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Intelligent risk

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IN THIS ISSUE

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INTELLIGENT RISK, JUNE 2013!

DOUGLAS ASHBURN

It is not easy being a risk manager in June 2013. Recent and ongoing financial crises have led to a global regulatory rethink, the likes of which have never been seen before. Concurrently, monetary and fiscal intervention from central banks and governments, while certainly providing a short-term respite from the depths of crisis, are creating imbalances and increasing long-term economic uncertainty.

A perfect example of this brave new world is the aftermath of the June 18-19 U.S. Federal Open Market Committee (FOMC) meeting and statement, where Chairman Bernanke sent equity and treasury markets into a tailspin by suggesting that a labor market recovery may spell the end of its current quantitative easing program. How can one manage risk in such a good-news-is-bad; bad-news-is-good environment?

Will the traditional risk models hold up in such an environment? For that matter, did they even hold up last time and, if not, are there models out there that could better assess risk in the real world?

Fortunately, as a member of PRMIA and reader of *Intelligent Risk*, answers to such questions are at your fingertips, both within our publications and within your local chapter.

Among the uncertainties evidenced by the recent FOMC meeting is a return of volatility in the market for U.S. Treasury securities. Inability to forecast the "risk-free" rate makes it difficult to use traditional pricing mechanisms, and makes accurate risk budgeting next to impossible. This truism is summed up nicely by PIMCO's Ben Emons in his submission *No Longer a True Risk-Free Rate*.

During the financial crisis, one of the chief impediments to restoring confidence in the system was the fact that there was no system in place to give regulators a full systemic risk snapshot. Instrumental in the establishment of such a system is the Global Legal Entity Identifier System ("GLEIS"). While there is plenty to be done to put in place this global standard, we are making headway. Allan Grody gives a status update on the project in an easy-to-read FAQ format.

Another market structure criticism stemming from the financial crisis was inadequate loan loss reserves at major financial institutions. While enhanced global capital reserve rules are certainly forthcoming, at least part of the solution will come in the form of tightened accounting standards. CreditExpo, a Dublin-based banking advisory group, offers its idea of synchronizing loss recognition with income recognition, and how such an idea might fit with international accounting standards. In a similar vein, Dr. Moorad Choudhry, in part two of a three-part series on bank liquidity and funding challenges, offers a best-practice policy template for internal funds pricing.

While we are on the subject of model inadequacy during crises, in this issue we revisit value-at-risk (VaR) and ask whether there is a better way to reflect the full risk profile. Dr. Frank Schmielewski of RC Banken Group introduces a model he calls extremeVaR, which, he says, more accurately reflects tail risk in the real world.

In this month's chapter update, we travel to the Emerald Isle and take a look at the recently reorganized, 1000-member strong PRMIA Ireland. Ireland has long been a leading indicator of global trends in the financial sector, from expansion to crisis and eventual recovery. Perhaps we should be paying attention to the content coming from this chapter.

I would like to close with a shout-out to my local chapter here in Chicago, as we have been quite busy of late. Among recent chapter-sponsored events are a half-day symposium on the true costs of climate change (the costs of doing nothing versus the costs of doing something) and a status update on Dodd-Frank implementation. My favorite, though, was the ERM Symposium in town April 22-24. Not only was I able to hear from and network with some of the pre-eminent risk experts, but I was also able to meet many of the PRMIA people with whom I have been working during my time as iRisk editor. To cap it off, former FDIC chair Sheila Bair offered her views on alignment of incentives, board and risk officer responsibility, and the limits of boards to handle the increasing complexity we are witnessing in today's corporate sector. If you ever get a chance to listen to this pull-no-punches ex-regulator, I encourage you to do so.

May you all have a wonderful summer. Make time for fun, but also make time to catch up on some reading, beginning with the June issue of *Intelligent Risk*.

— Douglas Ashburn, *Editor*

Douglas Ashburn is a Sustaining Member of PRMIA and a self-proclaimed "trader-masquerading-as-a-journalist." Doug is a 20-year veteran derivatives trader and manager of portfolio risk, whose focus has been in foreign exchange options, futures and OTC derivatives. He is currently Editor-at-Large of John Lothian News, a Chicago-based financial media company, where he regularly writes a column on FX, edits a managed futures newsletter, and leads the development of MarketsReformWiki, a site dedicated to tracking and archiving of all information related to global financial regulatory reform.

Dear PRMIA Members:

We are eager to announce some exciting changes that PRMIA will adopt in the next few months. These will aid the Professional Risk Manager (PRM™) Exam and curriculum, as well as its relevance and standing in the risk management community.

Our flagship PRM designation syllabus has recently been reviewed by a set of risk practitioners and other professionals and academics through the PRMIA Education Committee. As a result of the review, the study materials for the exam will be updated, as will the related exams. These changes are expected to be completed during the rest of 2013 with the updated material and exams being made available in early 2014.

PRMIA's Board of Directors has approved three strategic changes to the PRM designation, specially aimed at enriching the quality and standing of this certification in the risk management market. This in turn will benefit its candidates and designation holders.

- **Exam Frequency** — PRMIA will discontinue on-demand exam taking and will offer exams at fixed intervals throughout the year;
- **Exam Bundling** — The PRM Handbook will now be sold as a 'bundle' with 4 exam vouchers
- **Experience Requirements** — PRM holders will only be validated with the attainment of a minimum level of either education or work experience.

These will be implemented in early 2014.

Exam Frequency

PRMIA's new testing approach will begin in January 2014; thus, the last date for "On Demand" testing will be December 31, 2013.

This will benefit our candidates in multiple ways. Primarily, the new structure will motivate our candidates to better allocate study time in preparation for their exams. Furthermore, it will encourage the formation of a PRM study community, allowing candidates to join different study groups based on the testing period of their preference. It will also create a sense of urgency and disallow the candidates to procrastinate, thereby promoting a better outcome and a pathway to success.

Simultaneously, this new structure will advance PRMIA's capability to continuously update its curriculum, thus keeping its exams current, which is essential given the ever-evolving nature of the risk management industry.

We can offer this examination approach to our candidates, while still maintaining a high degree of flexibility in comparison to our peers by allowing 4 testing windows a year, each spanning over 3 weeks as opposed to an approach such as a single testing day spaced six months apart.

Exam periods will be:

- February–March (3 week test window)
- May–June (3 week test window)
- August–September (3 week test window)
- November–December (3 week test window)

During these periods candidates may still choose to take the complete exam or individual exams. To ensure convenience, testing will continue to be available in more than 165 countries in nearly 5,000 locations.

Exam Bundling

In a rapidly changing world of risk management, the use of outdated textbooks ranks high among our concerns. To discontinue the use of obsolete material and encourage candidates to follow the most up-to-date information, PRMIA will start selling the PRM Exam as a bundle. Each bundle will contain 4 exam vouchers, which can be used with any of the 4 PRM Exams and a complete set of the Professional Risk Managers' Handbook (PRM™ Handbook). This will ensure that our candidates are constantly educated with the most pioneering study materials available in the field and will eliminate the need to constantly change the PRM Vouchers.

PRM Vouchers will now have a validity of three years. Candidates will have two years to complete the PRM Program from the first successful attempt at any of the PRM Exams. In the eventuality of an unsuccessful examination attempt, candidates can purchase additional PRM Vouchers online or by contacting *support@prmia.org*.

Note: *The PRM Handbook will continue to be available as a stand-alone product, with the understanding that once a candidate decides to begin the PRM Exam, they will receive an additional copy with the purchase of the bundle.*

Call for iRisk Articles

Article submissions for future issues of *Intelligent Risk* are actively invited. Articles should be approximately 1,000–1,500 words, single spaced, and cover a topic of interest to PRMIA members. Please consult the submission guidelines located at the end of the publication prior to submitting your article. Please send all article submissions that you wish to be considered for publication to ***iRisk@prmia.org.*** Chosen pieces will be featured in future issues of iRisk, archived on ***PRMIA.org***, and promoted throughout the PRMIA community.

Voucher bundle options will include:

- 4 Exam Vouchers & PRM Handbook Digital Version
- 4 Exam Vouchers & PRM Handbook Print Version
- 4 Exam Vouchers & PRM Handbook Digital & Print Versions

Experience Requirements

The new minimum requirements for PRM candidates will take effect as of January 1, 2014. Anyone who begins the exam process as of this date will be subject to the new requirements.

The reason for the PRM requiring some previous experience of related work is that candidates can apply their experience to the theoretical concepts they meet in their study. Also, it allows the PRM to be seen as a qualification that is held by experienced risk management practitioners. This will be an attraction to new PRM candidates and a benefit to PRM holders.

Minimum experience requirements:

- 4 Years if no bachelor degree
- 2 Years if bachelor degree
- No experience requirements if graduate school or holder of other accepted professional Designations (CFA, CAIA, CQF, etc.)

Furthermore, with the impending release of *The Essentials of Risk Management*, Second Edition in December of this year, PRMIA will also update the Associate PRM certificate. PRMIA members are reminded that the Associate PRM certificate is an excellent introduction to the risk management subject area and also counts as an exemption to exam IV of the PRM designation.

If you have any questions, comments or concerns, please contact Andy Condurache, PRMIA's Director of Exams & Publications at andy.condurache@prmia.org

Sincerely,

Andy Condurache
Director of Exams & Publications

Justin McCarthy
PRMIA Education Committee

PRMIA OFFERS EXPANDED CLASSROOM EXECUTIVE EDUCATION OPPORTUNITIES

We have expanded our classroom training opportunities for the remainder of the year, offering education on a variety of key topics in various locations around the world. Ranging from one-day training sessions to more intensive week-long courses, these educational programs offer the chance for risk managers at all levels to advance their knowledge and their careers. Visit the PRMIA website or page 35 to learn more about these courses or to register.

FEATURED COURSES

A Complete Course in Risk Management
July 15–19, 2013 | Chicago, IL
In partnership with Kellogg School of Management

Financial Risk Modeling, Calculation of Economic Capital, and the Design of Prudential Regulation
September 9–12, 2013 | Atlanta, GA
In partnership with Georgia State University

Applied Financial Risk Management
October 7–11, 2013 | Berkeley, CA
Haas School of Business, University of California, Berkeley

UPCOMING CLASSROOM TRAINING COURSES

Investing in Commodities: Basics & Beyond
September 13 | Munich, Germany
Led by George Skiadopoulos

Managing Enterprise Risk in a New Environment: Dodd Frank and Operational Risk Impacts from Regulation
October 3–4, 2013 | Chicago, IL
In partnership with Kellogg School of Management, led by Professor Russell Walker

Counterparty Credit Risk: The Impact of CVA, Basel III, Funding and Central Clearing
October 17–18, 2013 | Minneapolis, MN
November 14–15, 2013 | Dusseldorf, Germany
Led by Jon Gregory

Managing Regulation, Reputation and Risk
December 5–6, 2013 | Chicago, IL
Led by Professor Russell Walker and Professor Timothy Feddersen

CHALLENGES IN BANK FUNDING AND LIQUIDITY: A 3-PART FEATURE
Part 2: Business best-practice bank internal funds pricing policy

PROFESSOR MOORAD CHOUDHRY

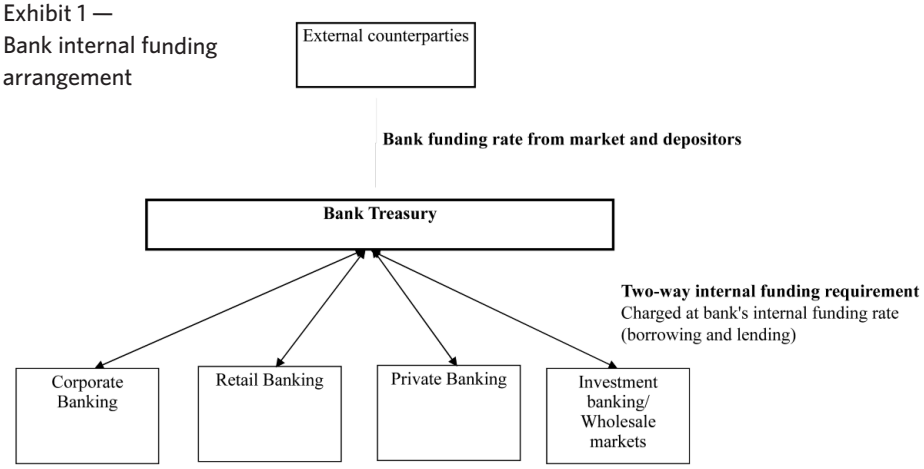
Internal bank funds pricing is a key element in liquidity risk management. An inappropriate or artificial internal funds pricing policy may lead to poor business decision-making, and could generate excessive liquidity and funding risk exposure. It is therefore imperative for banks to operate a robust and disciplined internal funding mechanism, one that is integrated into the overall liquidity risk management framework.

In part 2 of this three-part series on bank funding and liquidity challenges, we review the rationale behind the internal term liquidity premium and present a recommended best-practice policy template for internal funds pricing. *You can access part 1 by clicking here.*

Background

Bank internal funds pricing mechanism — funds transfer pricing (FTP), firm liquidity pricing (FLP), liquidity transfer pricing (LTP) or term liquidity premium (TLP) — is invariably operated via the Treasury function. This is logical given that all banks operate essentially the same internal funding arrangement, as illustrated in Exhibit 1. Treasury is also responsible for external balance sheet liquidity risk management, as well as interest rate risk.

Exhibit 1 — Bank internal funding arrangement



FTP — the price at which an individual business line raises funds from its own Treasury desk — is essential to the risk management process. It is the key parameter in business decision-making, driving sales, asset allocation, and customer product pricing. It is also a key hurdle rate behind the product approval process and in an individual business line's performance measurement. Just as capital allocation decisions affecting front office business units need to account for the cost of that capital (in terms of return on regulatory and economic capital), so funding decisions exercised by Bank Treasurers carry significant implications for sales and trading teams at the trade level.

A problem arises because banks undertake maturity transformation, funding long-dated assets with shorter-dated liabilities. Moreover, certain assets such as mortgages and corporate loans are frequently illiquid in nature. The combination of a funding gap and illiquid asset base makes it imperative that, each time an asset is originated, business lines correctly price in the term liquidity risk they are generating. Conversely, a business line that raises funds can also be valued at the internal term liquidity premium.

Hence, the internal funding rate is important to the discipline driving business decision-making. For example, a uniform cost of funds (something practiced by many banks during the lead-up to the 2008 financial crisis) will mean that the different liquidity stresses on the balance sheet, created by different types of asset, are not addressed adequately at the aggregate funding level. Different asset types place different liquidity pressures on the Treasury funding desk, thereby demanding a structurally sound internal funding pricing policy that is appropriate to the type of business line being funded.

Setting the Bank Policy Standard

A formal internal funding policy is necessary in order to make explicit to business lines the need for the bank to cover the cost of its liquidity risk. The objectives of the policy are to:

- ensure consistent liquidity pricing behaviour among each business line;
- remove interest-rate risk from business lines; and
- include the bank's cost of liquidity in product pricing.

The policy must also seek to ensure that business lines recognize the impact of asset and liability pricing on the balance sheet of the bank,

and allow for these costs accordingly. The policy document should be formalized and approved at the asset/liability committee (ALCO) level, and Treasury should review the document on a semi-annual basis. The policy should include the treatment for each product asset class in which bank deals.

The Term Liquidity Premium

It is important, then, that all banks put in place an internal funding structure that correctly charges for the term liquidity risk placed on the balance sheet by each business line. An artificially low funding rate can create as much potentially unmanageable risk exposure as a risk-seeking loan origination culture.

The principal debate concerns exactly what Treasury is pricing when it sets the FTP. If one accepts that a bank undertakes maturity transformation, then logic dictates that the FTP charge should be a term liquidity premium. For example, the internal rate from Treasury to the Corporate Banking division looking to price a 5-year bullet corporate loan would be the 5-year TLP. The FTP would then equal:

FTP = Short-term funding rate + TLP

The proxy for the short-term funding rate is usually 3-month Libor, but it could equally logically be 1-month Libor or the central bank base rate. The bank's ALCO should approve the appropriate proxy.

Note that this does not necessarily equate to the bank's 5-year wholesale cost of funds (COF). The bank's funding rate will incorporate an element of its own credit risk to the market, as well as the term liquidity premium, and it is only the liquidity premium that should be passed on to the business line in the internal FTP.

If we discount the reality of maturity transformation and assume matched funding, then in this example we would have:

FTP = COF

While it is always important to ensure that the correct cost of liquidity is allowed for in the internal funding model, it needs to be set in line with commercial and practical reality.

Calculating the Term Liquidity Premium

The TLP, when used in the way we have defined it here, is not a straightforward exercise when extracting from market and customer rates. Often one needs to have recourse to proxies, and instead of one specific value being available, one may need to be satisfied with a range and/or average.

The base case scenario would be for a bank to have access to the wholesale markets at Libor across the entire term structure. There is a case here for saying that the FTP can be Libor-flat; however this is the current state *now*, with the future state of the markets being unknown. Thus a zero FTP spread can be justified only on a match-funded basis. Given this logic, a bank needs to determine its cost of liquidity. There may be more than one answer, so an element of judgement is called for.

The starting point is the rate at which the bank can raise funds in the market. For a large bank, its primary issuance level will, in a stable market, lie above the secondary market level. If we ignore this difference for the time being, a logical first step would be to take the cost of its funds in the market as the primary input to its internal funding curve. Two things must be considered: (i) this funding rate includes the credit risk of the bank, which needs to be stripped out and (ii) not every bank has a public funding curve. It is necessary then to consider proxies to establish the cost of liquidity.

While a number of proxy measures can be considered, we recommend the following:

- The difference between the funded and the unfunded rate for the bank; that is, the swap rate versus the bond rate paid by the bank. In other words, what it pays fixed in an interest-rate swap against what it pays fixed on a bond it issues (of the same tenor);
- The difference between:
  - Paying fixed on a term interest-rate swap, and
  - Paying fixed on the same-tenor money market swap or OIS swap.
- The increase in the cost of funds for the bank for each incremental upward change in tenor; for example, a bank's cost of borrowing along the term structure, as a spread over Libor, may look like this:
  - 1-year: 20 bps
  - 2-year: 30 bps
  - 3-year: 35 bps
  - 4-year: 40 bps
  - 5-year: 50 bps

While the above approach assumes a flat credit term structure for the bank (which, from observation of the credit derivative market we know not to be accurate), it does still give some idea of the liquidity premium.

- The difference between the bank's CDS spread and the asset-swap spread (ASW) for the bank. This is the CDS basis, and in theory represents the cost of cash borrowing and liquidity premium for the bank against its pure credit risk. Since a CDS is, theoretically, the price of credit only, the basis should represent its liquidity premium.

The FTP charge can be based on a simple average of the above measures. Alternatively, given an individual bank's opperating model, it may choose to give higher weight to certain proxies. Since there is no transparent explicit cost of liquidity, a bank will have to exercise some judgment when setting the rate.

A worked example of this calculation will be presented in the next issue of *iRisk*.

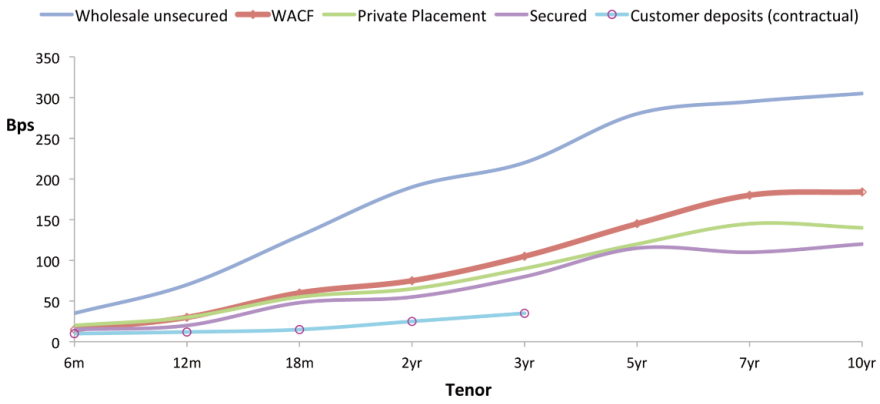
Funds Transfer Pricing Curve

The actual internal funding curve template, be it the TLP or all-in FTP curve, should be included in the bank's funding policy document and reviewed on a regular basis. While it is common for the FTP rates to be posted as a grid (as shown in Exhibit 2), this is not recommended because of the implied linear interpolation relationship between odd-date tenors. Instead, the FTP curve should be drawn as a curve such as Exhibit 3. Here we illustrate an example for a bank that operates across the retail, corporate and wholesale banking space and has also calculated a "weighted average" funding curve (WACF). Many banks choose the grid presentation, however. When a grid is used, assets or liabilities with maturities that are not exact full years, and thus fall in between the tenors on the grid, should be priced on a straight-line interpolation basis between the shorter and longer date prices.

Exhibit 2 — Bank FTP grid

Tenor	GBP
<3M	0
6M	7
12M	14
2Y	25
3Y	32
4Y	40
5Y	42
7Y	68
10Y	99

Exhibit 3 — Bank FTP curve and other funding curves



The FTP curve will state explicitly the rate paid or received by the business lines for assets and liabilities across the term structure. If the FTP policy assumes matched funding, and applies full marginal cost pricing (FMC), then this disregards the fact that, in reality, the bank is engaging in maturity transformation. While this is logically tenable, it may not be practical for commercial or economic reasons. This is why the more robust regime is for Treasury FTP to apply the TLP add-on to the short-term funding rate, rather than FMC. The final customer pricing would incorporate cost of capital, required margin and an add-on for customer credit risk.

Of course, the final choice for the FTP policy is a matter of individual bank judgment, and again, should be decided by ALCO.

As previously noted, where behavioural analysis indicates that the term to maturity of an item differs from its contractual term to maturity, the expected maturity is used to set the appropriate FTP rate. For assets and liabilities, the best example is as follows:

Residential mortgages: in the UK, the legal final maturity of such assets is 25 years. However, from observation and behavioural analysis the expected life is around 7 years, hence we would apply a 7-year rate, or lower, for new asset origination pricing.

Current accounts: this product has a 1-day (or 0-day) contractual maturity but balances are sticky and, typically, at least half of the aggregate balance is static over 2, 3 or even 5 years. It is logical to assign such tenors for FTP purposes. In a similar vein, if a call account balance is shown to be 50% sticky for one year, the 1-year FTP would be earned on 50% of the funds.

For trading book assets, which are generally assumed to be liquid and expected to be sold within 6 months of being bought, the FTP charge would be set according to the expected holding duration and not the legal maturity of the traded asset. Typically this will be at the 6-month FTP rate; however this depends on the type of asset and the level of liquidity. In general, a bank will set different tiers of liquidity, with Tier 1 (such as G7 government bonds) being the most liquid and thus attracting a 1-week or 1-month FTP, down to Tier 3 for the least liquid and attracting the 6-month internal funds rate.

Template FTP Regimes

Though there is no "one size fits all" FTP regime, we present here best-practice guidelines for the FTP approach in retail, corporate and wholesale market business lines.

The guidelines assume a standard internal funding arrangement, whereby internal funding operations are arranged via a bank account in Treasury. When a loan is made, this internal account is overdrawn and then funded on an overnight basis to the business line. The standard overnight FTP charge is 3-mo Libor, but it could be 1-mo Libor or 6-mo Libor, or the central bank base rate, depending on the opinion of bank's ALCO. Assets or liabilities are set at the relevant tenor FTP, although another option is to operate a net rather than gross funding basis and either charge or pay the net position long or short in each relevant tenor bucket at the relevant FTP.

Retail Bank FTP regime

A retail bank is stable funded, and in large part funded by zero- or low-rate liabilities (termed non-interest bearing liabilities or NIBLs). The asset FTP tenor can generally be set safely at less than

the contractual tenor, often the expected life (EL) tenor. This preserves competitive position. Liabilities are also priced at behavioral tenor. So here FTP = TLP and not COF. For residential mortgage assets we assume capital and repayment products, with no interest-only mortgages. The main principles are shown in Exhibit 4.

Note here that tenors quoted are behavioural or, as is common, can be adjusted downwards for competitive reasons. If operating a net charging regime, it is possible to net off nearly matching tenors, for example, 3-year deposits against 3-year assets.

(See Exhibits 4 and 5 below.)

From Exhibit 4, for the floating rate asset, FTP is 3M Libor + TLP. The TLP tenor will be the behavioural life of the asset, so we have suggested 7-year. For the fixed rate asset, FTP is the fixed rate equivalent to 3M Libor plus TLP where the TLP tenor matches the product life (for example, a 2-year fixed rate in a mortgage that moves to floating variable or can be re-fixed at new rate after 2 years). This transfers interest rate risk from the business line and centralises it in Treasury, which is recommended.

Exhibit 6 shows our recommended template behavioural tenors, but it must be emphasized that each bank should set the level appropriate to its own product analysis.

(See Exhibit 6 below.)

Exhibit 4 — Retail banking FTP regime

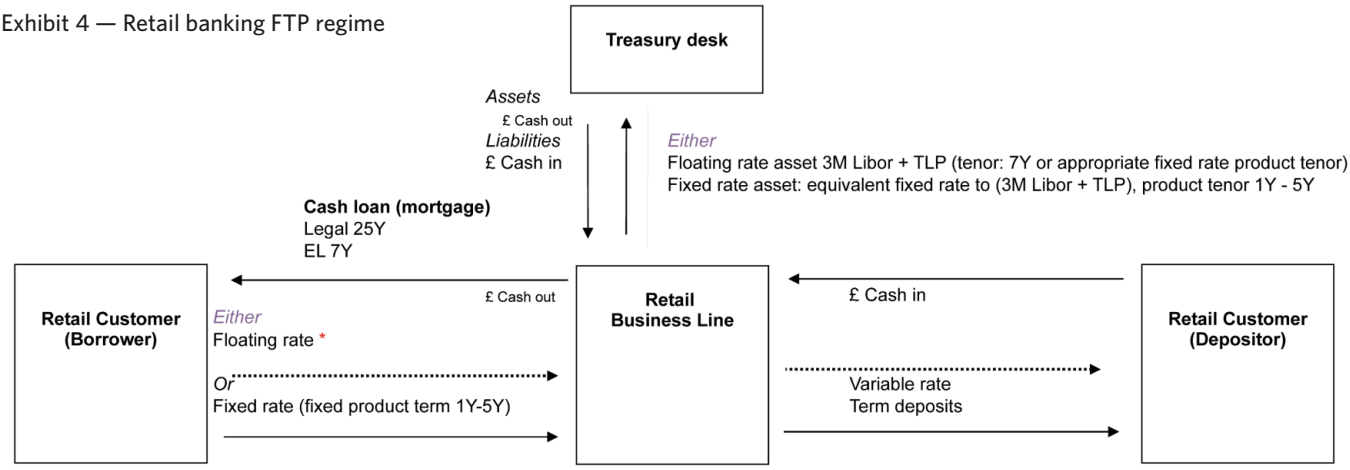


Exhibit 5 — Retail banking asset-liability interconnection

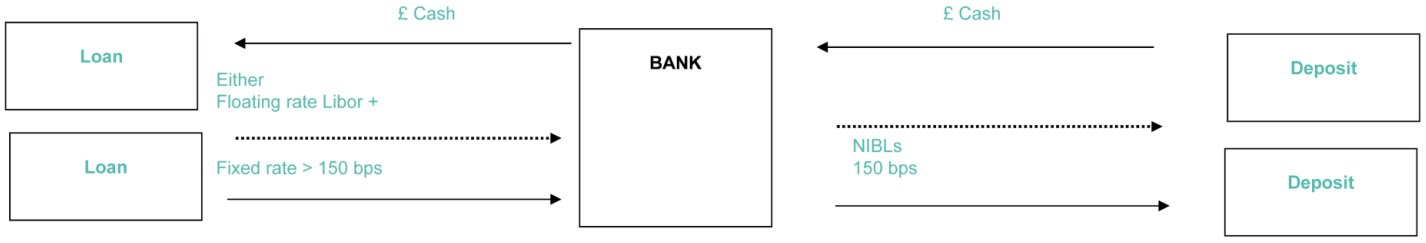


Exhibit 6 — Template retail bank behavioural tenors, percentage of balances

Retail bank product	< 1Y	1Y	2Y	3Y	4Y	5Y
Personal loans	20%		40%	40%		
Mortgages						100%
Overdrafts	10%	10%	80%			
Credit cards	20%		70%	10%		
Savings accounts	20%	20%	60%			
Current accounts	20%					80%

(Source: Choudhry 2012)

The reality of FTP policy is that it must reflect the two-way relationship between assets and customers. We summarize, with reference to Exhibit 5, that the practical considerations for FTP should reflect:

- Actual rates paid by both sides
- Competitive position
- Properly priced products:
  - in the Exhibit 5 illustration, deposits pay 150bps, so loans must earn above this rate
- Behavioural match-funding where applicable, for example match-funded or not:
  - banks that treat current account balances as 5Y or even longer tenor
  - banks that treat such liabilities as shorter tenor.

The longer-dated assumption allows a retail bank to consider itself as "almost match-funded". This is the attraction, from a liquidity risk management point of view, of stable customer deposits ("stable" liabilities as opposed to "non-stable" in the Basel III terminology).

Corporate Bank FTP regime

Compared to retail banking, corporate banking encompasses a wider range of products that attract FTP. As noted above, the treatment of specific product types should be articulated in the detailed funding policy statement.

Per the orthodox approach, business lines originating assets or raising liabilities will have funding and interest rate risk transferred to Treasury and made up to an equivalent interest basis. In the process, the model assumes that all assets are funded at the short-term FTP rate, let us again assume 3m Libor, and all liabilities are rewarded at 3m Libor. The key consideration here, which also applies in retail banking but to a lesser extent, is the hedging side, as a significant amount of corporate bank lending is at a fixed or capped interest rate that must be hedged against interest-rate risk. Note that variable rate products that are linked to the central bank base rate generally fund internally on a 3m Libor basis, but often are un-hedged for interest rate risk due to the lack of depth in the Base Rate swap market.

This raises a key management point. Since internal FTP-Base Rate-Libor basis risk cannot be hedged externally, a bank's origination policy should dictate that fixed-rate, fixed-term assets are hedged with cash fixed-rate liabilities, in order to match repricing tenor and matching interest rates bases. In other words, the bank's IRR hedging policy document should influence product origination strategy, to ensure basis risk is minimized at the point of origination.

The recommended corporate bank FTP regime is illustrated in Exhibit 7. Exhibit 8 shows a template tenor convention.

Note that there are two alternative approaches here, shown in Exhibit 7: (i) the internal FTP that Treasury charges the business for funds lent out at a fixed rate to the customer is also at a fixed rate for the (behavioural) life of the loan or (ii) the internal FTP is at a floating rate. Option 2 does not remove the interest-rate risk for the business line and so Treasury then also has to put in place an internal swap hedge with the business line.

The transparent approach is the first one, consequently that is recommended.

(See Exhibits 7 and 8 below.)

Wholesale bank FTP regime

The wholesale banking business model, where one exists in a bank, requires a more prescribed FTP regime. There is little, if any, concept of a "customer deposits" funding business and the asset side is funded with repo (secured funding) and wholesale funding

Exhibit 7 — Corporate banking FTP regime, asset example

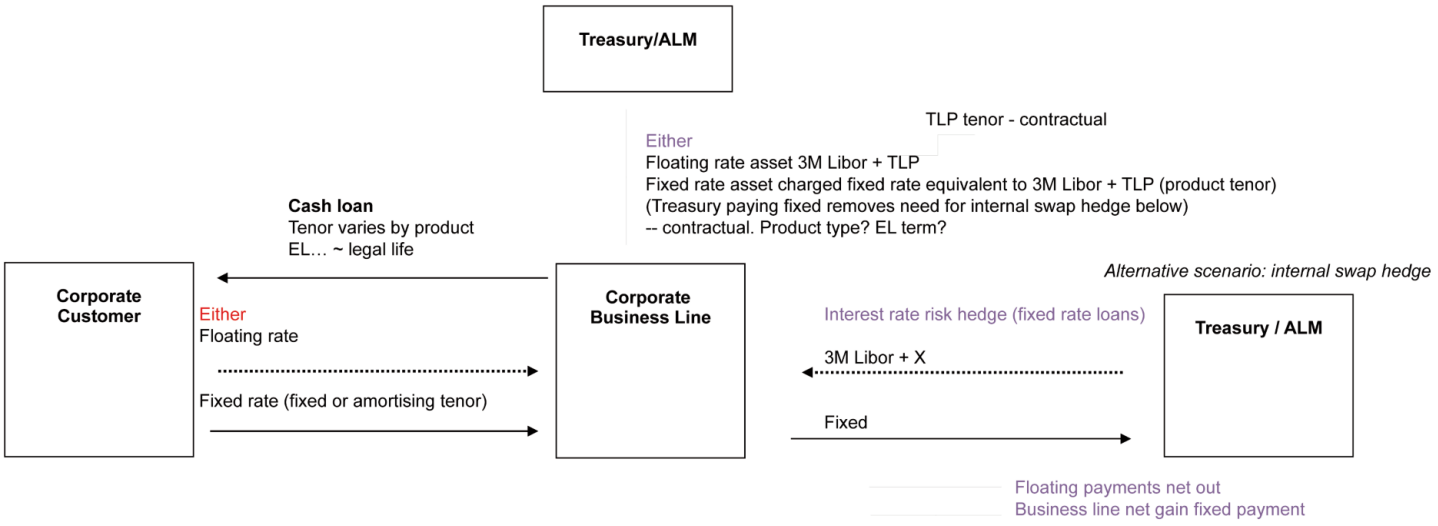


Exhibit 8 — Corporate banking product tenor behaviour, percentage of balance

Retail bank product	< 1Y	1Y	2Y	3Y	4Y	5Y	Contractual tenor
Base rate loans		20%	20%	10%			50%
Libor-linked loans			20%	30%			50%
Overdrafts		25%	75%				
Interest-only loans				25%			75%
Repayment loans		10%	20%	20%			50%
Variable tenor (Revolving facility)		10%					90%
Savings accounts				50%		50%	
Current accounts			20%	30%		50%	

(Source: Choudhry 2012)

(money markets and capital markets).

This makes the FTP model more straightforward to implement. For example, a summary template might look like this:

- **Trading book:** funded in repo at repo rate. Any unsecured funding is funded at 6-month or 12-month Libor. However, not all trading book assets are of an equal liquidity level. The funding policy may break down the asset types into the following:
  - Tier 1 G7 currency bonds
  - Tier 2 Bonds denominated in AUD, CHF, DKK, HKD, NOK, NZD, SEK, SGD
  - Tier 3 Bonds rated below A-/A3

  Most European banks will not have FTP grids for currencies other than their domestic currency and USD and EUR. The base currency grid can be converted to a required currency rate by applying the FX basis swap rate to it — not an exact science but the approach should be sufficient for most purposes.

- **Securitizable assets:** origination of assets that are eligible for securitization often receive a lower funding rate, say a specified reduction in basis points, because in theory they do not expose the bank to a need for more unsecured wholesale funding

- **Derivatives book:** contractual and collateral funding cash flows are modelled into tenor buckets, as expected positive exposure (EPE) and expected negative exposure (ENE), with the net number ("expected exposure" or EE) charged or credited with the appropriate wholesale market COF, rather than the TLP. *(See Part 1 of this series by clicking here).*

A bank that operates across all markets will need to consider carefully how to construct its FTP curve. Ideally there should be one unified curve across the bank, and not variations by business line.

Conclusions

The concept of internal funds pricing and the term liquidity premium is quite a complicated one, and there is no "one size fits all." It is important that the mechanism put in place is the one most appropriate to the business model of the bank in question, and set up to reflect the type of business that the bank's shareholders and board want it to do.

Implementing an internal funds pricing policy that explicitly charges each business line for its cost of liquidity is not always a painless task, due in part to inertia and resistance from the business lines themselves. This is particularly acute when the businesses have historically always paid a Libor-flat or Libor + fixed spread charge. The bank's FTP policy, whether it is an update or it is being set up for the first time, should always be owned by the Board, delegated to ALCO, and implemented by the Treasury and Finance departments.

References

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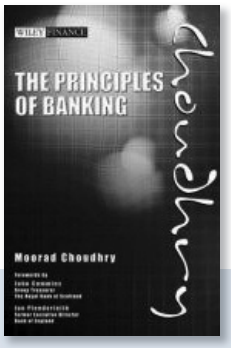

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NO LONGER A TRUE RISK-FREE RATE

BEN EMONS

Our financial system is build upon two premises. It is a fiat currency system that is comprised of free floating currencies backed by a paper standard, the reserve currency. The dominant factor is the reserve currency, the US dollar at which many currencies are valued against. The other feature is that financial assets are valued of a benchmark, a reference rate that is often dubbed as the "risk free rate". Whether one looks at finance such as the capital asset pricing model (CAPM) or at investment grade securities, in general a "risk free rate" is an important assumption. The financial crisis of 2008 may have changed the way the global financial system operated. For one, the amount of direct influence on asset prices by global central banks has been unprecedented. The aftermath of the crisis has shown that once what has long been assumed as a risk-free instrument, a Treasury bill or government bond, is not truly free in financial terms unless there is full back stop or subsidy of some kind. And so government bonds were viewed that way, boring instruments with a low return because they are public goods. Government bonds have been for a long time in the category of a benchmark for "safe haven", a beacon of perceived neutrality between risk and return. The onset of the financial crisis saw large guarantees by governments of their financial systems, and as economies fell into a deep recession, automatic stabilizers as well as additional fiscal stimulus increased governments' total debt. What was normally considered as a steady, boring investment has changed to a volatile instrument with credit risk characteristics.

To perhaps state it in bold terms, there is no longer a "true" gauge for the risk free rate. There were several signs why. For example, Treasury bills have yielded near zero or negative in real terms over the past few years. Even though this may be a sign of "safety", conceivably no or negative return implies no risk; in general, investors reject a negative or zero yield as being investable, either per guidelines or psychologically. As rating agencies downgraded a variety of sovereign issuers, including the United States and the United Kingdom, the universe of AAA-rated government bond issuers has shrunk. The effect of this was dramatic in smaller bond markets; for example, Sweden and Australia saw an increase of foreign ownership, up to 85 percent, according to data of the Swedish and Australian Treasury. Such high ownership has served in crisis times as a potential catalyst for sudden capital withdrawal, affecting the value of bonds adversely. Thus, even though Australian and Swedish governments are AAA, their bond markets are vulnerable to capital withdrawal because foreign investors are likely easier enticed to do so than domestic investors.

There was flight to quality during 2011 and 2012 stemming from the European debt crisis. This led to large inflows into corporate bonds, specifically those in the United States. The yield on the Barclays BBB-rated corporate bond index fell to a record low of 2.56 percent in 2012, below that of the yield on a 30-year U.S. Treasury bond at some point. This is a reflection of investors' perception of safety, whereby corporations are seen as having a sounder, healthier financial state than the government. That said, a corporate bond is per definition never defined as "risk free" because it is generally lower rated than a government bond, and companies are vulnerable to the economy, competition, and access to capital markets. As interest rates fell to new lows, the duration of 30-year government bonds has risen to over 20 years, producing more risks—interest rate, credit, and inflation—for fewer yields.

To the same degree, thanks to quantitative easing, U.S. mortgage-backed securities by Fannie Mae and Freddie Mac became excessively overvalued relative to their prepayment risk. These examples show that even interest rates are at record lows and thus perceived to be in demand, there is a mismatch with the underlying fundamental risk. In a different way, the European debt crisis revealed what modern-day sovereign risk is about. European government bond yields became distressed because of a combination of heightened political, economic, and financial risk. Underneath there was a host of risk elements, including sequential rating downgrades, private sector involvement, restructuring, currency convertibility, social-political rejection, and "debt mutualization", a term for governments assuming each others' liabilities. A good example was Italy which in 2005 was perceived almost as safe and sound as Germany when Italian government bonds yielded a mere 15 basis points—a 15th of a percent—over German government bonds. During the 2010-2012 European debt crises this perception drastically changed. Due to heightened political risk, liquidity deteriorated coupled with Italy's sovereign rating downgraded several times. When Italian bond spreads widened to a record of 600 basis points to Germany, investors received a "wake up call" that the risk of Italian sovereign debt had changed. Even when the European Central Bank took decisive action in 2012, investors still demand a risk premium of 250 basis points to invest in Italian bonds.

The Italian example showed how a risk free rate (15 basis points to Germany) can drastically change. It has led to a debate among market practitioners whether the risk free rate is no longer a suitable input to assessing risk premiums. Take the equity risk premium as another example. It is determined between the

difference of equity and bond expected returns. This premium moved closer to 5 percent in 2012, the highest since the 1960s. Historical data on equity risk premiums by Ibbotson has shown that at ultra low levels of risk-free rates, the risk premiums represent an "old normal." It created the perception that, for example, stocks are dramatically undervalued. That may not be fully correct because historical models are using a risk-free rate based on the assumption of growth rates from better times. It would overestimate the value of equities and perhaps other riskier assets such as corporate bonds. To that effect, valuations may appear to be "depressed" (i.e., risk premiums would be too narrow). If today's risk-free rate appears to be a rate that is "normalized" to pre-crisis levels, while using risk premiums and growth rates from a crisis period, the estimates of asset values may come out too low. In other words, risk premiums would be too wide. The present-day risk-free rate resembles an "upside-down" world. The rate is distorted on the one hand by flight to safety and central banks; on the other hand, the risk-free rate is assumed in models to be at old school value when growth was higher.

That begs the question if there is an "alternative" risk-free rate? In a world of low returns and near zero interest rates, developed market government debt is seen as less 'safe'. Its interest rate risk is the highest in history because of record low rates. But that risk is also in other fixed income securities. To assume there would be an alternative risk free rate implies a whole set of new assumptions to determine value of financial assets. Slowly but surely, the financial system is morphing into something new, whereby functioning on a risk free rate as well as a reserve currency has come into question. For investors it means that valuations of bonds, currencies, derivatives as well as equities have to be evaluated carefully. It requires a selective, defensive and pickier type strategy to achieve positive returns, knowing nothing is really "risk free".

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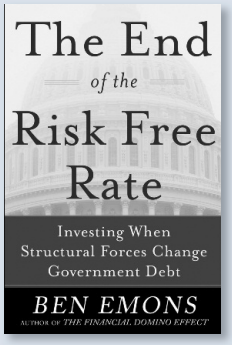


THE IASB EXPOSURE DRAFT — 'FINANCIAL INSTRUMENTS EXPECTED CREDIT LOSSES MODEL'

PATRICK SHALLOW

With the March 4, 2013 publication by the International Accounting Standards Board (IASB) of the Exposure Draft (ED), the long running debate between the "Incurred Loss" and the "Expected Loss" models for credit risk recognition has moved significantly closer to resolution. It can be expected that responses to the ED will progressively move International Financial Reporting Standards (IFRS) rules to a more realistic recognition and accounting for credit risk.

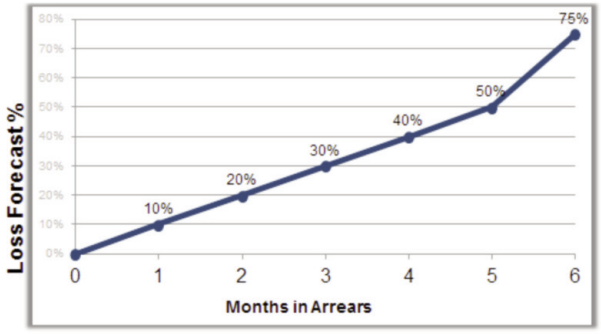
Risk Accounting Conventions under IFRS

Introduced in 2005, the IFRS rules had been progressively and widely viewed by international lenders as having failed to recognize credit risk in a timely fashion. It is now understood that the "Incurred Loss" model of IAS 39, which it introduced, restricted loss recognition and provisioning to *actual and significant arrears*, effectively excluding "Expected Losses", the focus of IASB's now favored Expected Loss model.

To its credit, the Irish Regulatory Document of Financial Regulation (26 October2005) took a less restrictive interpretation of the Incurred Loss model, stating that objective evidence of increased risk might include , for example, changes in national and international economies, arrear trends, risk concentrations or changes in risk profile. Taking a more pragmatic view than IAS 39, it suggested that these clearly significant events could also constitute "impairment" and justify appropriate loss provisioning.

It is worth examining here the risk accounting that has been universally common under the IFRS/IAS 39 dispensation. Banks used variations of the following static spreadsheet approach that attempted to relate and restrict the level of risk to the level of loan arrears (Figure 1).

Figure 1 — Traditional Spreadsheet Loss Forecasting for Retail Credit – Probabilities of Default



The static spreadsheet shown above suggests, for example, that if a loan is three months in arrears it has a 30 percent risk of loss/probability of default, and that if it is five months in arrears it has a 50 percent risk. These simple estimates generally originated in happier economic times; the 30 percent and 50 percent figures would today be neither accurate nor consistent.

This spreadsheet also suggests, unhelpfully, that if a loan is up to date, it has no measurable risk! Typically, and depending on the maturity of the overall loan portfolio, some 85 percent of loans are "up to date" at any time, yet it is not realistic to assume that 85 percent of one's lending is risk free and that the visible 15 percent arrears represents the full measure of the lender's exposure to loss. The pre-IAS 39 practice of allowing "general provisions" for well performing loans, while, arguably, superior as an approach, was also no substitute for realistic risk measurement.

Some further problems associated with these static spreadsheets include:

- Indicative probabilities of default were not only inaccurate, but were also insensitive to economic volatility and thus could not begin to reflect, or to predict, the recent sharp downturn.
- The static model did not reflect local economics, local lending policies or the lender's own borrowing constituencies — critical additional contributors to credit risk.
- Critically, since loan collateral was not marked-to-market, the static model did not recognize that the value of collateral, such as cars or property, had collapsed, thus negating both the borrowers' equity and incentives to repayment.
- Finally, as the high level indications of loss probabilities were seriously inaccurate, they were not amenable to analysis of loan types, or of variations in the term structure of risk.

How did these simple risk models survive up to now?

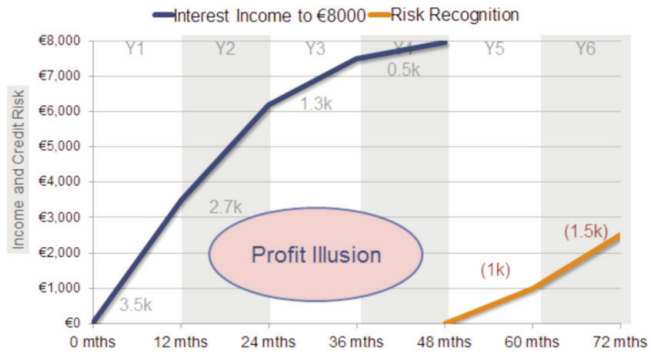
In a dramatically changing economic environment, with new Basel regulations (I, II and III) attempting to keep pace with change and to eliminate regulatory arbitrage, banks were obliged to accept these spreadsheet estimates as the respected and universal conventions, and:

- In a rapidly growing credit market with the acknowledged interest income- credit risk time lags, many years passed with no serious loan loss experience to challenge the figures.
- Since banks lacked an objective measure for loss probabilities, these broadly subjective measures could not simply be revised and replaced with new culturally embedded models.
- Since other banks were following the same conventions, to depart from the convention could place the bank at a disadvantage in terms both of profit reporting and of loan pricing.
- As "general provisions" against well-performing loans were not generally considered allowable against corporate tax, banks lacked the incentive to increase loan loss provisions.

Some Consequences from Delayed Credit Risk Recognition

Figure 2 illustrates how, because of this resulting late recognition of credit risk, the reporting of bank profits became seriously out of step with the reporting of loan interest and profitability.

Figure 2 — Traditional Mismatch of Interest Income with Risk Recognition



What the figure illustrates is the automated, heavily front loaded, recognition of retail credit interest (shown in blue) for a four year loan.

Credit risk (shown in red), however, is typically back-loaded, and typically reported only when loans are in serious arrears (commonly 90 days in the case of mortgage lending) and often, as suggested here, close to the end of the loan life cycle. Referencing IFRS rules, it is often only at this point that provisions are raised in later years, when loans are also written off.

But in the intervening years, the bank, relying on the optics of the spreadsheet, can report high profits. The bank has often paid out these profits in dividends, bonuses and overhead, while simultaneously commences under-pricing new loans. When a period of credit deterioration ensued, the situation led, in Ireland and elsewhere, to a run on reserves and threatened or actual lender insolvencies.

How might a Bank recognize credit risk? — The Experience-Based Model!

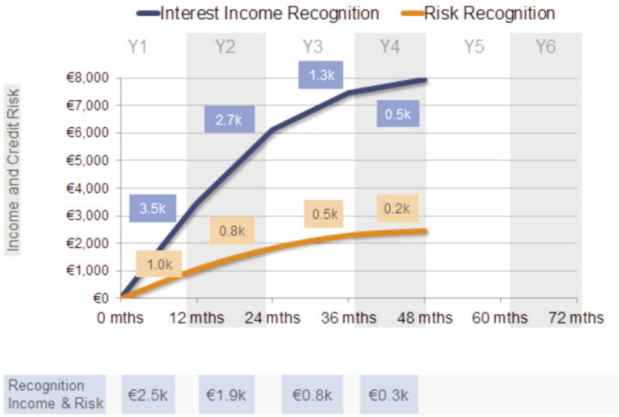
To avoid these distortions of bank performance, credit risk should, ideally, be measured on a continuing basis from the *lender's own recent experience*, and not be based on historical values or static templates. More importantly, credit risk should also take full account of the measurable risk in well-performing and up-to-date loans because, without taking these into account, as illustrated above, the lender will underestimate his credit risk and seriously under-price his lending. This error tends to be masked in an expanding economy with a growing loan book, but it becomes fully exposed when the loan books contract.

Figure 3 illustrates the recommended alternative recognition and matching of *credit risk* with *loan income*, producing a true reporting of profit and a correct analysis of loan types and of trends. It addresses risk as it goes along, and leaves nothing to years five and six. Since bad debts have been fully provided for along the way, (by the end of year four in our illustration) any additional write-offs have no additional impact on profit and loss.

Figure 3 reflects the same recognition of *loan interest* over four years. But now, based on empirical measurement, it accrues and provides against predicted loan losses on a rolling continuous basis. The loan loss forecast, €2,500 which now, critically, includes risk in the well-performing and up-to-date loan book, is measured *from the inception of each loan*. Loan loss provisions, (distinguished here from the loss forecast) keep pace with the loans, in line with the recognition of income viz. €1,000, €1,800,€2,300 and finally €2,500, thereby measuring and reporting true profitability.

The process further eliminates the loss forecasting "surprises" associated with the normal aging of debt and the fluctuations in the local or national economy. This approach also facilitates accurate

Figure 3 — Synchronizing Risk Recognition with Income Recognition



pricing of all loans and loan types, thus eliminating costly cross-subsidization of loans and informing risk mitigation policies. Importantly, it provides a critical guide to managing arrears and internal performance management. The approach is fully consistent with the Expected Loss model now being advocated under the IASB Exposure Draft, providing additional empirical evidence to quantify relevant expectations.

Conclusion

The misinterpretation of the IFRS/ IAS 39 standard may be blamed for some of the underestimation of credit risk recognition over the years. The real culprit, however, has been the associated reliance on the *home- grown static spreadsheet*, which seriously understates the credit risk of arrearages and completely ignores the risk in the well-performing loan book. This oversight induced complacency by the lender and, as illustrated, delayed action until it was far too late for constructive recovery.

ECM Analytics The empirical risk measurement methodology and software discussed here have been developed by **CreditExpo Ltd** at Nova University College Dublin's Technology Transfer Centre.

ABOUT THE AUTHOR

Patrick Shallow is a former senior banker with wide experience and founded Credit Expo in 2003. (Founded Finalysis, the parent company, treasury consultancy, in 1990.) Prior to this, he was Managing Director of the Metropolitan Building Society and, earlier, Deputy MD of Chartered Trust, the Finance arm of Standard Chartered Bank. In South Africa, he was employed as economist with Standard Bank of South Africa, specializing in the analysis of Bank performance and of profitability. ▪ Credit Expo was established to promote the ECM credit risk management methodology and software for lenders internationally. ▪ Patrick has presented regularly on Banking at University College, Dublin, also to the Irish Association of Corporate Treasurers. He is a regular contributor to Finance Magazine and to Business & Finance. Patrick holds a B.Comm (Law and Economics) degree from the University of the Witwatersrand, Johannesburg, an M.Sc. from Trinity College, Dublin and has recently completed his PhD on credit risk at the Smurfit Business School. He is a Fellow of the Institute of Bankers of South Africa.

FROM 'VAR' TO 'EXTREMEVAR': NEXT GENERATIONAL RISK MANAGEMENT

FRANK SCHMIELEWSKI

Introduction

As the world enters a new era of catastrophes, we collide head-on with the realities of natural disasters, which cause damage in the billions of dollars and disrupt or end thousands of lives. We may be forewarned and we may prepare ourselves; however, when disaster strikes, we humans find ourselves still highly vulnerable and wanting. In the face of such fatal natural events, humanity has explored extreme value statistics for centuries.

From an ethical viewpoint, an extreme financial market event cannot be compared to the magnitude of damage arising from a natural disaster but, from a statistical point of view, there exist certain parallels. Such events are rare and often result in immense economic damages that can only be predicted with considerable uncertainty. For example, the recent financial crises, which caused existential threats to entire economies, demands a rethinking of the financial sector by politicians, regulators, financial intermediaries and/or investors. The established methods of risk management employed thus far are no longer acceptable due to their misconceptions and model risks.

In the center of this concern, stands the Value-at-Risk (VaR) approach, which in the early 1990s was upraised, then held to a risk management standard. However, in the recent crises, it has proven to be insufficient and misleading. In its conventional use, the VaR approach is estimated almost exclusively on the basis of normal distributions that typically cannot be observed in the empirical realities, which often feature asymmetrical distributions and the occurrence of *fat tails*. Although it may be evident to risk managers, practitioners and experts that the VaR estimates does not accurately reflect market risk, it is an approach still widely used due to its 'availability bias' — simple calculability and common availability.

This article offers a solution, which descends from the extreme-value-theory (EVT) and allows sufficient estimation of the damages caused by extreme events in financial markets. The findings were backed by collaborations with several renowned universities and industry experts. Thus, it can be a starting point for a new direction in the assessment of market risks, which will venture beyond the classical (VaR) approach and represent a valuable alternative.

Pitfalls in using the established VaR approach

In 2000, the Bank of Canada along with other renowned institutions, indicated in a landmark paper, the shortcomings of the **value-at-risk (VaR)** approach (Bensalah 2000). The authors of this document underscore that the VaR calculated on the premise of normal distributed losses in the financial markets can lead to an underestimation of market risk in the higher percentiles, namely, the fat tails of empiric distributions. Other studies exploring alternative distributional assumptions for calculating VaR did not survive in the financial sector due to their lack of reliability and validity.

Since the vast majority of data used for calculating the VaR typically accumulate around the mean, the VaR tends to estimate these key observations with higher accuracy, whereas it systematically underestimates the rare but momentous extreme events in the tails of empiric distributions. Figuratively, the use of normal distributions to calculate VaR can be compared to an airbag that switches off automatically at speeds of over 120 miles per hour, rendering the driver defenseless against disastrous events, such as, a car crash at a speed higher than 120 miles per hour. From a risk management perspective, this is a catastrophic approach.

Extreme-Value-Distributions: A valuable alternative

Methods covering extreme value statistics are increasingly discussed in the field of evaluating extreme risks pertinent to banks, asset managers and insurance companies. This can primarily be attributed to the capacity of extreme-value-distributions to sufficiently predict the probability of rare but plausible events or damage levels. These are characterized primarily by their capability to model the fat tails of empirical distributions with sufficient accuracy. Unlike normal distributions, which converge to the mean of empirical distributions, extreme-value-distributions show a completely different type of convergence behavior. In the modeling of extreme risks, two popular families of distributions — the *Generalized Extreme-Value-Distribution* (GED) and the *Generalized Pareto Distribution* (GPD) — are both flexible instruments for fitting empiric distributions according to three parameters: location, shape and scale. Hence, by selecting well-fitted parameters, an appropriate distribution function can be found for all empirical data.

According to the selected shape parameter, the Generalized Extreme-Value-Distribution converges on different families of extreme-value-distributions that can be classified as *Gumbel, Fréchet or Weibull* distributions. Conversely, the Generalized Pareto Distribution, is characterized by how its model's exclusively empirical values lie above a defined threshold value *(peaks over threshold)*. Additionally, in daily practice, relying on extreme-value-distributions allows the capacity to estimate

events that have not yet occurred, namely, extreme events that are possible, but are outside the observed range. Crucial to these observations are the location and distribution of extremes within the empirical time series, which are reflected by the shape parameter (ζ) of the fitted extreme-value-distribution.

Generalized Extreme-Value-Distribution (GED)

$$H_{\xi,\mu,\sigma}(x) = \begin{cases} exp\left\{-\left(1+\xi\frac{x-\mu}{\sigma}\right)\right\}^{-1/\xi}, & if\ \xi \neq 0 \\ exp\left\{-exp\left(-\frac{x-\mu}{\sigma}\right)\right\}, & if\ \xi = 0 \end{cases}$$

Generalized Pareto Distribution (GPD)

$$G_{\xi,\mu,\sigma}(x) = \begin{cases} 1-\left(1+\xi\frac{x-u}{\sigma}\right)^{-1/\xi}, & \text{if } \xi \neq 0 \\ 1-exp\left(-\frac{x-u}{\sigma}\right), & \text{if } \xi = 0 \end{cases}$$

From VaR to extremeVaR

The following investigations focus on the modeling of market risks pertinent to the stock markets. Naturally, the acquired insights are equally applicable to other time series or to other markets. Moreover, extreme-value-distributions could also be used in a frame of Monte Carlo simulations or option pricing models. The results are closely related to the Value-at-Risk approach described in numerous other studies. Thus, henceforth in this article, *VaR* based on extreme-value-distributions will be referred to as *extremeVaR* in order to distinguish between these two risk measures very clearly.

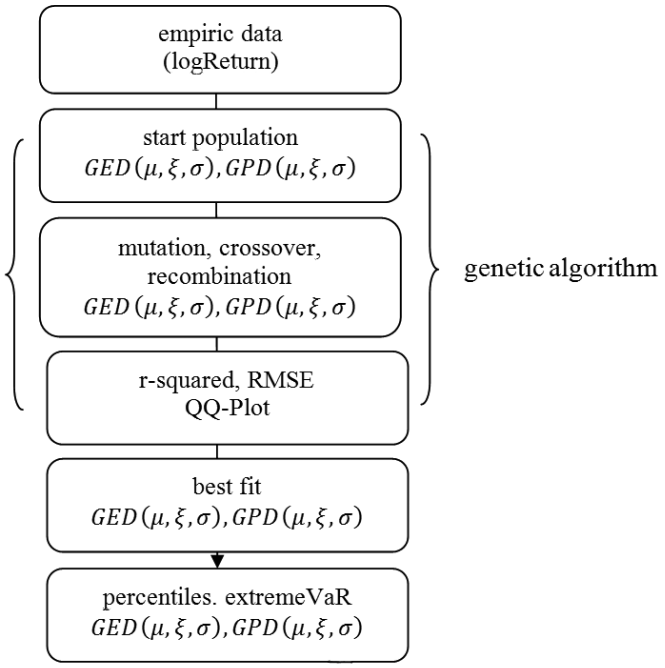
The exemplary calculation of extremeVaR for the Standard & Poor's 500 (SP500) with different holding periods, illustrates the different convergence behavior of a Generalized Pareto distribution (GPD) and a standardized normal distribution (table 1). Particularly, in case of the 99th, 99.90th or 99.99th percentiles, the fitted GPD suggests significantly higher losses to be expected than a of standardized normal distribution report for this data. Hence, the risks in the fat tails of the applied empiric distributions are clearly underestimated by common Value-at-Risk approaches.

The parameter estimation is of considerable importance when using extreme-value-distributions with respect to the validity and reliability of the preserved results. This is especially true if the parameter estimation does not result numerically, but rather through a heuristic optimization procedure, like in this attempt, based on genetic algorithms.

Genetic Algorithms are efficient heuristic optimization methods. In general, they have the advantage that they will not be caught by local minima. The optimization routine works as follows: first, randomly generated possible solutions (starting population) for the given optimization problem are provided by the optimization routine. Next, these starting populations are optimized further during the process by changing (mutation) and recombining (cross-over) the parameters. With each iteration step, the next generation of possible parameters is extracted by following strict pre-defined goodness-of-fit-criteria (selection).

The selection step thereby works with so-called surviving probabilities, so that those parameters, which nearly fulfill the goodness-of-fit-criteria (GOF) are selected with a higher probability than others. The GOF-criteria, therefore, plays an important role, in that the lowest root mean square error (RMSE) and the highest regression coefficient r-squared of the Q-Q-Plot is used. This takes into account the percentiles of the given empiric distribution and the estimated distribution, respectively. Because of the focus placed on the fat tail of the empiric distribution, the estimated parameters that report the best results with regard to the GOF-criteria for the values above the empiric 90th percentiles of the empiric data are chosen.

Figure 1 — Estimating parameters of extreme-value-distributions (GEV, GPD) by means of a genetic algorithm could be integrated to a fully automated process of calculating the extremeVaR.



At the introductory example of the SP500 with a holding period of 10 days, the results are protected through an r-squared of 99.77% and a RMSE of 0.0015 of the corresponding QQ-Plots (empirical Quantiles applied against the estimated Quantile). In addition, both the performed Kolmogorov-Smirnov test and a proprietary developed fat tail test confirm the low uncertainty of the delivered probabilities of losses.

Another critical factor in the estimation of the distributions in general, and the extreme-value-distributions in particular, is the amount of the empirical data used for estimation. Since rare events seldom occur, data sets, which are as extensive as possible, should be used to estimate the fat tails with sufficient accuracy. In this case, the empirical data set comprised to estimate the market risk of the SP 500 includes 3324 observations with a maximum loss of 28.72% for a holding period of 10 days.

As stated above, extreme-value-distributions permit valid and plausible assumptions on events that have not occurred so far. By the example of the SP500, this would be clarified: The extremeVaR with a given probability of 99.99% estimated by GPD counts 32.10%, which is clearly higher than the previously observed maximum loss of 28.72%. In opposition, the classic VaR reports a loss of 13.19% in the 99.99th percentile. Hence, the VaR based on a normal distribution significantly underestimates the losses in the fat tail of the empiric distribution.

In conclusion, therefore, it can already be drawn at this point, that extreme-value-distributions are offering a valuable flavor of 'quantitative stress testing' targeting an estimation of extreme market risks of individual assets, asset classes, or entire segments of the market. In other words, extreme-value-distributions estimate the overall risk more sufficiently than normal distributions, and therefore are suitable as primary market risk metrics. This is especially true relative to the *expected shortfall*, which aims to shape the distribution margin beyond the VaR. The expected shortfall is a frequently discussed complement to the simple VaR but appears to be useful only if it is used with fat tailed distributions, as the tail of a normal distribution can offer only little more information than were already expressed by the VaR. In connection to the extreme value theory (EVT), it is often incorrectly assumed that these distributions were consistently more conservative than normal distributions, and thus, unnecessarily consume equity. In practice, this cannot be confirmed, since by means of appropriate parameters applied to extreme-value-distributions, *thin-tailed* distributions of empiric data can also be approximated with appropriate accuracy. Finally, the widespread use of EVT in risk management is no longer faced with any technical obstacles, because a software system is now available that assesses the risks almost as easy and as fast as one would expect from normal distribution approaches. Therefore, the *availability bias* simply no longer exists.

The results illustrated thus far have been confirmed by the extremeVaR for the SP500 with a holding period of one day: **Table 1** suggests that the estimates based on a GPD being valid with estimation errors count 99.91% for the r-squared and 0.001 for the MRSE, hence, are almost negligible. The classic VaR that counts 4.95% in acceptance of normally distributed losses versus 9.43% in the case of the GPD, confirms the observation that the extreme risks are considerably underestimated particularly when compared to the observed historic maximal loss of 9.03%.

Table 1 —
Comparison of the extremeVaR with the VaR in the case of the SP500
Holding period one day: GPD (scale 0.0079, shape 0.057, location -0.0054);

R-squared = 99.91%, RMSE=0.001.
Holding period 10 days: GPD (scale 0.0166, shape 0.1481, location -0.0056);

R-squared = 99.77%, RMSE=0.0015.

SP500 (holding period one day, n=3334, max=9.03%)

Percentile	extremeVaR (in %)	VaR (in %)
90th	1.42	1.70
98th	2.97	2.73
99th	3.70	3.09
99.90th	6.35	4.11
99.99th	9.43	4.95

SP500 (holding period 10 days, n=3324, max=28.72%)

Percentile	extremeVaR (in %)	VaR (in %)
90th	4.00	4.49
98th	8.24	7.24
99th	10.41	8.21
99.90th	19.42	10.94
99.99th	32.10	13.19

The scientific literature also suggests various methods of quality measurement to assess the *goodness-of-fits* of extreme-value-distributions that additionally allow a comparison of different distributional assumptions. For example, here, the so-called *violation ratio* indicates a number of losses that exceeds the determined percentile values.

In case of the SP500, no infringements are to be observed when relying on a GPD for the 99.99th percentile in both circumstances: a holding period of ten days as well as that of one day. Thus, in this event, the violation ratio amounts to 0% **(see table 2)**. In contrast, when assuming a normal distribution of

Table 2 — Comparison of violation ratios and shortfalls in the case of the SP500

SP500 (holding period one day, n=3334, max=9.03%)

Percentile	Violation Ratio extremeVaR (in %)	Shortfall (in %)	Violation Ratio VaR	Shortfall (in %)
90th	319 (9.57%)	341.86	246 (7.38%)	259.93
98th	64 (1.92%)	86.44	83 (2.49%)	104.86
99th	34 (1.02%)	53.21	54 (1.62%)	79.29
99.90th	6 (0.18%)	9.67	28 (0.84%)	40.55
99.99th	0 (0.00%)	0	14 (0.42%)	23.03

SP500 (holding period 10 days, n=3324, max=28.72%)

Percentile	Violation Ratio extremeVaR (in %)	Shortfall (in %)	Violation Ratio VaR	Shortfall (in %)
90th	335 (10.08%)	939.22	232 (6.98%)	789.67
98th	68 (2.05%)	269.68	92 (2.77%)	348.25
99th	37 (1.11%)	165.21	69 (2.08%)	271.55
99.90th	3 (0.09%)	20.57	36 (1.08%)	145.71
99.99th	0 (0.00%)	0	21 (0.63%)	84.89

losses, the violation ratio amounts to 0.42% for a holding period of ten days and 0.63% for a holding period of 1 day respectively. This may seem to be low at first glance, but the shortfall that amounts to 23.03% for a holding period of ten days and 84.89% for that of one day holding period, demonstrates the importance of exceedances of probability. The estimate of losses that can be expected with a 99.90% probability provides a similar picture. Both the small violation ratio of 0.09% and the shortfall of 9.67% illustrate the relatively valid estimation of extreme losses by means of the established extreme-value-distributions, while the application of the normal distributions leads to a significant underestimation of rarely entering losses (violation ratio: 1.08%, shortfall 145.71%). See table 2.

It is widely recognized that in case of empirical distributions, which are characterized by pronounced fat tails, extreme-value-distributions, due to their particular convergence behavior, allow significantly more accurate modeling of the distribution margins, while normal distributions only provide an adequate assessment of key observations in the vicinity the of the mean of empiric data. Conversely, this raises the question of how the estimation accuracy of the extreme-value-distributions should be assessed at nearly normally distributed data. The financial markets rarely encountered case of normally distributed empirical loss data, the Generalized Extreme-Value-Distribution is obviously converging to the tails of normal distributed data, therefore, with regard to the estimated losses, no significant differences between the two distributional assumptions are likely to be noted **(see table 3)**.

The respective extremeVaR for the components of the German DAX as well as the corresponding low estimation errors reported in table 4, demonstrate the high generalization capability of extreme-value-distributions and the appropriate parameter estimation procedure. For all constituents of the DAX, an r-squared of 98% or higher confirms the flexibility of extreme-value-distributions in approximating extreme events with a low uncertainty. In this case, the genetic algorithm prefers the Generalized Extreme-Value-Distribution. Furthermore, it is interesting to observe that extremeVaRs expect a wide variety of extreme risks, which is independent of the holding period, i.e., ten days versus one day in the case studied. An investment in Infineon (IFX), Commerzbank (CBK), or Continental AG (CON) are obviously connected to very high extreme risks, while Henkel (HEN), Beiersdorf (BDF), or Fresenius (FRE) are significantly reporting lower extreme risks.

Table 3 — Comparison of extremeVaR with VaR applied to normally distributed data

The extremeVaR is approximated by means of a Generalized Pareto Distribution (scale 0.651, shape -0.1993, and location -0.0471). Goodness-of-fit: r-squared=99.72%, RMSE=0.0016.

Holding period one day, n=3334, max=23.05%

Percentile	extremeVaR (in %)	VaR (in %)
90th	7.31	7.56
98th	12.97	12.42
99th	14.91	14.13
99.90th	19.70	18.94
99.99th	22.74	22.90

Table 4: Approximated *extreme risks* for the German DAX demonstrate that, by choosing different holding periods, significantly diverging extreme risk could be expected for the components of the index.

extremeVaR (holding period one day)					extremeVaR (holding period 10 days)				
Ticker	99.90%	99.99%	R^2	Type	Ticker	99.90%	99.99%	R^2	Type
IFX	16.97%	25.43%	99.75	GEV	IFX	48.55%	65.20%	99.46	GEV
CBK	15.21%	23.87%	99.92	GEV	CBK	41.37%	58.87%	99.30	GEV
SAP	15.13%	26.14%	99.83	GEV	CON	37.41%	54.33%	99.48	GEV
DBK	14.80%	24.77%	99.86	GEV	SAP	35.74%	52.26%	99.90	GEV
ALV	14.19%	23.83%	99.78	GEV	ALV	35.09%	51.52%	99.37	GEV
SDF	13.95%	24.49%	99.72	GEV	LXS	34.18%	46.87%	99.89	GEV
DTE	13.37%	22.14%	99.77	GEV	SDF	33.87%	50.56%	98.42	GEV
LXS	12.02%	18.24%	99.52	GPD	DBK	33.69%	48.16%	99.75	GPD
MUV2	11.42%	18.16%	99.90	GEV	TKA	31.92%	43.90%	99.80	GPD
DB1	11.28%	17.49%	99.83	GEV	BAYN	31.88%	48.33%	99.35	GEV
TKA 1	1.10%	15.80%	99.89	GPD	DTE	31.70%	46.00%	99.80	GEV
BEI	10.86%	18.50%	99.75	GEV	SIE	31.38%	42.90%	99.71	GEV
BAYN	10.82%	18.51%	99.87	GEV	HEI	30.22%	39.60%	99.73	GPD
VOW3	10.75%	15.33%	99.84	GEV	FME	29.20%	45.97%	99.61	GEV
SIE	10.52%	14.96%	99.72	GEV	DPW	28.99%	44.92%	99.76	GPD
CON	10.34%	14.08%	99.88	GEV	VOW3	28.47%	37.95%	99.85	GPD
HEI	10.33%	14.20%	99.87	GEV	EOAN	28.34%	42.78%	99.90	GPD
EOAN	10.06%	15.81%	99.77	GEV	MUV2	28.13%	40.30%	99.67	GPD
MRK	9.72%	14.25%	99.79	GEV	DAI	27.93%	37.13%	99.14	GEV
DAI	9.44%	12.84%	99.18	GEV	BMW	27.88%	42.92%	99.62	GEV
RWE	9.36%	14.29%	99.89	GEV	RWE	26.93%	42.54%	99.76	GPD
BMW	9.21%	12.53%	99.89	GEV	MRK	25.23%	34.52%	99.67	GEV
DPW	9.02%	13.04%	99.90	GEV	DAX	25.20%	38.23%	99.21	GEV
FRE	8.97%	12.66%	99.71	GEV	LHA	25.14%	32.61%	99.84	GPD
BAS	8.78%	12.68%	99.85	GEV	LIN	24.65%	36.53%	99.84	GEV
LHA	8.77%	11.89%	99.94	GPD	ADS	24.40%	33.40%	99.88	GPD
ADS	8.68%	12.53%	99.81	GEV	DB1	23.61%	29.36%	99.72	GEV
FME	8.60%	12.98%	99.87	GEV	BAS	23.18%	31.27%	99.09	GEV
LIN	7.54%	10.50%	99.81	GPD	FRE	22.92%	29.42%	99.55	GEV
DAX	7.28%	10.33%	99.87	GPD	BEI	20.19%	26.70%	99.53	GEV
HEN3	6.69%	9.12% 9	9.49	GEV	HEN3	18.39%	23.87%	99.90	GEV

Advantages in Risk Based Portfolio Construction

Based on this insight, the extremeVaR approach offers extension room for different risk-based investment strategies which, in the simplest case, aim to avoid instruments with a comparatively high extremeVaR and favorably weight instruments with lower tail risks. The symmetry properties and convergence behavior of extreme-value-distributions also offer another useful option that can be implemented to an active investment strategy in terms of portfolio weighting. Besides estimating loss probabilities, extreme-value-distributions can also approximate the likelihood of rewards at given holding periods. This can aid in optimizing portfolios in the direction of favorable reward to risk ratios **(see tables 5 and 6)**.

Table 5: Approximated *extreme returns* for the German DAX demonstrate that, by choosing different holding periods, significantly diverging extreme risk could be expected for the components of the index.

extreme Return (holding period one day)					**extreme Return (holding period 10 days)**				
Ticker	99.90%	99.99%	R^2	Type	Ticker	99.90%	99.99%	R^2	Type
IFX	21.10%	36.76%	99.90	GPD	IFX	78.28%	140.90%	99.90	GPD
CBK	17.57%	29.55%	99.84	GEV	CBK	41.92%	59.78%	99.84	GEV
SAP	16.75%	31.36%	99.80	GPD	CON	37.04%	52.83%	99.85	GPD
MUV2	15.55%	29.46%	98.16	GEV	DBK	35.87%	53.15%	99.88	GEV
CON	14.65%	25.31%	99.85	GPD	SAP	34.31%	50.63%	99.80	GPD
LXS	13.90%	24.55%	99.90	GPD	ALV	32.37%	47.68%	99.52	GEV
DTE	13.86%	24.22%	98.55	GPD	BMW	31.19%	46.72%	99.87	GEV
ALV	13.81%	23.34%	99.52	GEV	TKA	31.16%	45.60%	99.80	GEV
HEI	12.72%	19.20%	99.81	GPD	MUV2	30.99%	47.59%	99.86	GEV
FME	12.59%	25.85%	99.85	GPD	SIE	29.66%	40.76%	99.90	GEV
SDF	12.43%	20.86%	99.84	GPD	SDF	29.40%	39.09%	99.84	GPD
DBK	12.25%	18.14%	99.44	GPD	FRE	29.09%	42.54%	99.85	GPD
BAYN	11.81%	23.31%	99.64	GPD	VOW3	28.77%	36.45%	99.87	GPD
BEI	11.47%	19.51%	99.81	GPD	HEI	28.18%	35.73%	99.87	GEV
SIE	11.37%	16.68%	99.73	GPD	DTE	27.65%	41.20%	99.68	GEV
TKA	10.73%	15.13%	99.67	GPD	DB1	26.20%	36.76%	99.88	GEV
DB1	10.62%	16.13%	99.79	GPD	LXS	25.96%	33.72%	99.89	GPD
VOW3	10.18%	13.81%	99.88	GPD	DAI	25.58%	32.03%	99.76	GPD
FRE	10.09%	15.85%	99.85	GPD	LHA	25.52%	32.80%	99.84	GEV
BMW	10.00%	13.99%	99.83	GPD	DPW	24.79%	36.56%	99.76	GEV
DAI	9.98%	13.82%	99.76	GPD	MRK	24.60%	34.52%	99.87	GPD
LHA	9.89%	13.95%	99.26	GEV	RWE	22.33%	32.14%	99.16	GEV
LIN	9.81%	16.15%	99.89	GPD	BAYN	21.30%	26.80%	99.64	GPD
EOAN	9.54%	14.66%	98.96	GEV	BAS	21.20%	27.89%	99.83	GPD
MRK	9.51%	13.70%	99.87	GPD	BEI	21.07%	29.75%	99.81	GPD
ADS	9.41%	13.50%	99.81	GEV	ADS	20.70%	26.08%	99.81	GEV
BAS	9.16%	13.53%	99.83	GPD	LIN	20.42%	27.59%	99.88	GEV
DPW	8.31%	11.65%	98.27	GEV	FME	20.15%	26.96%	99.90	GEV
RWE	7.62%	10.64%	99.20	GEV	EOAN	19.23%	24.78%	99.62	GEV
HEN3	7.09%	9.63%	99.21	GEV	DAX	17.19%	23.13%	99.63	GPD
DAX	6.50%	8.86%	99.63	GPD	HEN3	16.36%	21.66%	99.89	GEV

Table 6: Return/Risk Ratios of German DAX

	extreme Return		extreme VaR		Return/Risk Ratio	
Ticker	99.90%	99.99%	99.90%	99.99%	99.90%	99.99%
IFX	78.28%	100%	48.55%	65.20%	1.61	1.53
FRE	29.09%	42.54%	22.92%	29.42%	1.27	1.45
BMW	31.19%	46.72%	27.88%	42.92%	1.12	1.09
DB1	26.20%	36.76%	23.61%	29.36%	1.11	1.25
MUV2	30.99%	47.59%	28.13%	40.30%	1.10	1.18
DBK	35.87%	53.15%	33.69%	48.16%	1.06	1.10
BEI	21.07%	29.75%	20.19%	26.70%	1.04	1.11
LHA	25.52%	32.80%	25.14%	32.61%	1.02	1.01
CBK	41.92%	59.78%	41.37%	58.87%	1.01	1.02
VOW3	28.77%	36.45%	28.47%	37.95%	1.01	0.96
CON	37.04%	52.83%	37.41%	54.33%	0.99	0.97
MRK	24.60%	34.52%	25.23%	34.52%	0.98	1.00
TKA	31.16%	45.60%	31.92%	43.90%	0.98	1.04
SAP	34.31%	50.63%	35.74%	52.26%	0.96	0.97
SIE	29.66%	40.76%	31.38%	42.90%	0.95	0.95
HEI	28.18%	35.73%	30.22%	39.60%	0.93	0.90
ALV	32.37%	47.68%	35.09%	51.52%	0.92	0.93
DAI	25.58%	32.03%	27.93%	37.13%	0.92	0.86
BAS	21.20%	27.89%	23.18%	31.27%	0.91	0.89
HEN3	16.36%	21.66%	18.39%	23.87%	0.89	0.91
DTE	27.65%	41.20%	31.70%	46.00%	0.87	0.90
SDF	29.40%	39.09%	33.87%	50.56%	0.87	0.77
DPW	24.79%	36.56%	28.99%	44.92%	0.86	0.81
ADS	20.70%	26.08%	24.40%	33.40%	0.85	0.78
LIN	20.42%	27.59%	24.65%	36.53%	0.83	0.76
RWE	22.33%	32.14%	26.93%	42.54%	0.83	0.76
LXS	25.96%	33.72%	34.18%	46.87%	0.76	0.72
FME	20.15%	26.96%	29.20%	45.97%	0.69	0.59
EOAN	19.23%	24.78%	28.34%	42.78%	0.68	0.58
DAX	17.19%	23.13%	25.20%	38.23%	0.68	0.61
BAYN	21.30%	26.80%	31.88%	48.33%	0.67	0.55

ABOUT THE AUTHOR

Frank Schmielewski is a leading practitioner, academic, and advisor working at the forefront of risk management methodologies. He is Member of the Executive Board at RC Banken Group, a German company with a successful history of more than 25 years in the financial industry that is highly specialized on risk management methodologies. He holds a PhD in Economics and a diploma in natural sciences.

He started his career at Reuters PLC where he was responsible for risk management and asset management solutions, e.g. Kondor+ and KVAR+. He later was responsible for credit risk modeling at T-Mobile Germany. Most recently, he developed a unique model for measuring liquidity risks to retail and institutional funds at RC Banken Group. Based on his proprietary algorithm for automatically estimating parameters of extreme value distributions by means of evolutionary algorithms he developed a innovative approach to risk based portfolio optimization.

He is a frequent speaker at industry conferences and has published several papers and book chapters on modeling extreme risks and risk based portfolio optimizations.

Conclusions

The introduced distribution families (GEV and GPD) deliver a valid estimation of the probabilities of extreme events for almost each empirical distribution. The represented procedure of parameter estimations on the basis of genetic algorithms permit the wide industrial use in the frame of a mass screening of financial instruments, portfolio construction, risk limitation, and early warning systems.

The proposed *extremeVaR* appears to be a robust risk measure that solely provides an estimate of the total loss amount, but no prediction of when an extreme risk will occur in the future.

Nevertheless, using extremeVaR during times of tremendous market stress marks significant progress since it answers the question of, "if something happens to go wrong, by how much is it likely to go wrong?"

The accuracy of extreme risk estimates also offers the possibility of interesting and promising investment strategies (see also Risiko Manager 20.2012). In addition, the estimated extreme-value-distributions provide the opportunity to reduce model errors in Monte Carlo simulations and option pricing models by a significant amount, such that complex structured financial instruments can be sufficiently assessed. The proposed 'extremeVaR' with an integrated automated process for parameter estimation offers a long-overdue alternative to traditional value-at-risk approaches and provides a substantial step toward the next generation of risk management.

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FREQUENTLY ASKED QUESTIONS ABOUT THE GLOBAL LEGAL ENTITY IDENTIFIER (LEI) SYSTEM (GLEIS)

ALLAN D. GRODY

Background

The G20's Global Legal Entity Identifier (LEI) initiative is intended to provide regulators transparency into the financial system and a computerized means to aggregate financial transactions so that they may carry out mandates to observe and mitigate risks to the global economy. This capability would be useful to limit systemic risk, a key objective promoted by the various global and sovereign regulators that make up the Financial Stability Board (FSB) and the Regulatory Oversight Committee (ROC). Its first use is intended for swaps data reporting.

Q What is the LEI and what business entities are covered?

A The LEI is a globally unique identifier for all financial market participants entering into financial transactions. See below from the Financial Stability Board's (FSB's) June 8, 2012 Recommendation 8[1]

> SCOPE OF COVERAGE Eligibility of 'legal entities' to apply for a LEI should be broadly defined, in order to identify the legal entities relevant to any financial transaction. No more than one LEI may be assigned to any legal entity.
>
> For purposes of this definition, the term 'legal entity' refers to a legal person or structure organised under the laws of any jurisdiction. Legal entities include, but are not limited to, unique parties that are legally responsible for the performance of financial transactions or have the legal right in their jurisdiction to enter independently into legal contracts, regardless of whether they are incorporated or constituted in some other way (eg trust, partnership, contractual, etc). It excludes natural persons, but includes governmental organizations; and supranationals, defined as governmental or non-governmental entities established by international law or treaty or incorporated at an international level. Examples of eligible legal entities include, without limitation: all financial intermediaries; banks and finance companies; all entities that issue equity, debt or other securities for other capital structures; all entities listed on an exchange; all entities that trade stock or debt; investment vehicles, including mutual funds, pension funds and alternative investment vehicles constituted as corporate entities or collective investment agreements (including umbrella funds as well as funds under an umbrella structure, hedge funds, private equities, etc); all entities under the purview of a financial regulator and their affiliates, subsidiaries and holding companies; and counterparties to financial transactions.

Q An ISO 17442:2012 Legal Entity Identifier (LEI) Standard has been endorsed by the FSB and now the ROC. It is the official length, character string and check digit method for the LEI. In its first appearance, however, it was interpreted by some that in satisfying the non-intelligence requirement of the standard it was to be exclusively an 18 character randomly generated number/character set. Is this still the case?

A No. Subsequent studies have further partitioned the code into a four (4) digit prefix, two (2) zeros (0's) for future expansion, a 12 character entity-specific code component and two check-sum digits calculated from the previous 18. However, the randomly generated number/character set is still thought of and being used as a non-intelligent code construction for the entity-specific portion of the code. The United States Commodity Futures Trading Commission (CFTC) and Germany's BaFin have endorsed such a preliminary LEI, the pre-LEI CICI in the US swaps market and the pre-LEI GEI in Germany. (It should be noted that the more granular code construction is not an ISO standard, but rather an implementation approach of the standard).

Q What does "non-intelligence" mean in the LEI code construction?

A Non-intelligence means that no computer or human can parse the code and find out anything about the underlying entity. Finding out about the code's owner (the entity) and other characteristics of the entity must be referenced from one or more databases, referred to as LEI Registries, by using the code to access this information. However, this does not mean that the code can't be memorized so that upon observing the code it is recognized as identifying a specific legal entity.

1 Financial Stability Board, A Global Legal Entity Identifier for Financial Markets, Recommendation 8, *http://www.financialstabilityboard.org/publications/r_120608.pdf*, June 8 2012, at page 35

Q What does persistence of the LEI code mean as defined by the FSB in their LEI recommendations?

A Persistence of the LEI code is defined by the FSB as:

"The code should be persistent, in the sense that the code would never be assigned to another entity."

However, this does not mean the identity of an entity assigned an LEI cannot receive another LEI after a corporate event changes its organizational affiliation. An LEI inherited by another LEI, as for example in a merger or acquisition would be "decommissioned" and a new number assigned. The decommissioned number would be left in the reference data of the LEI registry containing the new LEI. The new LEI can contain the decommissioned code as reference data pointed to in its LEI Registry for audit trail purposes.

Q As the US Treasury's Office of Financial Research (OFR's) Chief Counsel now holds the Chair of the ROC, how should the OFR's recent report referencing "one golden standard" for the LEI be interpreted?

A The FSB and now the ROC have described a "consistent" and "uniform" global legal entity identifier system. As the ROC takes over from the FSB's regulatory Implementation Group (IG), and forms the Central Operating Unit (COU) and its Board of Directors, it will be their decision after consultation with industry experts as to what such a consistent and uniform LEI standard will be. The Committee on Evaluation and Standards (CES) has the responsibility to review and advise on all standards.

Q What was intended for the March 2013 launch of the global LEI system? The recommendations allow for some jurisdictions to act as "early adopters."

A In advance of the full global LEI system being established, local jurisdictions have begun moving ahead with identification systems for swaps data reporting. Some have issued a pre-LEI, as the term is defined by the ROC, intended to be consistent with the global LEI standard. These are the first LEI candidates for evaluation by the ROC for inclusion into the global system.

Q A recent FSB report noted that the March 2013 commencement date is ambitious given that the only LEI-like code that exists today for reporting is the US's CICI (the CFTC's Interim Compliant Identifier). WM DatenServe recently announced that its German Entity Identifier (GEI) portal was also available for registering legal entities. Has the CICI become the LEI in the US, and the GEI in Germany as of the announced March, 2013 commencement date?

A The CICI and the GEI do conform to the intended global LEI standard (as pre-LEIs). The FSB's IG and now the ROC has made an explicit commitment for the CICI, the GEI, and any other pre-LEI authorized by a public authority that is a member of the ROC to be able to "transition" to the global LEI. However, those transition rules have not yet been finalized. The ROC has stated that the detailed procedure for obtaining global recognition related to the transition towards the LEI will be disclosed shortly after settling remaining issues. At this time, the unofficial date as reported in the press by LEI and now ROC officials for the startup is July 2013 in deference to the expected start date for international swaps regulations becoming effective. However, the issues related to harmonization of international swaps regulation is still being debated as of this writing and the July date may also be postponed.[2]

Q The FSB report identifies the US supplier of the CFTC's CICI as a candidate to become a LOU (Local Operating Unit) for the Global LEI System (GLEIS). Noting that the CFTC has given the US supplier, the CICI Utility, an interim mandate which expires in mid-2014 and is callable on six (6) months' notice, when will this candidate or others be granted final LOU status?

A The criteria to become an LOU within the GLEIS have not yet been established other than that a ROC member must sponsor a pre-LOU candidate. We assume that establishing such criteria will be one of the priorities of the ROC and the CES. The final decisions will be made by the yet to be established Board of Directors who will establish and oversee a Central Operating Unit to set and maintain standards for the LEI, the LOUs and the network.

Q The CFTC has exempted counterparties in privacy jurisdictions and foreign banks and foreign branches of US banks from having to register a CICI until the exemption expires in July 2013. What will happen thereafter?

A It was assumed that this "issue" will be resolved prior to the date of the expiration of the exemptive order. There is a group of foreign regulators meeting together with the CFTC to resolve this issue, primarily around the arguments of extraterritorial overreach of the CFTC in swaps regulation where the CICI and other pre-LEIs will be first used. One CFTC Commissioner has expressed doubt that this date can be met. This issue has been "resolved" with the US's SEC

2 U.S. Needs More Time on Overseas Swaps, Democratic Senators Say, Bloomberg News, *http://www.bloomberg.com/news/2013-06-26/u-s-needs-more-time-on-overseas-swaps-democratic-senators-say.html*, June 27, 2013

through accepting "substitute regulation" but they have yet to mandate security-based swaps data reporting or use of the CICI.

Q What is the current state of implementations of the first uses of candidate pre-LEIs, the CICI in Swaps regulations in the US and elsewhere?

A The CICI is currently being used in the US by 70 Swap Dealers and 8 Major Swap Participants to report information to Swap Data Repositories (SDRs) and to the CFTC. The CFTC reports they were overwhelmed by the data coming to them in varied reporting formats. Nearly 1000 different data elements are being sent to describe swaps creation and continuation data. The next reporting date was April 10, 2013 when all swaps counterparties would have had to report this same information on their swaps transactions. The CFTC provided an exemptive relief order on April 9th and effectively postponed swaps data reporting to them, although they continue to require counterparties to acquire a CICI and report to the three SDRs and two more that are applying for status as SDRs in the US. Globally, there are currently 15 other SDRs and more expected.

The CFTC, at an April 30, 2013 Technical Advisory Committee meeting, described to the industry the issue of their lack of capability to aggregate data from disparate locations, and sought direction from the industry and particularly from SDRs. A proposal has been made to the CFTC, to each SDR and to them collectively that they pursue a federated model to aggregate data, similar to how the aggregation of separate LEI registries for the GLEIS is to be performed as required by the FSB and now the ROC.

The FSB in their April 15, 2013 progress report on OTC Derivatives reform recognized this as a global problem and sought a study to define a best approach to aggregating the data of multiple SDRs that are being formed globally. These SDRs will rely on multiple local LEI registries and the individual LEIs registered therein to be the first pillar for the aggregation of data across counterparties and across hierarchies of relationships of LEIs. The global aggregation of SDR data has now been taken up at the global level by the Financial Stability Board with a scheduled date of mid-2014 for a final report on options.[3]

Q The goal of the LEI initiative is to identify the contagion of systemic risk building up in the global economy. How will that be accomplished?

A The concept is to aggregate LEIs into their appropriate control structures such as by accounting consolidation rules to determine risk across all the legal entities that comprise a financial market participant. It is also the objective to do so across legal entity structures such as trusts and Special Purpose Enterprises (SPEs) used for various purposes including securitizations and derivatives. Finally, it is expected that control groups will need to be aggregated in instances where economic interdependence can cause funding or repayment difficulties.

Q What has been determined as to how to organize such control structures?

A One approach being discussed is to set up LEIs with reference data that identifies its parent and/or ultimate parent identifiers. Whether both or one or the other will be required at LEI set up time or at a later time is still under consideration. An additional concept of an ultimate control entity has been proposed which would conform to definitions of non-equity controlling interests. Finally, the concept of a categorization of control groups that are not affiliated entities has been proposed. These are categories of businesses that are economically interdependent due to their interconnectedness within an industry or segment of an industry or within a particular governing set of risk regulations i.e. banks or brokers or hedge funds, as examples and more granularly, swaps market participants in the US, in Europe, or in total globally.

Q Are there proposals to use the GLEIS to observe the contagion of systemic risk building up across the financial system?

A Yes. One proposed approach leverages the individual LEI registries in a networked solution to perform systemic risk aggregation. It requires each LEI register to conform to specifications for a "network architecture" and "plug-in card" envisioned by the FSB, not unlike how the architecture of the Internet interoperates. This proposal recognizes that the only place the complete and timely set of LEIs will be updated and stored is in the Global LEI system (GLEIS), a federated global LEI registry network which is to be locally administered in home country jurisdictions. This home/host country is also where risk data associated with financial transactions are to be sourced from, making the LOUs a natural place to aggregate this data locally and, in turn, make risk data available globally through the same virtual data-basing and intelligent network concept envisioned by the FSB for the LEI.

Q What is an intelligent network?

A The "concept" of an intelligent network has its roots in early work on semantic networks where meaning through data tags is imparted to the data that flows through it. A lot of this work was conducted and still is conducted in the military and intelligence communities. The systemic risk and straight-through-processing (STP) application of such an intelligent network is at the heart of the federated network approach envisioned for the GLEIS.

3 FSB's Plenary Progress Report **see Press Release** , June 25, 2013 at Page 2

The concept of an intelligent semantically aware real-time financial network was previously presented to the SEC, the CFTC, and the US Treasury's Office of Financial Research. This was done in late 2010, in response to these three agencies' separate solicitations of interest in a global identification system and its use in swaps regulation and data reporting. It is part of the public record of each agency.

Most recently this work and the evolving LEI network were proposed to the European Union (EU) as the backbone of an intelligent semantic network. The network is referred to as the Financial Industry Ontologies for Risk and Regulation Data (FIORD) Project, proposed under the EU's Seventh Framework Program (FP7) for Research. The proposal was submitted on April 26, 2013 by a consortium of European Universities, financial institutions and technology companies. Its aim is to provide novel algorithms, software infrastructures and methodologies for real time interaction, visualization, analytics and decision support applications over extremely large volumes of data (both structured and unstructured).

Mr. Grody advises the FSB on the GLEIS and is the Advisory Board Chairman of the FIORD Project.

ABOUT THE AUTHOR

Allan D. Grody is the President of Financial Intergroup Holdings Ltd. He is a founding editorial board member of the Journal of Risk Management in Financial Institutions and founding partner of Coopers & Lybrand's (now PwC's) financial services advisory practice. He was the founding professor of the graduate risk management systems course at NYU's Stern School of Business and was a founding Board Member of the Futures Industry Association's Technology Committee. As an industry practitioner he held staff and management positions in commercial finance and international banking, and in investment management and the securities industry.

He writes and speaks frequently on topics at the intersection of risk management and data management within the context of current regulatory reform efforts aimed at risk adjusting the financial system. He can be reached in New York City at (917) 414-3608 and at ***agrody@FinancialInterGroup.com***

KEYNOTE DINNER REMARKS BY DAVID WEISBROD

Monday, May 6 at the Harmonie Club, 4 East 60th Street, New York, NY

Navin Sharma and Mark Abbott produced the CRO Summit for PRMIA New York and thanked over 40 senior risk practitioner attendees, Ernst & Young LLP for their continued CRO Summit sponsorship and PRMIA staff Marietta Ruppe and Cheryl Buck for their assistance.

Mark introduced the keynote dinner speaker David Weisbrod, CEO of LCH Clearnet LLC whose remarks covered the following:

- Risk Management – personal insights from service at a financial institution, on boards and at a clearinghouse
- Challenges and opportunities of post-crisis regulatory environment
- Rollout of mandatory clearing in the US market

David Weisbrod, CEO of LCH Clearnet LLC, provided his personal insights from his prior risk management career at JP Morgan, as a member of boards of directors and as an active participant in industry groups. He also provided a perspective on challenges and opportunities of the post crisis regulatory environment as they relate to derivatives and gave a brief update on the rollout of mandatory clearing in the US market.

The Financial Crisis Inquiry Commission labeled unregulated derivatives as one of the principal causes of 2008 crisis. When the Dodd-Frank Act was being drafted, it addressed a broad range of OTC derivatives (not just credit default swaps which featured most prominently in the 2008 crisis). This was fostered in part by LCH Clearnet having successfully closed out the Lehman interest rate swap portfolio ($9 trillion of notional exposure in nine currencies and maturities out to 30 years).

The resulting Dodd-Frank Act entailed four principles regarding OTC derivatives:

- Most OTC derivatives should be transitioned to trading on centralized platforms
- These derivatives should be cleared through a clearinghouse
- Data on the derivatives should be reported to a swap data repository and
- Derivatives that are not cleared should be subject to higher capital requirements.

Regulators and market participants now see clearinghouses as a key mechanism for managing counterparty risk. Competition among exchanges and clearinghouses is acceptable, but risk management needs to remain at the heart of everything we do and the clearinghouses need to avoid a "race to the bottom" and must not allow the compromising of risk management for commercial gain.

Recovery and Resolution of central counterparties (CCPs) is a big topic and CCPs need a recovery plan that ensures continuity of clearing services. Collateral management has moved to center stage given the increase in cleared volume, which brings increased demand for high quality collateral. The Legally Separated/Operationally Commingled (LSOC) model for collateral segregation replaces the "gross omnibus" regime that exists in the futures world, in which client collateral is legally and operationally segregated from assets of an FCM, but legally and operationally commingled with assets of other clients.

Another topic of attention is the so-called extraterritoriality issue, the resolution of which may necessitate a globally coordinated solution. Conflict among regulatory jurisdictions should be avoided; disjointed regulatory approach could bifurcate existing liquidity pools and create thinner and therefore riskier liquidity pools to the detriment of systemic risk reduction. With the CFTC exemptive relief expiring on July 12 and with the draft SEC rules now released, the level of debate within the US will likely intensify before a resolution is reached.

Also needing resolution is the debate regarding Swap Data Repositories (SDR), with the Depository Trust and Clearing Corporation (DTCC) now having initiated a law suit vs. the CFTC and the CFTC staff in turn admitting that inconsistent reporting and variability of data make it difficult to use the information being submitted.

It was concluded that sweeping changes are unfolding mandating derivative trade execution, clearing, reporting to SDRs and imposing higher capital charges on uncleared derivatives. Clearinghouses and the regulators are adopting mechanisms to enhance collateral management, resolution and recovery, differences between swaps and futures and are addressing issues pertaining to extraterritoriality and structure of swap data repositories.

After his prepared remarks, Weisbrod spent 45 minutes answering questions from participants and engaging in excellent and lively discussion.

ABOUT THE SPEAKER

David Weisbrod was appointed by LCH.Clearnet Group Ltd as Chief Executive Officer of its U.S. subsidiary in February 2013. Previously, he was Vice Chairman of Risk Management at JPMorgan Chase & Company. Prior roles at JP Morgan included Chief Risk Officer of JPMorgan's Treasury and Securities Services business, positions in the Asia Banking Group, the Middle East Banking Group and Corporate Banking Manager in Milan, Italy. Mr. Weisbrod also served as Credit Executive for the Real Estate Finance division and as Corporate Credit Audit Executive.

Mr. Weisbrod represented JPMorgan as a member of the New York Federal Reserve Bank's Payments Risk Committee and served as a Director of the Depository Trust and Clearing Corp (DTCC), as chairman of its Risk Committee and a member of the Finance and Capital Committee and the Governance Committee. Mr. Weisbrod was also a Director of CLS Group Holdings and CLS Bank International.

Mr. Weisbrod has a BA degree from Cornell University and an MBA from NYU.

PRMIA SPRING 2013 CRO SUMMIT MEETING

Tuesday, May 7 at Convene, 810 Seventh Avenue (at 53rd Street)

MARK ABBOTT

The semi-annual PRMIA NY CRO Summit was held on Tuesday, May 7, 2013 in New York City. About 45 senior risk professionals attended. The seminar ran from 8 a.m. through lunch, ending around 1:30 p.m. The meeting used Chatham House rules where comments by attendees are not attributable to any one person.

Three primary discussions were held and the notes below review the comments made by the attendees.

Discussion #1 — Risk Principles and Standards of Practice

1. Are professional risk management standards of practice (SOPs) at the individual level desirable (and doable)?

This question was discussed as follows with SOP encompassing the following issues:

- **SOPs include addressing the work of the individual.** Organizations as well as individuals should be included as part of the SOP.
- **SOPs are a true sign of a profession.** For example, actuaries have an SOP that adds much credence to that profession. The SOP also incorporates educational achievement and educational standards.
- **SOPs define what can be considered true professional work.** This builds a minimum set of criteria for sound practices in risk management. This also forms the basis for a disciplinary process for risk managers.
- **SOPs provide guidance to stakeholders (e.g. individuals, employers, etc).** Senior management and clients have an observable base within which to view and review risk management efforts.
- **SOPs provide a basis for professional opinions.** They provide boundaries within which risk managers can function freely, and also may protect risk managers from litigation if they are performing their work under the profession's sound practices.
- **SOPs provide transparency.** Tied to regulatory requirements in some situations. Also provides a means to communicate when being asked to deviate from normal practices.

Two key takeaways from this initial question:

- Other professions' SOPs use words such as "should" or "may" rather than "must" when describing SOP expectations for their members. Hence, a lack of using prescriptive language allows the SOP to be widely used yet still ensure that sets of best practices and other risk-endemic approaches are utilized.
- If the risk management profession does not develop the SOPs rapidly and pass along to regulators for discussion, review and acceptance, then the regulatory agencies will impose their own versions upon the risk management profession. This is not desirable, as portions of the regulatory-imposed SOPs could hamper the profession's ability to function independently with desired freedoms.

2. Should or can similar risk management SOP be adopted across professions and industries (e.g. banking, insurance, asset management)?

For example, existing Actuarial SOPs identify what the risk manager should consider, document, and disclose when performing a professional assignment. However, idiosyncrasies of each industry need to be taken into account when developing risk management SOPs for each such industry (or profession).

3. What would prevent risk management SOPs from tying my hands?

The consensus was that any such restrictions were well worth the foundation/framework that SOPs will provide to risk managers. One other perspective was that when the actuarial SOPs were being developed, some actuaries complained that the SOPs would add costs to firms that aimed to incorporate the standards within the corporate management framework. As it turned out, the acceptance of the actuarial SOP overshadowed any perceived or actual incremental costs to firms' overall costs of running their businesses.

4. What risk management SOPs are desirable (and doable) at a group level (i.e., board, management committee, risk management unit, or business unit)?

The views were that reliable and defensible SOPs are needed regardless of the organizational level being considered.

5. How do risk management SOPs at the individual level (i.e., "on the ground") compare/contrast with risk management standards at a group level?

It was noted that SOPs will assist in fostering better relationships between risk managers and senior management. It was

inferred that SOPs at the individual level may be more quantitative than at the group level.

The process of keeping SOPs up-to-date was discussed, and it was suggested that a large document like the Risk Principles, published by the Buy Side Risk Managers Forum in 2008, is a large document and difficult to update in its entirety, but could be broken into smaller SOPs and each SOP could be more easily updated.

It was agreed that the SOP topic should be revisited at future CRO Summits, and also should be discussed in other public and private forums.

Discussion #2 — Risk Management Challenges — Juggling evolving responsibilities, heightened expectations and expense pressures

The second discussion, "Risk Management Challenges — Juggling evolving responsibilities, heightened expectations and expense pressures," was led by a team from Ernst & Young LLP — John R. Walsh, Partner, Financial Services Advisory; Jim Embersit, Executive Director, Financial Services Advisory; and Stefan Walter, Principal, Global Bank Supervisory and Regulatory Policy Leader.

The topic was regulatory reform and the increasing focus on the adequacy of risk management and internal controls by boards of directors, regulators and the media and, when combined with significant earnings pressure across the financial services sector, are posing mounting challenges for CROs.

The discussion centered on the idea that proper risk governance depends on three "lines of defense":

- investment teams;
- risk managers and compliance staff; and
- internal auditors.

Note that all three "lines of defense" report directly up to executive management and the boards and at the same time are expected to communicate with each other.

Most participants seemed to agree that a risk-adjusted return approach reflected the proper functioning of such a tripartite approach within financial firms. However, attendees also acknowledged that some investment teams (using an example of a hedge fund investment team) were primarily interested in returns and that the risk management department in such a firm needed to function as the first as well as the second line of defense. So, it seems that the three lines of defense function differently depending on the organization, but for the most part the approach is tenable and functions accordingly within organizations. Additionally, it was generally acknowledged that such a tiered approach to risk governance would only work if the CRO and CEO had a non-adversarial working relationship with senior management respecting and officially acknowledging the need for risk management within the firm and ensuring that the CRO is an integral component of the firm's executive governing committee.

Discussion #3 — Current, significant risk concerns of attendees

Navin Sharma, Co-Regional Director, PRMIA New York was the moderator for this discussion section and asked the attendees about their major risk concerns at this time. We do this toward the end of each such CRO Summit meeting. The following comments were noted (not prioritized):

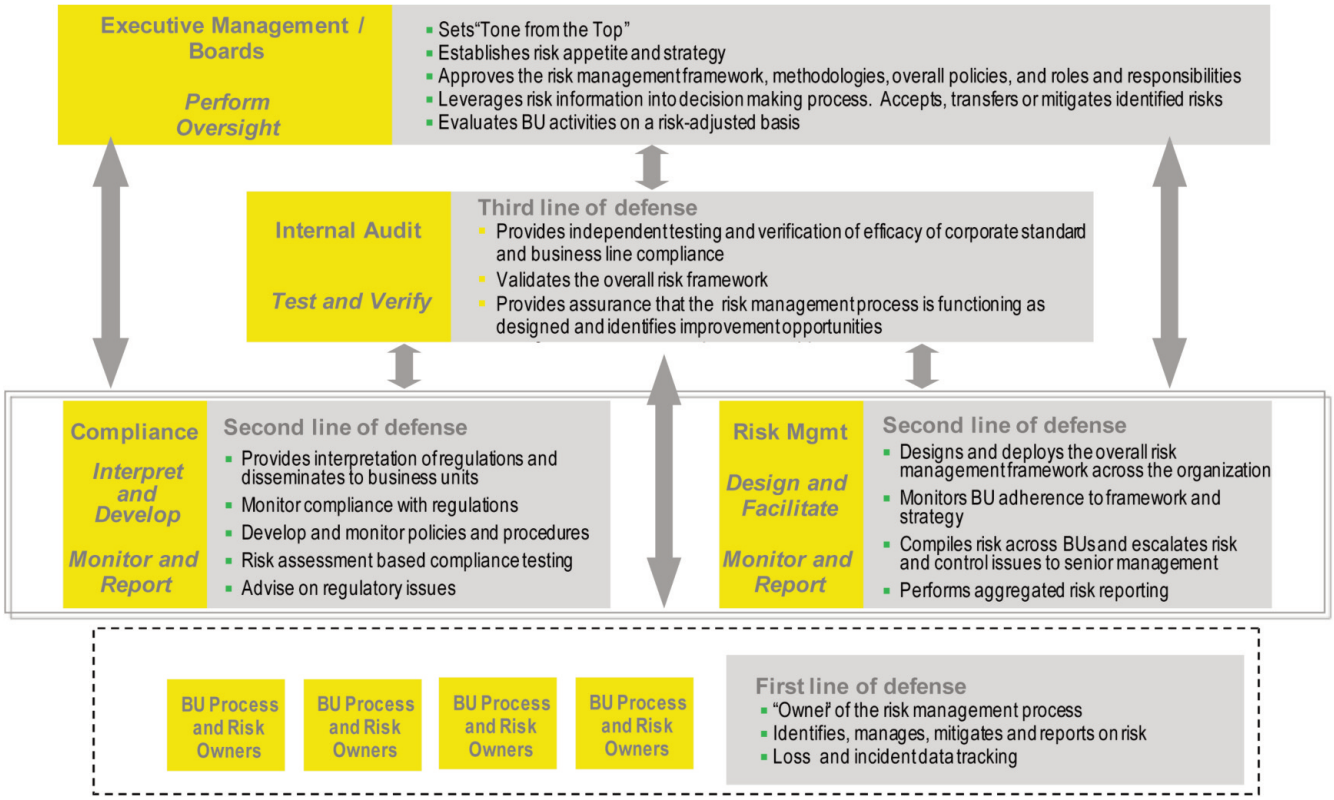
- EM local debt — significant borrowing, large issuances; numerous issues remain that can create idiosyncratic risks within firms as well as disruptions to financial markets.
- Cyber security — this was mentioned by a few attendees. There have been significant instances of such attacks occurring at financial firms, and firms are taking steps to protect themselves.
- Rising rates — this was mentioned by a number of attendees. The potential that rising rates could also create spreads widening rather than simply impacting interest rates exposures. Given that there is search for yield and asset management firms' (and other market participants') portfolios are thus extended, there is potential for market dislocations with unintended tilts/consequences.
- Insurance firms — are tied into long-term liabilities but low rates aren't allowing the meeting of such liabilities, hence this remains a "huge" strategic risk for such firms.
- Pensions — could have cascading impacts on the financial markets.
- "Risk fatigue" — This was mentioned by a few attendees. The current low volatility environment may lead to complacency such that a significant shift in risk my catch risk managers (and investment professionals) unawares.

- Deflation — with a slowly growing economy and artificially low rates, deflation could sneak up and harm the overall economy.
- Regulatory impacts — including the ongoing uncertainty of rules yet to-be-written as well as the range of interpretations to be worked out for rules that have already been instituted.
- Use "lessons learned" from the crisis — one attendee in particular felt that regulators were enthusiastic about talking to risk practitioners, especially those who had undergone the trial-by-fire experience of the financial crisis. He suggested that we take advantage of the openness of regulators at present and move to develop open dialogue between risk managers and regulators.
- Need for cohesiveness in the risk management profession — this was mentioned by a few attendees that the two large organizations, PRMIA and GARP organize together to develop standards of practice and to confront such issues affecting the risk management profession.
- Liquidity event — it was expressed by more than one attendee that the low rate environment has created a moral hazard environment, where the Fed is expected to keep rates low — thus overly-encouraging risk-taking, as well as the notion that any rate increases will be conducted in a slow and very deliberate manner under full control of the Fed.

APPENDIX – Handout by Ernst & Young LLP displayed below.

Three Lines of Defense are key to risk governance

- Regardless of the organizational structure or risk governance approach, corporate risk governance needs to be extended to all levels in the organization.



PRMIA AWARDS DR. COLIN LAWRENCE WITH 2012 HIGHER STANDARD AWARD

Dr. Colin Lawrence has been chosen as the winner of the 2012 PRMIA Higher Standard Award. This prestigious award is granted to an individual who has significantly impacted the global practice of risk management, provided a substantial contribution to the mission of PRMIA and its members, and shows an ongoing commitment to the highest standards of the profession. Dr. Lawrence now joins the list of previous respected winners, including Dr. Dan Rodriguez, Prof. John Hull, David R. Koenig, Prof Carol Alexander, and Prof. Robert Merton.

Dr. Lawrence is the Director, Strategic Risk Advisor, Deputy Governor's Office, Prudential Regulation Authority, Bank of England. As Vice Chair of the PRMIA Board of Directors and formerly as Acting Chair, he has shown his commitment and dedication to PRMIA's members and staff through times of growth, uncertainty and transition. In addition, Dr. Lawrence offers a strong voice to the risk management community, as both a well-respected author and speaker. Over the past 5 years he has embedded a strong risk management culture into regulation and was instrumental in innovating and designing stress testing to re-capitalize the UK financial system.

We asked Dr. Lawrence about his motivations and his contributions to PRMIA and industry activities.

Can you tell us about your involvement with PRMIA and the risk management industry this year?

In addition to my work on the PRMIA Board of Directors and Executive Committee, I have given PRMIA workshops, conferences, roundtable CROs, seminars and lectures across the globe including South Africa, New York, London, Edinburgh, Amsterdam, Chicago, Geneva, Washington DC, Hong Kong, and Beijing. In addition, I actively participate in the steering committee in London.

In my professional risk life I have built a brand new division in UK regulation with 300 staff spanning all areas of risk In Banking and Insurance. We were successfully involved in all the stress testing and recapitalization of UK Banks as well as deep dives into the portfolios of the banks and insurers. This has dramatically strengthened supervision to have a deeper understanding of the risk practices as well as concentrations of risk in the system. We also industrialized our ability to work with all CROs at the larger institutions to provide us with granular datasets for the stress testing and built the analytical and econometric overlay. I have also played a role in the transition program of migrating the FSA into the two new agencies — the FCA (Financial Conduct Authority and the PRA (Prudential Regulation Authority) with my focus on risk.

Why have you decided to take such an active role both in PRMIA and in the risk community? Are there any of PRMIA's initiatives to which you are especially committed?

The profession urgently needs a radical overhaul of risk management standards of practices. Having spent five years at the fulcrum of regulation, I and my risk division at the Financial Services Authority and now at the Prudential Regulation Authority, have witnessed some poor risk management behaviours, weak risk cultures and failures in governance and risk leadership. These risk management failures were clearly part of the Great financial crash in 2007. In my webinar to PRMIA members I outlined a new paradigm of risk management in which risk managers must embed risk standards within the context of the business. This is a massive jump, shifting risk management from a discipline of risk measurement to a discipline of risk MANAGEMENT.

I believe that PRMIA as an organization can be very influential in changing all the aforementioned failures and lead the industry in this needed transformation. I have been motivated by the fact that the financial crisis has opened my eyes to our own failures and that PRMIA is that organization with its grass roots to risk management worldwide. It is through PRMIA by which I am hopeful we can change standards so that the impact of the crisis can be significantly reduced.

How have you seen the roles of volunteers change during your time with PRMIA? How will volunteers affect PRMIA's future?

I think that PRMIA relies on its volunteers to drive our risk management programs. Whilst the Executive Committee and Board have now provided smarter governance, refined the committees (such as the Global Council, Ethics Committee, Finance Committee and Education Committee), the bottom line is all of these are run by volunteers who have done some amazing work. Most of our chapters are extremely well run with excellent programs in place. This obviously needs to improve in some chapters, but we couldn't be where we are without the core contribution of our volunteers, especially Regional Directors.

Our volunteers are simply our future. However, we need further transformation of linking our overall educational program with the chapters directly. Our future lies in building a life cycle of professional risk management education and application to the financial services. We could call this risk management from cradle to grave where the chapters are the homes of our members providing nurturing for new "apprentices" and continuing education for our more advanced risk managers.

As the winner of this year's award, you were given the opportunity to select a student in the field of risk management to receive an award of US$1,000 to be donated by PRMIA to the school of the student's choice for further education for the student. Who did you select to receive this award?

I selected Jialin Zhao, a Ph.D. candidate at the Business School of Stuart, Illinois Institute of Technology, as I think her work (as described below) is worthy of the Higher Standard Award prize.

Most traditional financial models have a limitation in the reasonableness of their markets assumptions. For example, the classic Black Scholes Model assumes the normality of financial time series. The distribution of these time series, in fact, appears to be asymmetric and fat tailed in real markets. People also observe the market regime switching upon many prominent financial events, which is another empirical finding contrary to the underlying assumptions of many classic models.

Jialin has already co-authored a published paper on regime switching mode with Professor Liu at the University of Dayton. The paper, "A Lattice Method for Option Pricing with Two Underlying Assets in the Regime-Switching Model", was published in *Journal of Computational and Applied Mathematics*, March 2013. She intends to build on this approach to see how regime switching can be linked to fat tailed distributions. She can thus explore regulation and optimal risk strategies in fat tailed distributions.

PRMIA IRELAND CHAPTER

MONIKA SMATRALOVA

The Gathering is an initiative started by the Tourism board in Ireland to encourage people to come and visit our wonderful country in 2013. Communities throughout Ireland are displaying and sharing the very best of Irish culture, tradition, business, sport, fighting spirit and the uniquely Irish sense of fun. With this as the backdrop, the PRMIA Ireland Steering Committee has set about putting in place some significant gatherings in the near future.

The Irish Chapter has recently been reorganized, with the regional directorship role split between Justin McCarthy and Monika Smatralova. The first task of the new co-regional directors has been to set up a strong steering committee with a clear focus on building awareness of the PRMIA brand in Ireland among risk management professionals. The newly formed committee is comprised of individuals from a broad range of backgrounds within the risk management sector. This diversity brings new ideas and challenges to existing norms to ensure that PRMIA Ireland is innovative, and delivers quality events to our members and facilitates the exchange of knowledge, ideas and opinions on risk management.

PRMIA Ireland has initiated a series of topical events that will run throughout 2013. These sessions will feature presentations from the chief regulatory officers (CROs) of each of the four largest retail banks in Ireland, as they share their visions of risk management within the Irish banking sector.

Irish Chapter Steering Committee

Monika Smatralova (Co-RD), *Ulster Bank (Royal Bank of Scotland)*
Justin McCarthy (Co-RD), *GRC3*
Richard Pike, *Wolters Kluwer Risk & Compliance*
Alan Bluett, *The Panel*
Carol O'Connor, *National Asset Management Agency*
Tim Byrne, *Murex*
Conor Griffin, *Ernst & Young*
Enda Roche, *Dell Financial Services Europe*
Pedro Angulo, *Angulo Consulting*
Gerard A Greene, *Allied Irish Bank (AIB)*

In many ways, Ireland has been the "canary in the mine" in relation to the turmoil and upheaval experienced by the industry since the start of the financial crisis, partly due to the size and extent of the financial services industry located here. Due to the constant change in business and risk models, regulations, and the structure of banks and financial firms, having a strong and successful PRMIA Ireland chapter is more important than ever. In fact, several of the financial institutions in Ireland are designating the PRMIA qualifications as must-have for their staffs.

The Irish Chapter has grown to more than 1,000 members and, given the level of interest and attendance at recent chapter events, we expect to be welcoming more industry professionals to our ranks within the coming year.

To learn more about Ireland Chapter of PRMIA, please email us at ***ireland@prmia.org***.

ABOUT THE AUTHOR

Dr Monika Smatralova was appointed as the Regional Co Director of the PRMIA Irish Chapter in April 2013. She is currently working in Ulster bank (part of RBS Group) in the risk function.

She has gained the experience in Credit and Operational Risk management and measurement in various banking roles over the last number of years. Prior to this she obtained a doctorate degree in Financial management.

INSTITUTE OF BANKERS IN IRELAND

PHILIP HAMILL

Founded in 1898, the Institute of Bankers in Ireland is one of the oldest banking institutes in the world. It is a membership body with 40 corporate and over 33,000 individual members. From its inception, it has served the education and professional development needs of banking and international financial services. The Institute is a recognized college of University College Dublin (UCD), with its programs delivered by its School of Professional Finance. All of its awards are accredited by UCD, Ireland's largest research-led university. As a professional body and education institute, the vast majority of students are professionals working in the financial services sector. Consequently, the majority of programs are delivered part-time in the Institute of Bankers School of Professional Finance's Conference and Learning Centre in the International Financial Services Centre (IFSC), Dublin. The Institute's mission is to offer programs to its members which are academically rigorous, professionally relevant and cater to the teaching and learning needs of adult learners.

The Executive Master in Risk Management (ExMRM) program is one of a suite of master's and executive development programs offered by the Institute. The ExMRM is a two year, four semester part-time program offered on a bi-annual basis. Students study six semester-long modules and eight short intensive modules, and must complete a minor project on a topical thematic area of risk management. Candidates who successfully complete the ExMRM earn an MSc in Risk Management.

The program was specifically developed to meet the increasing need for well-qualified risk management professionals in Ireland. It covers a broad technical curriculum encompassing the conceptual and quantitative foundations of risk management, and engenders in students a critical understanding of the challenges facing senior management. It aims to develop risk professionals with a holistic perspective of the wider implications of risk and risk management. Typically, entrants come from quantitative disciplines; candidates with sufficient professional experience in risk management from more general backgrounds will be considered on a case-by-case basis.

The Institute's IFSC location provides an ideal venue to facilitate knowledge transfer from academic research to practitioners. The Institute supports the Financial Mathematics and Computation Research Cluster (FMC^2), which is a collaboration between colleagues at University College Dublin, Dublin City University, and National University of Ireland Maynooth. FMC^2 aims to develop cutting-edge research and research capability in financial mathematics, financial computation and financial economics, both nationally and at the international level.

Recent research activities at the Institute include the annual FMC^2 Finance conference on 1st May 2013, which included papers by Andrew Karolyi (Cornell), Semyon Malamud (Swiss Finance Institute), Matthew Spiegel (Yale), and René Stulz (Ohio State).

For more information on our program visit:

http://www.bankers.ie/postgrad

ABOUT THE AUTHOR

Philip Hamill, BA(Hons), MSc, PhD, MCSI has been Dean of the School of Professional Finance at the Institute of Bankers in Ireland from 2012. Previously Philip was Professor of Finance and Investment at the University of Ulster from 2007 to 2012, and beforehand a lecturer in finance at Queen's University, Belfast. During his academic career he has been seconded to work in asset-management and has been a consultant to both public and private sector organisations. His research involves theoretical and empirical analysis of financial markets with a specific focus on modeling stock market volatility and security valuation which has been published in a range of academic journals, books and professional periodicals.

MASTER PROGRAM, QUANTITATIVE ASSET AND RISK MANAGEMENT (ARIMA), UNIVERSITY OF APPLIED SCIENCES BFI VIENNA (UAS BFI VIENNA)

SILVIA HELMREICH

The University of Applied Sciences bfi Vienna is proud to announce that the Quantitative Asset and Risk Management ("ARIMA") master's program received full accreditation from the Professional Risk Managers' International Association (PRMIA) in December 2012. ARIMA is the first Austrian degree program to have met the rigorous requirements for PRMIA accreditation and is now in a select group of universities to have done so. ARIMA is a two-year master's program that aims to equip graduates with the skills required to become risk management specialists and, eventually, industry leaders in analytic disciplines.

The University of Applied Sciences bfi Vienna was founded in 1996 as a response to the Organization for Economic Cooperation and Development's (OECD's) recommendation that nations create and promote work-related education at the university level, with all the advantages of a basic theoretical education combined with practical implementation. The UAS bfi Vienna is now one of the leading universities of applied sciences in Austria, and its graduates are internationally regarded as being highly qualified. The university is also in Europe's top league, as one of only ten universities in Europe to have been awarded both the Diploma Supplement and the **European Credit Transfer and Accumulation System (ECTS)** labels by the EU. In addition, credits obtained for exchange semesters and work placements may be translated into ECTS credits, thus making UAS bfi Vienna part of the Bologna Process elite.

The UAS bfi Vienna offers seven bachelor's degree programs and six master's degree programs in the field of Social and Business Sciences. Approximately 1900 students are currently enrolled in these degree programs.

ARIMA commenced in the second half of 2009 and is now in its 4th successful year. The aim of the master's program is to impart an all-encompassing understanding of the connections between asset management and risk management. Both managerial functions deal with the same subject matter but from different vantage points. In a manner of speaking, the risk manager looks over the asset manager's shoulder to ensure that the asset manager does not take too much risk. Mutual understanding is thus essential.

The medium of instruction is English. The third semester of the program is a required exchange semester, which can be spent at the joint degree partner universities in Katowice (University of Economics) and Prague (Anglo American University) or at the double degree partner university — University of Bologna. Graduates of the program generally enter careers in banking, insurance, enterprise-related services, supervisory authorities or public administration in risk disciplines such as risk management, asset management, treasury services, trading and auditing. There is, to date, no master's program with comparable international orientation and quantitative focus in Austria, or anywhere within the EU. Since current trends indicate a growing significance of risk management and asset management within the financial sector, it is likely that graduates of the UAS bfi Vienna ARIMA program will continue to be rewarded with good career opportunities.

For more information please visit our website: ***http://www.fh-vie.ac.at/en/Degree-Programmes/Master/Quantitative-Asset-and-Risk-Management***

ABOUT THE AUTHOR

Prof. Mag. Silvia Helmreich is the program director of ARIMA. She studied at the Vienna University of Business Administration and Economics. Before joining the University of Applied Sciences bfi Vienna she worked for many years in the banking industry, primarily in the risk management field. Her teaching and research focus is on credit risk, bank management and regulations (Basel II and III, Solvency II). To emphasize the strong connection with the financial industry she provides consulting services in the field of regulators reporting in addition to her role as program director of ARIMA.

In the current environment risk education is not just a choice, it is a necessity.

Since the global recession began in 2008 the demand for risk management training has dramatically increased at all levels. In response, our training is evolving in line with member needs. PRMIA recognizes the diversity in this renewed demand and has responded by providing a library of risk education tools, delivered in brief via online and web-based training solutions, as well as through live classroom and customized in-house training. All platforms are created and delivered by leading industry experts. Watch your e-mail and check the website for current training schedules.

ONLINE SERVICES

Available anytime, anywhere in the world with an Internet connection.

WEBINARS

PRMIA offers global access and a degree of precision to key concepts from risk leaders through PRMIA open-enrollment and customized webinars. Live and recorded webinars are available each week on a broad range of risk management topics, including but not limited to:

- Behavioral Finance
- Corporate Governance
- Counterparty Credit Risk and CVA
- Credit Risk
- Economic Capital
- Enterprise Risk Management
- Market Risk Analysis
- New Paradigms in Risk Management
- Operational Risk Management
- Stress Testing
- Systemic Risk

Weekly webinars are available for free to PRMIA's Sustaining Members.

PROFESSIONAL DEVELOPMENT

PRMIA offers over 700 eLearning short courses separately and in different library and course series combinations to fulfill your risk management professional development needs.

Libraries

PRMIA provides 62 comprehensive online course libraries consisting of more than 700 eLearning short courses.

Corporate Licensing

Special pricing is available for corporate licensing of any online course or course combination. Please contact training@prmia.org if you are interested in learning more.

When you purchase an online course, you will receive:

- One year unlimited access to the course or courses
- 24x7 email support
- Specific Job Aids and other PDFs that are printable to complement your digital course
- Online Chat, Discussions and tracking of your progress

EXAMINATION PREPARATION

PRMIA offers access to multiple resources to assist candidates in the exam preparation process. These resources include printed publications, online training, webinars, classroom training and DVDs. A full list of online exam preparation material is available on line.

CLASSROOM TRAINING

Intensive and Comprehensive

OPEN ENROLLMENT COURSES

PRMIA, leading universities and key industry experts around the world have come together to offer specialist and advanced courses in risk management taught by world authorities in their subjects. PRMIA offers one, two and five-day training opportunities addressing relevant risk management topics. Topics include, but are not limited to:

- Counterparty Credit Risk and CVA
- Risk Management Beyond VaR
- Operational Risk Management
- Stress Testing
- Enterprise Risk Management
- Advanced Liquidity Risk
- Funds Transfer Pricing
- Monte Carlo Modeling
- Credit Risk Management
- Behavioral Risk Management
- Systemic Risk Management
- Corporate Governance

PRMIA Sustaining Members receive a discount on open-enrollment offerings. ***http://www.prmia.org/training/classroom***

CUSTOMIZED

Customized training allows our corporate clients to work with PRMIA and the instructor to design a training program that is relevant to their specific business and to hold the training course at the time and location convenient for their staff. This approach to training provides the opportunity for a more personalized learning experience, one which enables ongoing dialogue with the instructor and other course participants to ensure that specific issues and questions are addressed.

PRMIA OFFERS WEEKLY THOUGHT LEADERSHIP WEBINARS. TO REGISTER GO TO ***www.prmia.org/webinars***

PRMIA

"This short course on risk management (Complete Course in Risk Management) crams more into its 20-week span than many other certificate or even degree level courses. The professors are excellent and the material ensures a solid foundation in the subject. I would unhesitatingly recommend this course."

Jay Namputhiripad, Director, Risk Management, Federal Home Loan Banks Office of Finance

OPEN ENROLLMENT COURSES

A COMPLETE COURSE IN RISK MANAGEMENT

Offered jointly by PRMIA and Kellogg School of Management, Zell Center for Risk Research | July 15–19, 2013 | Chicago

This intensive one-week course is designed to meet the demands of the risk professional by bridging the gap between theory and practice in financial risk management. PRMIA and the Kellogg School's Zell Center for Risk Research jointly offer this classroom-based educational program featuring top faculty from the Kellogg School of Management. Please note registration ends July 12th for this course offering.

http://www.prmia.org/civicrm/event/info?reset=1&id=3772

ADVANCED RISK AND PORTFOLIO MANAGEMENT (APRM) BOOTCAMP-SYMMYS

One-week course led by Attilio Meucci | August 12–17, 2013 | New York

The Advanced Risk and Portfolio Management Bootcamp provides in-depth understanding of buy-side modeling from the foundations to the most advanced statistical and optimization techniques, in six intensive days of theory and MATLAB live examples and exercises.

http://www.prmia.org/civicrm/event/info?reset=1&id=3918

FINANCIAL RISK MODELING, CALCULATION OF ECONOMIC CAPITAL, AND THE DESIGN OF PRUDENTIAL REGULATION

Held jointly by PRMIA & GSU | September 9–12, 2013 | Atlanta

In the last decade, few topics have been discussed as intensely and vigorously among financial professionals as financial regulation. This course provides a broad overview of the design and evaluation of financial regulation. We develop the technical tools necessary to analyze regulation—theoretical models, econometric and numerical techniques—and also provide a detailed introduction to recent regulatory frameworks such as Basel III. We also discuss the economic motives for the prudential regulation of financial institutions and the considerations that would go into its optimal design. This course is designed as a four-day intensive course with the possibility to sign up for a limited number of days, depending on each participant's background and interest. Participants who sign up for the full four-day program will earn a certificate from Georgia State University's J. Mack Robinson College of Business and also PRMIA.

http://www.prmia.org/civicrm/event/info?reset=1&id=3337

INVESTING IN COMMODITIES: BASICS AND BEYOND

A one-day course led by George Skiadopoulos | September 13, 2013 | Dusseldorf

Over the last years there has been a tremendous interest of investing in commodities worldwide. This is a unique course that will make the audience familiar with the "basics and beyond" features of investing in commodities and it will present cutting edge developments in the field. A number of case studies will be shown throughout the course so that delegates become familiar with concepts and techniques. Common pitfalls will be highlighted so that the investor will be aware of the risk and return when it comes to invest in commodities. The pricing of commodity derivatives will also be explained.

http://www.prmia.org/civicrm/event/info?reset=1&id=4059

MANAGING ENTERPRISE RISK IN THE NEW ENVIRONMENT DODD-FRANK, AND OPERATIONAL RISK IMPACTS FROM REGULATION

A Two-Day Course Led by Dr. Russell Walker | October 3–4, 2013 | Chicago

This two-day session will provide an executive overview of Enterprise Risk Management with special emphasis on the importance of Operational Risk Management. The principles of Credit and Market Risk Management will be discussed in depth based on Basel III and the impact to retail banks from the Dodd-Frank act. The evolving role of the Risk Office in the new risk environment will be developed, with direction given on how leading firms have positioned and empowered their Risk Offices. Implications of risk management on corporate strategy will be reviewed with an executive perspective on the Basel III accords and the appropriate regulatory calculations and Value-at-Risk techniques. Given the great importance of understanding the risks in modern credit instruments, we will also review credit swaps, credit derivatives, and CDOs, examining inherent risks in each and how each poses unique counter party risks. We will also look at the role of Liquidity Risk and Model Risk in today's environment and how firms should prepare for the confounding of risks going forward. With Operational Risk viewed as a great driver in risk management, we will examine in detail the approaches for calculating Operational Risk and resolving the needed regulatory capital, under Basel III. International research on the risks and lessons from the 2007-2008 market and the role of Operational Risk in it along with outlooks on the US economy will also be covered, including Basel III and Dodd-Frank.

http://www.prmia.org/civicrm/event/info?reset=1&id=3837

APPLIED FINANCIAL RISK MANAGEMENT

Offered jointly by PRMIA & The UC Berkeley Center for Executive Education October 7–11, 2013 | Berkeley

The Global financial crisis challenged the paradigm of Risk Management and set it on an evolutionary path. This program, taught by veteran practitioners and world renowned academics, sets the direction for the future of the profession. The curriculum addresses the quintessential issues for today's managers, who are dealing with a new generation of developments and risks: dynamic capital management, (il-) liquidity, behavioral aspects of financial markets and risk-taking, regulatory revolutions, systemic risk, and the future of the Euro, Yuan, and U.S. dollar.

http://www.prmia.org/civicrm/event/info?reset=1&id=3987

COUNTERPARTY CREDIT RISK: THE IMPACT OF CVA, BASEL III, FUNDING AND CENTRAL CLEARING

A Two-Day Course Led by Jon Gregory | October 17–18, 2013 | Minneapolis

Counterparty credit risk and CVA have become key concepts since the outset of the global financial crisis. In addition, funding has become a key concern for assessing trading costs. Regulation means that counterparty risk quantification and management will be key challenges over the coming years for banks and other financial institutions. The large move towards centralized clearing for many types of OTC derivatives will also be a key dynamic defining structure of financial markets.

http://www.prmia.org/civicrm/event/info?reset=1&id=3955

COUNTERPARTY CREDIT RISK: THE IMPACT OF CVA, BASEL III, FUNDING AND CENTRAL CLEARING

A Two-Day Course Led by Jon Gregory | November 14–15, 2013 | Dusseldorf

Counterparty credit risk and CVA have become key concepts since the outset of the global financial crisis. In addition, funding has become a key concern for assessing trading costs. Regulation means that counterparty risk quantification and management will be key challenges over the coming years for banks and other financial institutions. The large move towards centralized clearing for many types of OTC derivatives will also be a key dynamic defining structure of financial markets.

http://www.prmia.org/civicrm/event/info?reset=1&id=3957

MANAGING REGULATION, REPUTATION AND RISK

A Two-Day Course Led by Professor Russell Walker and Professor Timothy Feddersen | December 5–6, 2013 | Chicago

The fate of enterprises is often determined or accelerated by external events stemming from reputational events and regulatory policy. Indeed the profit function of a firm can more or less be defined by impacts from either in many markets. Specific industries, such as financial services, energy, insurance, and major manufacturing are granted explicit licenses to operate and those terms of operation are adjusted through regulation. Changes in the political landscape pose an enormous risk to firms operating under such licenses. In many ways, all firms operated under a license, some of those being more implicit licenses than explicit. The trust and reputation of a firm form de-facto expectation with customers and other stakeholders that when violated or compromised pose a tremendous risk to the enterprise and impact the implicit license to operate and generate profits. This executive course will look at how enterprises have faced such crises from regulatory and reputational events. Through case studies, we will examine the actions of prominent firms in the context of recent and very public crises and motivate frameworks for identifying and addressing risks for reputation and regulation.

http://www.prmia.org/civicrm/event/info?reset=1&id=4080

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Cass Business School

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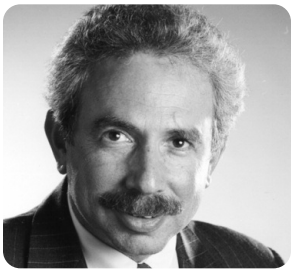

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Term Expiration: 2013

Call for iRisk Articles

Article submissions for future issues of *Intelligent Risk* are actively invited. Articles should be approximately 1,000–1,500 words, single spaced, and cover a topic of interest to PRMIA members. Please consult the submission guidelines located at the end of the publication prior to submitting your article. Please send all article submissions that you wish to be considered for publication to ***iRisk@prmia.org.*** Chosen pieces will be featured in future issues of iRisk, archived on ***PRMIA.org***, and promoted throughout the PRMIA community.

I-RISK SUBMISSION GUIDELINES

Follow these instructions regarding the format of your articles and references.

Article Submission
Please send all article submissions that you wish to be considered for publication to ***iRisk@prmia.org***

File Format
Please prepare your work using Microsoft Word, with any images inserted as objects into the document prior to submission.

Abstract
Please present a brief summary or abstract of the paper on the page following the title page.

Author Biography
Please include a biography, not exceeding 150 words, for each of the contributing authors listed. All biographies must be included at the end of the article.

Author Photo
Please provide a professional photograph to be included with your article. The photo must be submitted as a separate file in jpeg or tiff format.

Exhibits
Remember to attach all elements relevant to the paper (tables, graphs, charts and photos) on separate and individual pages at the end of the article. Please denote all tabular and graphical materials as Exhibits, and designate them using Arabic numerals, successively in order of appearance in the text.

Exhibit Presentation
Please ensure that tables and other supplementary materials are organized and presented consistently throughout the paper, because they will be published as is. You may submit exhibits produced either in color or black and white. Use the exact same language in consecutive appearances; indicate all bold-faced or italicized entries in exhibits; arrange numbers consistently by decimal points; use the same number of decimal points for the same types of numbers; center headings, columns, and numbers correctly; and incorporate any source notes when required. Consistency of fonts, capitalization, and abbreviations in graphs throughout the paper is required, and all axes and lines in graphs must be labeled in a consistent and coherent manner. Paste all graphs into Word documents as objects, and not as images, allowing access to the original graph. Please supply source materials for graphs such as Excel files.

Equations
Please present equations on separate lines. All equations must be aligned with the paragraph indents, but not followed by any punctuation. Use Arabic numerals at the right-hand margin to number equations consecutively throughout the article. Use brackets to indicate all operation signs, Greek letters, or other such notations that may be ambiguous.

Reference Citations
In-text citations of authors and works must be represented as: Smith (2000). Use parenthesis for the year, not brackets. Similarly, references within parentheses must be represented as: "(see also Smith, 2000)."

References List
A reference is a source that is actually cited in the text. Please formally list only articles previously cited, using a separate alphabetical references list at the end of the article.

AUTHOR GUIDELINES
PRMIA categorically values literary excellence in selecting articles for publication. To enhance clarity and coherence, we urge the use of simple sentences comprising of a minimal number of syllables per word.

Please follow these recommendations in the interests of meeting PRMIA's publication standards, and to accelerate both the evaluation and editorial process. The review process will take up to 4-8 weeks. The author will receive articles due for revision, as well as those while accepted, departs in large part from these guidelines.

Finally, PRMIA reserves the right to return to an author for reformatting purposes, any article, which is accepted for publication that deviates from the aforementioned standards. The editors always reserve the right to make further changes to your work for consistency and coherence.