derivatives and hedging transactions (originally issued as FAS 133 in 1998), the Board restricted hedge accounting for commodity hedges to those situations where the derivative served to offset changes in the entire invoice price of the commodity, which tended to preclude the application of hedge accounting when basis effects represented “too large” a portion of the commodity's overall price variability. FASB amended this guidance in November of 2017 with the release of ASU2017-12, which reversed course and allowed hedge accounting for a component of commodity prices, with an important proviso -- that the component being hedged was contractually specified in the purchase or sales agreement.

Although hedge accounting is not automatic and a variety of prerequisite conditions must be satisfied to qualify for this treatment, hedge accounting is widely understood (correctly) to be the preferred accounting treatment for derivatives used in hedging transactions. This preference derives from the fact that, with hedge accounting, the payoff of the derivative is recognized in earnings in the same accounting period as is the earnings realized from the hedged exposure. This coincident earnings recognition serves to reflect the intended hedging objective. Otherwise, without hedge accounting, these two earnings amounts would likely be reported in different accounting periods, giving rise to income statement volatility that many financial statement users regard as misleading or artificial.

Under this more liberalized guidance, reporting entities seeking to apply hedge accounting are still required to assess hedge effectiveness and qualify for hedge accounting by demonstrating that the hedge will be “highly effective” in offsetting changes in cash flows attributable to the price change of the contractually specified component. But whenever the contractually specified component in the purchase or sales contract is identical to the underlying price of the derivative, this assessment of high effectiveness can be made “qualitatively” by simply asserting the equivalence of the hedged item's price with the derivative's underlying price. This is all well and good when this condition is satisfied, but if the contractually specified reference price differs in the slightest from the derivative's underlying price, a quantitative effectiveness test is required.

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## conclusion

Although basis risk is often considered to be largely uncontrollable, a more appropriate perspective should appreciate the fact that the consequent earnings variability that follows from basis risk is easy to quantify. All that's required is having some historical perspective as to the range of basis conditions that have occurred – that, and an appreciation that those historical boundaries may still yet be tested.

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## author

### Ira Kawaller



Prior to founding Derivatives Litigation Services, Kawaller has had decades of experience as a practitioner, advisor, educator, and expert witness, concentrating on issues pertaining to derivative instruments and financial risk management. His longest tenures were as the President of Kawaller & Company, a consulting firm specializing in assisting commercial entities with their use of derivatives, and as the director of the New York office for the Chicago Mercantile Exchange.

Ira Kawaller served on the board of Hatteras Financial Corp (which merged with Annaly Capital Management Inc.) and participated on their risk committee and compensation committee. He has also served on a variety of professional boards and committees, including board of the International Association of Financial Engineers (now the International Association for Quantitative Finance) and the Financial Accounting Standard Board's Derivatives Implementation Group.

He received a Ph.D. in economics from Purdue University and has held adjunct professorships at Columbia University and Polytechnic University. He writes and lectures prodigiously, largely focusing on derivative contract market activity.

## ☒ Horizon risk & FRTB: insight from Europe's risk leaders

by **David Croen & Eugene Stern**

From horizon and fragility risk to the implementation of new regulations, including the Fundamental Review of the Trading Book (FRTB), risk managers have a broad set of issues to focus on in 2019 and beyond. In November, Bloomberg hosted the Professional Risk Managers' International Association (PRMIA) 2018 EMEA Risk Leader Summit at its London offices, joined by 120 senior executives, risk managers and policy makers to engage in interactive sessions, panels and conversations to advance risk management practices.

The event featured 11 panel discussions on a wide range of current topics including political risks (e.g. Brexit), climate risk, systemic risks, technology risks (e.g. cyber risks, fintech disruption, and digitalization), risk and strategy, regulatory risks, machine learning, and systemic risk. Bloomberg's David Croen and Eugene Stern moderated two of the panels, on Horizon Risk and Regulation and Market Structure respectively. Here are the key takeaways from their discussions:

### Horizon risks cannot be ignored

Horizon risk is becoming central to risk management and business strategies. While the definition of horizon risk can be debated (should it include only risks that are embedded in today's risk environment or risks that may emerge in the future?) the panel of senior industry practitioners agreed that several key horizon risks are developing – and that market participants need to look beyond just where equities are going.

The panel also discussed fragility risks, including market and state fragility. Participants noted there are concerns not only about markets and countries perceived to have structural weaknesses and higher social unrest, but also about developed markets and countries where recent economic growth has not benefited everyone. These weaknesses could affect investment opportunities and quality of life.

Panelists identified a broad range of other risks that require monitoring, from political risk and the implications of leadership change to changing demographics in developed countries. Aging populations are creating new challenges, such as the cost of care, that bring potential investment opportunities and risks.

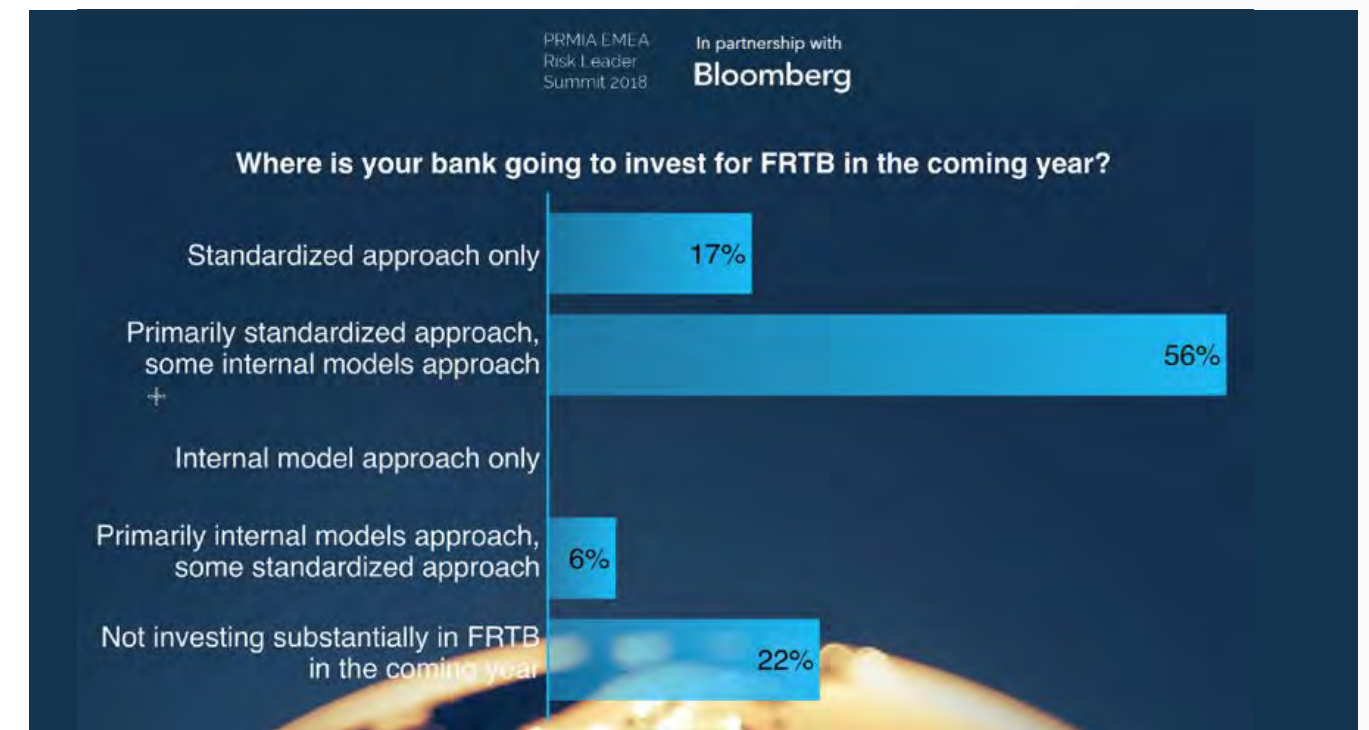
Meanwhile, an increasingly decentralized financial services environment has implications for the value of trust – particularly evident in crypto and blockchain businesses – and highlights numerous potential risks. Regulatory arbitrage and “gray zones” were identified among the challenges regulators face as they try to keep up with rapidly evolving technology.

## regulation comes with its own risks

A second panel of regulatory thought leaders, including policy makers, discussed some of the most pressing statutory governance issues facing banks today. For example, the final version of the Fundamental Review of the Trading Book (FRTB) regulation, developed by the Basel Committee on Banking Supervision, may be published early in 2019. This made FRTB a focus of the session, with the panel highlighting the potential fragility of the proposed framework. In particular, there was lively discussion of the likelihood that FRTB could introduce additional systemic risks by forcing over-standardization of banks' internal risk models.

There was also discussion of banks' progress on planning for and implementing the proposed regulation, and while there was consensus among the panelists that substantial work was underway, most banks are not near implementation of the proposed rules. An audience poll revealed that most institutions are focusing on FRTB's Standardized Approach, and the practitioners on the panel agreed that the benefits of the Internal Models Approach may not compensate for its complexity. In particular, the panel highlighted the substantial organizational and structural changes likely to result from FRTB as posing significant and underappreciated challenges for implementing the regulation.

## where is your bank going to invest for FRTB in the coming year?



### authors



**David Croen**

Bloomberg's Head of Credit Risk Product



**Eugene Stern**

Bloomberg's Head of Market Risk Product

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