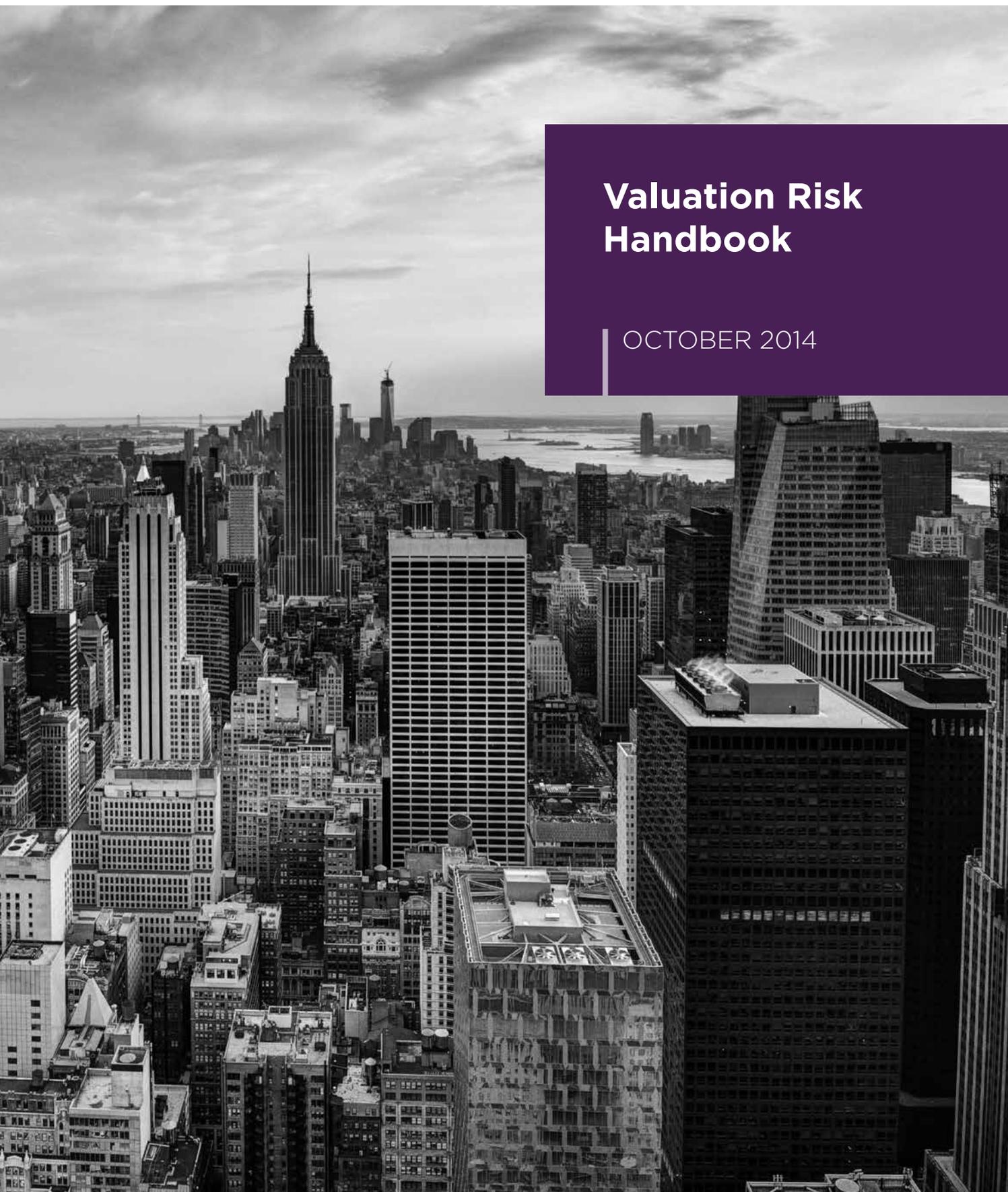




# Valuation Risk Handbook

OCTOBER 2014



# CONTENTS

- 03 Introduction
- 04 Valuation Regulation
- 31 Valuations User Survey
- 38 Expert Market Reviews
- 120 Vendor Directory
- 198 Appendix

## FOREWORD



There have been a number of reforms brought in to ‘fix’ the causes of the global financial crisis. However, one area of unfinished business is valuation. The plunge in financial asset prices in 2008 led to a much greater understanding of the importance of valuation. Indeed, the need to improve valuation standards, consistency and transparency was identified by bodies such as the Group of 20 and the Financial Stability Board during the aftermath of the crisis. Yet, in the intervening years, little seems to have happened. Most recently, calls to improve valuation standards have featured in documents prepared for the recent G20 summit in St Petersburg. The FSB report “Strengthening Oversight and Regulation of Shadow Banking” also recognises that poor valuation is a risk that spans banking and shadow banking, and states improved collateral valuation practices as a policy goal. Furthermore, the G20/OECD report “High-Level Principles of Long-Term Investment Financing by Institutional Investors” calls for the transparency, consistency, relevance and reliability of valuation methods for long-term assets to be promoted. Despite this awareness, the lack of regulatory backing or focus is hampering the effort to develop a single set of global valuation standards. This is in contrast to International Financial Reporting Standards (IFRSs), which are now required by three-quarters of G20 members. Sound valuation is critical both as an input for the smooth functioning of financial markets and institutions, and as an output from financial systems in their role of allocating capital efficiently across the economy. Valuation issues are integral to today’s financial system and they must be addressed before we can even begin to consider moving on from the crisis.

**Sir David Tweedie**, Chairman, Board of Trustees,  
International Valuation Standards Council



# INTRODUCTION



**The Voltaire Advisors Valuation Risk Handbook aims to present, in one easily accessible publication, a clear and comprehensive review of the key issues currently facing firms involved in the ongoing valuation of financial instruments, and the sources of pricing, data and models available to them to assist their efforts. Nowhere previously has this information been collated in one volume, and we firmly believe that our Handbook will become an indispensable resource for valuations professionals.**

The first section of the Handbook, **Valuation Regulation**, is arguably the most important. Here, global regulators, standard setters and experts outline the current state of play with regard to valuation rules and sound practice. This is an area which has seen significant change over the last few years as a result of the financial crisis, and valuations processes and sources are part of the continuing 'regulatory tsunami' generated by this industry-transforming event. Any firm involved in valuing a financial instrument, whether for regulatory reporting, NAV calculation, client reporting, accounting, risk management, product control, or other purposes, will be required to comply with such regulation at a local and, increasingly, transnational level. This section is required reading for valuation practitioners.

Of course, compliance with these rules and guidelines is a practical operational issue, rather than a theoretical exercise, and our second section, the **Valuations User Survey**, aims to reveal how firms are actually going about this. During May 2014 Voltaire conducted a survey of over 200 global financial firms – asset managers, asset servicers and banks – on their valuations policies, procedures and purchases. This large and representative sample of users provides the best information yet on how they actually go about their day-to-day pricing, what are their major concerns, and what they are looking for from sources and suppliers.

User firms typically deploy a range of outside vendors to assist them in meeting their various valuation obligations. This ranges from direct sourcing of market or evaluated pricing, to the use of models (either bought

in or developed internally) requiring input, benchmark and calibration data to fuel them. The providers of these products and services offer vital options to valuations users and the final two sections of the Handbook focuses on their capabilities.

The **Expert Market Review** section presents a series of articles by vendors involved in the valuations industry, outlining some of the key issues faced by user firms and how their products or services are designed to help. These are not simply sales flannel! We have required contributors to focus on very real operational questions confronted by valuations practitioners, and to demonstrate their expert assessment of both the problem and its solution. We hope that this section provides concrete practical advice to user firms on how to resolve some of the thornier issues they face in their daily valuation grind.

Finally, we conclude with a **Vendor Directory** listing all the firms involved in the provision of pricing, data and models to the global valuation community. Many leading players have chosen our Handbook to showcase their products and services with much more rounded company profiles, and this section represents an exhaustive index of around 50 firms servicing the valuations community.

In all, the Valuation Risk Handbook provides all you need to know to keep on top of developments in the financial valuations business.

*Ian Blance*

**Ian Blance** Editor



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**06** IVSC

**10** Deloitte

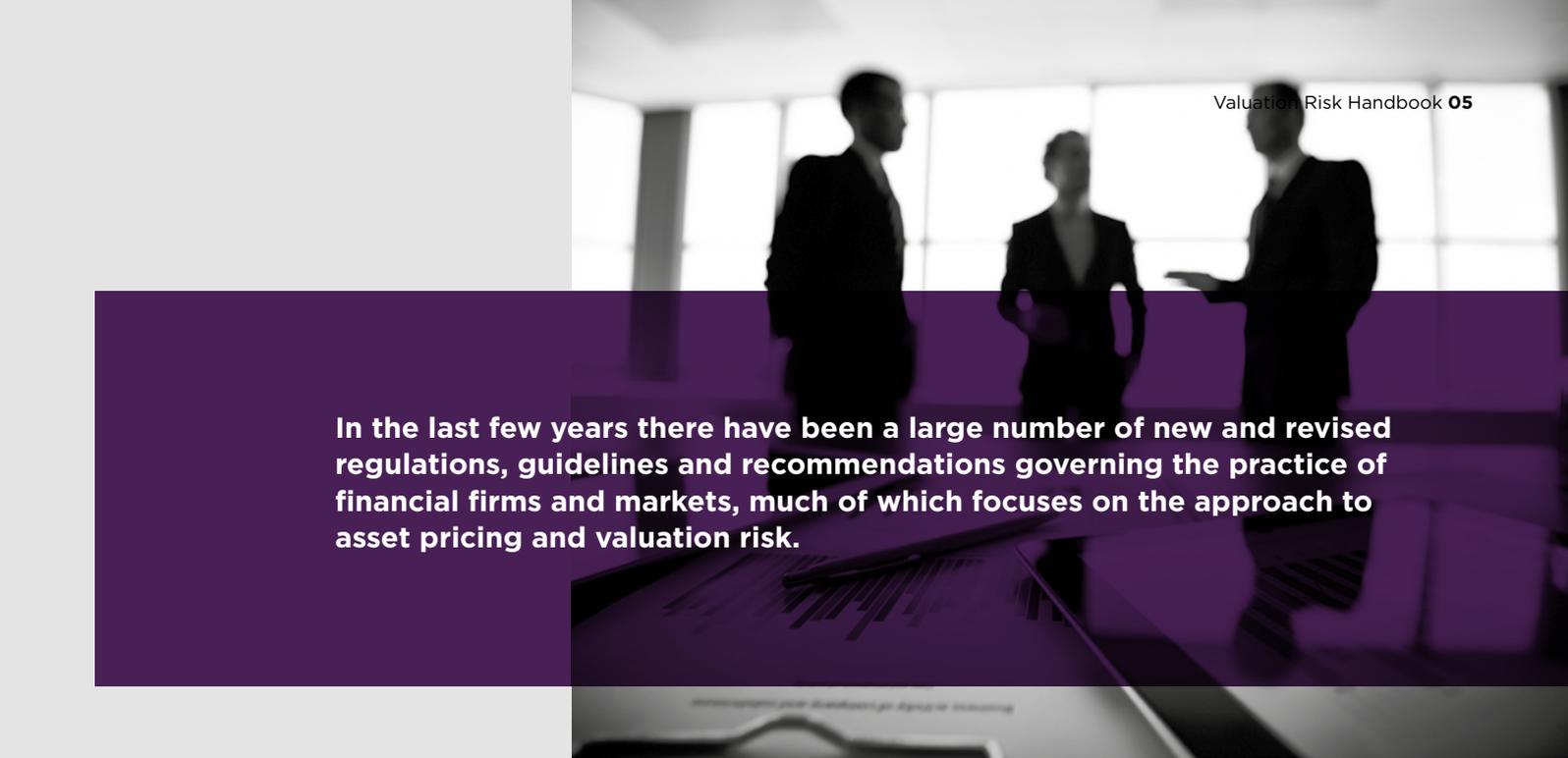
**16** KPMG

**20** Quantifi Deloitte

**24** Thomson Reuters

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# VALUATION REGULATION



**In the last few years there have been a large number of new and revised regulations, guidelines and recommendations governing the practice of financial firms and markets, much of which focuses on the approach to asset pricing and valuation risk.**

According to the International Organization of Securities Commissions (IOSCO), the three key objectives of regulation and accounting oversight of financial institutions are:

- The protection of investors;
- The fair and efficient operation of markets;
- The reduction of systemic risk in the financial system as a whole.

It is in this light that the complex regime for asset valuations should be seen. Whilst the sources of the regulatory or accounting guidelines vary according to the type of institution in question, the purpose of the valuation or the geographic location in which it operates, there are a number of recurring themes which are increasingly seen as sound practice for valuations regardless of what type of institution or to what purpose or location:

- Principles of fair value or mark to market, consistently applied;
- Independence and objectivity to avoid conflict of interest;
- Transparency of process and approach.

**Broadly, the sources of regulations and guidelines which govern firm's valuation processes can be classified into four areas:**

- 1. Securities and Banking Laws** – The regulatory regime under which a firm operates will often set rules or principles for valuations to which regulated firms must comply to do business.
- 2. Accounting Standards** – The financial accounting framework that firms must abide to when producing reports and accounts will have views on the valuations used as inputs in these accounts.

**3. Industry Bodies** – Associations and lobby groups for various types of firms in the financial industry frequently produce guidelines for sound practice in areas of their member's activities, including valuations.

**4. Internal Standards** – In most cases the firms themselves are responsible for interpreting the various rules and guidelines to implement an appropriate valuations system.

The short review articles in this section cover some of the key regulatory issues currently presenting a challenge to valuation practitioners.

The **IVSC** outline the efforts being undertaken to establish Global Standards for valuation, and how this intersects with the accounting standards developed under IFRS. As Sir David Tweedie points in the Foreword to this Handbook, much remains to be done.

One of the most well established regulatory regimes in the world is that for US Mutual Funds under the '40 Act'. These laws stipulate a clear requirement for independent, fair valuation of fund holdings, and **Deloitte's** Fair Value Pricing Survey (now in its eleventh year) sheds light on how funds are dealing with this.

In contrast with the 74-year old '40 Act' the AIFMD - a new oversight regime for Hedge Funds and Private Equity firms - is just a baby, but it has major implications for this burgeoning area of the asset management industry. **KPMG** review the main valuation challenges arising from this Directive.

As we state above, it is usually not good enough just to follow these rules, but firms also need to show that they are doing so. Such transparency is the subject of the final article by **Thomson Reuters**.



**International Valuation  
Standards Council**



## Value Added – Why do we need Valuation Standards?

**Chris Thorne**, Technical Director,  
International Valuation Standards Council

Valuation suffers from being a ‘grudge purchase’. Few people who commission a valuation do so because they want it for its own sake or to appreciate the elegance of the logic on which it is based. Valuation is normally required as a means to an end, for example to justify a transaction or to comply with a regulatory requirement. Too often this has led to a lack of recognition of the importance of the valuation itself and has resulted in a fragmented professional and regulatory landscape when viewed from a global perspective. As a consequence valuation is often misunderstood or misrepresented and certainly underappreciated as a professional discipline. However, proper valuation is an essential component of the global financial system. Among other things it is needed to support investment decisions, for measuring investment performance, as a measurement basis in financial reporting and for complying with capital and other regulatory requirements.

The IVSC’s mission is to establish and maintain effective, high-quality international valuation and professional standards, and to contribute to the development of the global valuation profession, thereby serving the global public interest.

The IVSC is an independent, not-for-profit, private sector organisation. Its membership and supporters consist of over professional bodies from nearly sixty different countries together with firms or organisations that provide valuation services, rely on valuation services or who have any other interest in valuation.

In 2008 the IVSC underwent a restructuring aimed at increasing its independence from the professional bodies that founded it and broadening its remit and support base. One of the changes was to bring financial instrument valuation experts onto the IVSC Standards Board and to set up expert working groups to assist with the development of specific projects in the financial sector.

The IVSC is funded partly by subscriptions paid by its member organisations and partly by donations from its sponsor firms.



## THE IVSC

The IVSC was established in the 1980s by a group of professional bodies from the major economies concerned with the valuation of real estate. They all saw benefit in aligning their own valuation standards in the light of increasing cross border investment. Since the turn of the century the roll out of International Financial Reporting Standards around the world has produced a requirement for consistent valuation standards for many other types of asset and liabilities, including business interests, intangible assets and financial instruments. As the demand for valuations, and standards for valuation, has grown so in recent years the IVSC and its agenda have expanded to encompass a much wider range of organisations with an interest in valuation and with expertise and many different types of asset.

Today the IVSC's standards are set by one of two boards, the IVSC Standards Board which issues standards on processes and procedures for valuation practice and the IVSC Professional Board that issues standards for the competency and behaviour of those who provide valuations. The members of these Boards all volunteers appointed by the IVSC Trustees for a fixed term, and are senior practising valuers selected to provide a the necessary spread of expertise and geographic experience.

To assist the Board, expert working groups are often formed to advise on specific projects. Again these working groups consist of volunteers with skills relevant to the project under consideration, and allow the Board access to wider cross section of relevant expertise to ensure that the eventual standard is of the highest possible relevance and quality.

## BUILDING REGULATORY PRESSURES

Regulations around valuation fall into two basic types; stipulations on who may value and stipulations on how the valuation is carried out. In some countries there are long established regulations of both types around valuations for mortgage lending on real estate. Recent years have seen increasing regulation around valuations for other purposes as national legislators have reacted to the 2008 crisis. However, much of this regulation is not well coordinated, and frequently presents operational challenges to those who have to prepare the required valuations.

The flow of regulation that concerns or touches valuation shows no sign of abating. For example, the need for robust valuation practices has been highlighted by the FSB in its paper "Key Attributes for Effective Resolution Regimes for Financial Institutions". The increasing adoption of International Financial Reporting Standards around the world coupled with increased audit oversight is also leading to greater regulatory scrutiny of fair value estimates. The international body that coordinates national audit regulators, IFIAR, identified issues around fair value as the biggest single reason for adverse audit findings in its 2012 survey across more than forty countries.

In this context, the development and adoption of global standards for valuation for the major purposes for which valuations are required, and for the major classes of asset, will be of considerable benefit to the global financial system. Apart from helping to build trust and confidence in the valuation process among investors and others who rely on valuations, common standards will reduce the risks associated with national governments and regulators developing inconsistent regulation which in turn will reduce the costs and risks involved with cross border transactions.

Engagement with the regulatory community on valuation issues is therefore very much part of the IVSC's remit and it has regular dialogue with many of the global intergovernmental regulatory organisations such as the Financial Stability Board, the Basel Committee on Banking Supervision and IOSCO. It also engages with regional regulatory authorities, such as those established in the European Union.

## WHAT ARE THE INTERNATIONAL VALUATION STANDARDS?

The standards set requirements for the acceptance, undertaking and reporting of valuation assignments. Some core requirements are applicable to most types of asset or valuation purpose, whereas others may vary depending on the purpose for which the valuation is required or the type of asset being valued. The requirements in the standards consist of high level principles in order to enable them to be broadly applicable across different jurisdictions and valuation. The standards set requirements for the acceptance, undertaking and reporting of valuation assignments.



**International Valuation  
Standards Council**

### **RELATIONSHIP BETWEEN IVSC AND IASB.**

Both the IVSC and the IASB have a shared interest in the consistent measurement of fair value for financial reporting. Certain Standards issued by the IASB use fair value as a measurement basis. The IASB has also published IFRS 13 Fair Value Measurement, which sets out the principles for measuring fair value when it is required to be used in other financial reporting Standards. The IVSC issues standards valuation generally and facilitates collaboration and co-operation among its member organisations to help ensure consistent application of those standards.

The IFRS Foundation and the International Valuation Standards Council recently announced a joint statement of protocols for co-operation on the future development of International Financial Reporting Standards (IFRS) and International Valuation Standards (IVS).

The aim of the agreement is to ensure that both organisations are able to co-operate effectively in this important area with each organisation continuing to assume sole responsibility for their Standards.

#### **The statement of protocols:**

- captures and recognises the nature of the present and continuing co-operation between the IVSC and the IFRS Foundation in developing standards and guidance on fair value measurement that will support financial statements prepared in accordance with IFRS;
- identifies areas of mutually supportive work that each institution will use its best endeavours to undertake; and
- provides for continued future co-operation between the IVSC, the IASB and the IFRS Foundation.

### **WHAT ARE THE INTERNATIONAL VALUATION STANDARDS?**

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To help the consistent application of these principles the standards include non prescriptive guidance. Typically this might include matters that should be considered when preparing a valuation of a specific type of asset or for a particular purpose. While this guidance should be considered were applicable ultimately the decision on which approach to use remains one for the responsible valuer after careful consideration of the material facts.

### **WHEN DO THE STANDARDS APPLY?**

The question often arises as to when the International Valuation Standards are applicable. The role of the IVSC is to create the standards. When they apply is a matter for any party that adopts them, as is any sanction for a breach of the standards. In practice they are most useful where a valuation is likely to be relied upon by a third party or be subject to external scrutiny, such as by a regulator or auditor, and any situation where it is in the public interest that valuations are prepared in accordance with recognised standards.

### **Projects Relevant to Financial Firms**

The IVSC Standards Board currently has a number of projects that involve the valuation of



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or visit [www.ivsc.org](http://www.ivsc.org)

financial instruments or which are of interest to financial firms. In each case the objective is to provide information and guidance on the topic that will be relevant and helpful to those preparing valuations and to those receiving them. Providing guidance helps to set parameters for the valuation expert when exercising professional judgment; providing users with an explanation of the basic principles involved in valuations helps improve transparency and understanding, which in turn builds confidence. The guidance the IVSC produces should not be confused with or treated as teaching material – like the rest of the standards it deals with broadly applicable principles and is intended to be practical rather than academic.

#### **Credit/Debit Valuation Adjustments**

While the subject of credit and debit valuation adjustments is largely well understood within sell side institutions, many of whom have developed specialised teams on procedures for dealing with the adjustments. However, the advent of IFRS 13 means that the need to reflect own credit risk extends to any entity that holds derivatives and the IVSC guidance is aimed at explaining the principles and main methods used for calculating adjustments. An Exposure Draft of the proposed guidance was issued in late 2013 and following an analysis of the comments received and further discussion with interested parties, the Board expects to finalise and issue its guidance in the third quarter of 2014.

#### **Derivatives Valuation**

The Board intends to develop guidance on the valuation of derivatives. It has been decided to break this project down by underlying asset class, and the first paper to be developed is for the valuation of equity derivatives. An exposure draft was issued in July 2013. The feedback received on that has prompted the Board to make a number of changes to the tone and scope of the paper and it is planned to issue a further exposure draft for comment in mid 2014. Once the Board is happy with the general

scope and content of the paper it is intended to start work on similar guidance for other asset classes, ie interest rate, FX, credit and commodity derivatives.

#### **Funding Valuation Adjustments**

The issue of funding valuation adjustments has come to the fore in the last few years as banks have started to reflect the cost of funding uncollateralised positions, which was not generally reflected in the various methods used for valuing positions that used a risk free rate. However, there is significant controversy as to how and when this adjustment should be reflected. Some argue that making such adjustments to valuations appearing in financial statements is incompatible with the concept of fair value as defined under IFRS and US GAAP. Others believe there is scope for overlap and double counting with debit valuation adjustments. The Board has agreed a project to develop guidance around this topic and will be forming an expert group in the summer of 2014.

#### **Valuations for Recovery**

Financial regulators around the world are looking to align their regimes for the resolution and recovery of financial institutions in order to alleviate the “too big to fail” threat that was a feature of the 2008 crisis. In 2011 the FSB issued a paper “Key Attributes of Effective Resolution Regimes for Financial Institutions” that identifies that provisions for the valuation of an that assets of an institution in financial difficulty is an important element of any resolution regime. Prompted by the above and the lack of any internationally recognised valuation standards to support the recovery of any corporate entity, the Board has agreed a project to develop a standard to sit alongside its existing standards on valuations for financial reporting and valuations for secured lending. While not exclusively focussed on the financial sector, it is envisaged that a major part of the project will be to consider the valuation requirements that are appropriate under the emerging resolution regimes in the sector.



## Fair Value Pricing Survey, Eleventh Edition Finding The Formula That Fits

By **Paul Kraft**, U.S. Mutual Fund &  
Investment Adviser Practice Leader

**It goes without saying that there is no precise formula for determining fair value and performing related oversight. Those charged with valuation responsibilities have to do what any scientist in a lab would do: pursue a course of action, measure the results, and then refine the approach, taking into account changes in internal and external factors. Over the eleven years that we have conducted our annual Fair Value Pricing Survey, we have seen mutual fund firms continue to tweak their valuation efforts in search of the right formula. Along the way, we have catalogued both emerging practices and those that have matured into common industry processes.**

### **MORGAN KEEGAN SETTLEMENT RETURNS THE SPOTLIGHT TO VALUATION OVERSIGHT**

The omnipresent threat of regulatory action has long hovered over the valuation process — a threat that became real this past year, when one board's oversight formula was publicly challenged. In June, the former mutual fund directors of the Morgan Keegan Funds settled administrative charges brought by the U.S. Securities and Exchange Commission (SEC) regarding their oversight of pricing procedures. This case, which came after a series of other SEC enforcement actions, was more than a warning shot — it was the strongest signal yet that the SEC has fund directors firmly in its sights, holding them responsible for fair valuation decisions.

Against the backdrop of the Morgan Keegan case, this year's survey garnered the highest participation since we launched it in 2001: a record 96 mutual fund firms representing more than \$10 trillion in assets under management completed the survey.

A strong indication of how seriously fund boards are treating valuation issues after the case was evident from the fact that survey participants identified SEC enforcement actions as the most talked about valuation topic among board members outside of regularly scheduled meetings. These discussions, as well

**Figure 1**

<b>Types of valuation materials provided to the board</b>	
Back-testing results on foreign equities priced using a standardized fair value process	82%
Written valuation memo regarding fair value decisions	84%
Information on the valuation controls	81%
Analysis of impact on NAV of individual fair value decisions	64%
Information on the valuation disclosures and procedures for financial reporting purposes	64%
Fair value price compared to actual sale price upon disposition	57%
Calculations supporting fair value decisions	53%
Prices for illiquidly/thinly traded securities	53%
Value of each fair-valued position as a percentage of total investments	52%

as deliberations during regular board meetings gave directors opportunities to assess whether they needed to change elements, such as the timing and frequency of their oversight, the type and extent of materials being reviewed, and the level of delegation provided to others. These efforts bore fruit as this year's survey shows that changes have been made to valuation oversight practices.

Amongst other considerations, SEC enforcement actions have mutual funds stepping up their focus on fair value.

- Seventy-eight percent of survey participants indicated they changed their valuation policies and procedures over the last year
- Fifty-seven percent of survey participants have changed the level of detail in the valuation materials provided to the board
- Fifty-four percent of survey participants said they have changed the types of valuation materials provided to the board

Finding the right balance of information can require experimentation. Providing too much detail may create difficulties for board members in identifying salient points or relationships that may be obscured by the volume of data. Providing too little detail, on the other hand, may result in board members not being able to identify the key questions they should be asking. Whether fund boards decide to make changes to their oversight approach is, in the end, a matter of judgment. That judgment will likely be directly affected by the types of funds and the nature of investments they oversee, perceived valuation risks, and external

factors that impact fair value decisions. Apart from SEC enforcement actions, 34 percent of survey respondents identified trading halts as the second most popular subject prompting discussion among directors outside of regular meetings. Trading disruptions can affect the availability of security prices, and, as a consequence, can trigger the need for fair value determinations, particularly when trading halts extend past the time for fund net asset value (NAV) calculations. As technology glitches continue to plague securities exchanges, it appears likely that these issues will continue to demand attention from fund directors and management alike.

### **BALANCING RISK WITH EFFICIENCY**

The survey findings show that risk management remains an integral part of the valuation alchemy for many fund groups. More than half — 51 percent — of survey participants indicated that they had identified valuation risks for one or more specific investment types as part of their annual compliance reviews under rule 38a-1 or formal risk assessment process.

Almost six out of seven respondents (84 percent) reported that their fund's chief compliance officer (CCO) has a full-time presence at board meetings when valuation matters were discussed. CCOs were also more actively involved in identifying risks associated with the valuation of investment classes. Additionally, 58 percent of respondents noted that adviser compliance personnel also have full-time participation at such meetings.



There is also an indication that some fund groups adjust the timing, nature, and extent of their processes and internal controls based on the type of investment or macroeconomic data. For example, certain funds identify investment valuations requiring further scrutiny by customizing their procedures based on the presence of market-related events, such as movements in an underlying benchmark or changes in credit quality. This approach can be an efficient way to increase effectiveness because it allows fund groups to focus on instances that may be more susceptible to valuation risk, rather than relying on standardized triggers that apply broadly across the asset class.

Given the current business and regulatory environment, a thoughtful assessment of valuation risks allows fund groups to balance both effectiveness and efficiency. In this regard, 38 percent of survey participants indicated that they had conducted an analysis in the last year designed to identify ways to improve the efficiency of the valuation process and to reduce redundancies. More than 60 percent of these same survey participants increased automation in their valuation processes in the current year, suggesting there may indeed be a way to rethink the formula for processes and controls to generate better results overall.

### LOOKING AHEAD

We asked our survey participants to identify what they believe will be the most pressing valuation challenges over the next one to two years. Not surprisingly, navigating future actions, guidance, and expectations of the SEC was at the top of the list for many survey participants. There was a wide range of responses, but the most common are grouped below into these five main areas:

#### 1. Changes necessitated by SEC regulatory action

- Challenges in the regulatory arena include the uncertainties associated with the SEC's next action, including what it will say (e.g., how prescriptive its guidance or admonitions may be) and how it will say it (e.g., in an SEC speech, another enforcement action, or more formally through proposed industry-wide guidance). Given the complexities associated with valuations and the different practices followed within the industry, it will be important for the industry to continue to share its experiences and perspective in advance of any final SEC action.

#### 2. Pricing vendor oversight

- Pricing vendors continue to offer new asset class valuation products, as well as new tools to assist the industry in fulfilling its valuation responsibilities. This year, survey responses revealed an increased focus on transparency tools and how best to use them. These transparency tools can provide meaningful assistance to fund groups in determining whether to make price challenges, as well as aid in the overall understanding and assessment of a pricing vendor. With these potential benefits also come challenges, such as evaluating how frequently and formally to employ such tools and what steps funds may take in the valuation process when presented with contradictory evidence to the primary valuation.

#### 3. Managing the external audit process

- It can be difficult for fund groups to understand current external audit requirements and expectations for valuation testing. Gaining a full understanding of the external auditor's procedures is important, as well as being flexible enough to handle new audit requests arising because of changing requirements and expectations. Fund boards also need to ensure that they understand the benefits and limitations of the external audit in connection with their valuation responsibilities.

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or visit [www.deloitte.com](http://www.deloitte.com)

**4. Derivative valuations** - New asset classes have always created a degree of valuation risk. Derivatives are certainly no exception. Exchange-traded derivatives have historically been more straightforward from a valuation process, but the move to centrally cleared swaps has created a new dynamic for fund groups. Understanding the level of trading volume will likely be a factor in determining whether exchange-traded prices are reflective of fair value.

Over-the-counter derivatives can be a concern for fund groups when the instruments involve underlying securities that themselves are difficult to price. Accordingly, it remains very important for fund groups to truly understand the terms of the contracts and the inputs that are likely to affect the valuation. Fund groups holding more complicated derivatives may want to assess the benefit of having the necessary modelling skills in-house to value these instruments should markets and the environment change.

**5. Board reporting and oversight** - Even though we have seen industry practices coalesce in certain areas over the years, the governance and oversight structure that will function best very much depends on the particular circumstances of the fund group, and even to some extent, individual board members. Arriving at the appropriate mix of information, degree of director involvement, and overall delegation model can largely be driven by the size of the fund group and board, type and complexity of investments, and external factors impacting valuation risks. Changes resulting in greater oversight may be called for from time to time and yield beneficial results. This said, boards and fund management should also not shy away from discontinuing practices that are no longer effective. As with other areas, sustainability is a critical ingredient for success in the

governance and oversight arena, even when the regulator's spotlight turns up the heat.

Finding the right formula to address these and other challenges will require further exploration in the years ahead. The key will be anticipating and planning for future challenges, including building an infrastructure that is adaptable and flexible enough to address developments as they unfold.

#### CONCLUSION

This year's survey illuminates once more that valuation practices and processes are continually being refined in ways large and small. After all, valuation is an ongoing and iterative process — even when a fund finds the formula that fits, its investment setting and other factors can and often do change. Over the years, we have seen our survey respondents adjust to these changes, and we suspect that they will continue, particularly as the SEC steps up its focus.

#### Background

Deloitte's eleventh annual Fair Value Pricing Survey aggregates the views of 96 mutual fund firms and respondents hold more than \$10 trillion in assets under management. The population of survey participants represents a diverse mix of mutual fund firms encompassing various sizes, asset classes, and geographies. The survey took place between June and August 2013.



## VALUATIONS

[www.deloitte.co.uk/valuations](http://www.deloitte.co.uk/valuations)

**Deloitte's global valuation service provides access to a team of over 1,500 dedicated valuation professionals in all major geographic markets and jurisdictions.**

### WHAT DO WE OFFER?

#### Portfolio valuations

We provide regular valuation services to a number of funds, private equity firms and institutional investors in respect of their investment portfolios including underlying debt and equity investments, infrastructure, real estate and other unlisted, illiquid assets.

#### Financial instruments and structured products

We combine bespoke models, tools and software platforms to price and assess the full spectrum of financial instruments and structured products.

#### M&A and investment analysis

Our team assists management and stakeholders in transactions, strategic reviews and capital investment appraisals.

#### Reorganisation, turnaround and recapitalisation

We work closely with the our Reorganisation Services group to advise management, shareholders, debt providers, trustees and other creditors of businesses undergoing restructuring in respect of security valuation and value realisation strategies.

#### Litigation, expert determination and disputes

We often act as an expert witness, an independent expert appointed to determine

a value or an advisor to one of the parties in an expert determination. We work closely with Deloitte industry and technical specialists, to deliver solutions tailored to the specific circumstances of the matter.

#### Intellectual property and intangible assets

We have many years of experience in valuing intellectual property and intangible assets; dealing with the commercial and valuation issues unique to intellectual property and the related impact on shareholder value and financial reporting requirements.

#### Real estate and tangible assets

We frequently work alongside other teams across Deloitte which enables us to provide real insight to our clients and a truly differentiated service from traditional real estate valuers. We provide the full range of valuation services, whether supporting a real estate transaction or providing tangible asset insight into fair value reporting.

#### Fiscal valuations

We advise taxpayers on fiscal valuation in the context of corporate structuring, employee share schemes and transfer pricing. We work closely with tax professionals from Deloitte's global network to provide comprehensive and up-to-date advice on complex and changing domestic and international regulations as well as the interaction between different regulatory regimes.



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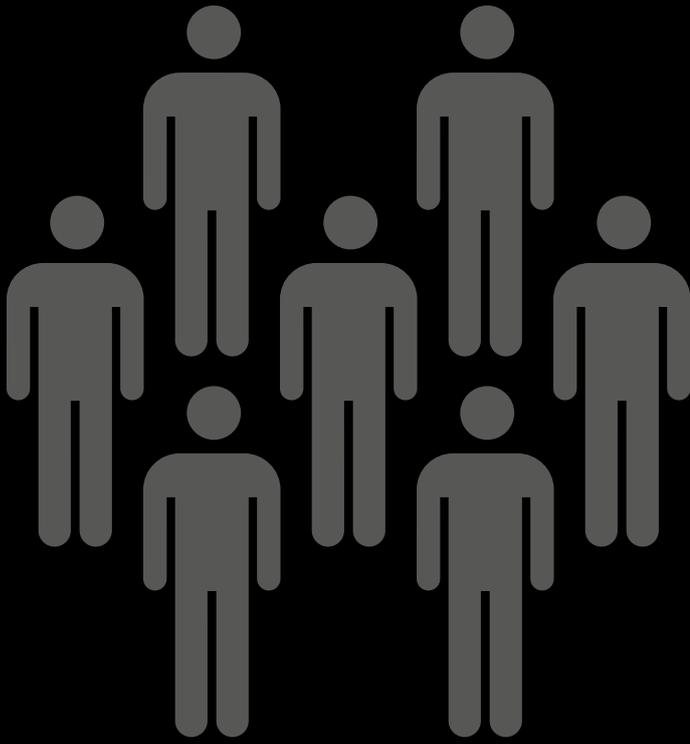
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## Standing out from the crowd

Deloitte is unafraid to challenge established conventions to achieve better results. It is not simply number crunching. Deloitte's Valuation team combines a wide range of expertise in highly effective ways to form robust opinions – standing out through the impact we have on the reputation and success of our clients.



Doug McPhee



Matthew Warren

## AIFMD: Prepare for takeoff

By **Doug McPhee**, Global Head of Valuation Services at KPMG and Member of the International Valuation Standards Council's Professional Board and **Matthew Warren**, Director and AIFMD subject matter expert for Valuations at KPMG in the UK.

**When the European Commission introduced the Alternative Investment Fund Managers Directive (AIFMD), it drafted one of the most ambitious and complex regulatory reform agendas ever introduced into the asset management industry.**

Amongst many reforms, the Directive provides a detailed valuation framework, including requirements for detailed valuation policy and procedures to be applied consistently across all alternative investment funds (AIFs) and requirements for competence and independence of personnel performing valuation functions. This requires close attention by Alternative Investment Fund Managers (AIFMs).

There are a number of challenges AIFMs face in order to satisfy the Directive on valuation. Here we focus on some of the more pressing areas that will impact AIFMs.

### INDEPENDENT VALUATION

AIFMs are required to ensure that the valuation function pertaining to the investments they manage on behalf of investors is carried out impartially and with skill, care and diligence, either by an independent external valuer or by the AIFM itself.

The requirement for impartiality brings challenges for AIFMs. For instance, for AIFMs undertaking valuations internally, the Directive requires that those responsible for valuation be independent from portfolio management teams, yet have equivalent knowledge, experience and level in management hierarchy as those in portfolio management in order to appropriately challenge key valuation matters.

This relates to both those overseeing the valuation function and undertaking valuation analyses. As such, “lending” staff from portfolio management to an internal valuation function will most likely be challenged by regulators. For many AIFMs, building an independent valuation function with the requisite knowledge of the underlying investments will be challenging. This will be increasingly challenging for AIFMs that do not readily have a larger pool of sufficiently experienced resource.

Regulators may also require that an external valuer verify the independence of the internal valuation function and an AIFM may wish to include such confirmations in its regulatory submissions.

An AIFM could alternatively appoint an external valuer (which has no link to the portfolio management function of the AIFM or the AIF, and is not appointed by the portfolio managers) to undertake the valuation function. Whilst the appointment of an external valuer will not affect an AIFM's liability to an AIF, the external valuer will be liable to the AIFM for any losses suffered by the AIFM as a result of the external valuer's negligence or intentional failure to perform its tasks.

## VALUATION POLICIES AND PROCEDURES

For each AIF it manages, an AIFM must establish, maintain, implement and review Valuation Policies and Procedures (VP&Ps) that ensure sound, transparent, comprehensive and appropriately documented valuation processes. VP&Ps should include:

- The AIF's investment strategy and assets it may invest in;
- The valuation methodologies used for each asset type and the selection process for each methodology;
- Obligations, roles and responsibilities of all parties in the valuation process (including external valuers);
- Details of the competence and independence of those doing the valuations; and
- Escalation channels for resolving issues in asset values.

VP&Ps should be reviewed at least annually and, in any event, before an AIF engages in a new asset type. An AIF may not invest in a particular asset type before a valuation methodology for that asset type has been included in the VP&Ps.

The AIFM's risk management function should review the VP&Ps and senior management should review and approve all VP&P changes.

AIFMs also need to implement sufficient governance to ensure that there is no disconnect between the documentation and implementation of the VP&Ps.

## USE OF VALUATION MODELS

AIFMD requires that the main features of all valuation models be documented in the VP&Ps. Before being applied, a model must be validated by a competent and experienced person who has not been involved in building the model and be approved by senior AIFM management. Again, the regulator may require an independent audit on applied models.

This presents potential challenges for AIFMs, particularly when investing in more illiquid assets where bespoke and complex models are developed that evolve over time. As such, AIFMs will need to ensure there is sufficient governance around model validation, update procedures, version controls and documentation.

## WHAT QUESTIONS SHOULD AIFMS BE ASKING?

If you have not already done so, there are a number of valuation-related questions that AIFMs should be considering now:

- If performing valuations internally:
  - Do we have sufficient qualified individuals that are separate to portfolio management in order to deliver impartial valuations?
  - Do we have sufficient governance to support the delivery of objective valuations?
- If using an external valuer:
  - Have we performed the necessary diligence on external valuers to be satisfied of their competence?



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- Are there sufficient information transfer and governance processes in place to ensure an efficient process?
- Have we ensured that the external valuer does not delegate any of the valuation work to a third party?
- Do we have sufficient governance structures around proprietary valuation models (particularly model validation, version control and model updates)?
- Do our VP&Ps contain sufficient detail and are we putting our VP&Ps into practice?

#### **WHAT SHOULD I DO NEXT?**

AIFMs that have not already conducted an in-depth AIFM impact and readiness assessment should do so without delay. The timelines to compliance are increasingly short and by undertaking such an assessment, AIFMs will get a better sense of the implications and the scope of the work that needs to be done in order to not only comply with the Directive, but to maintain long-term profitability under these new rules.

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cutting through complexity

# Do you need to know what **your business assets are worth?**

Companies seek valuations for corporate governance or regulatory reasons, or because management wants to better understand value so it can make optimal decisions. In these instances, a company is often at a critical juncture – it may be planning an acquisition, resolving a shareholder or joint venture dispute, or seeking to reduce the gap between intrinsic and market value. At such a strategic time, it makes sense to seek the services of an experienced commercial valuations team.

KPMG's Valuation Services teams have the technical skills and practical deal experience to provide objective, independent advice. KPMG member firms' professionals recognize that a valuation is not a simple numbers exercise. Our approach is to focus management's attention on many of the key transactional or strategic issues that can help generate shareholder value.

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# Quantifi Deloitte.



D Pugachevsky



R Douglas



R Bedau

## IFRS 13 – Accounting for CVA & DVA

By **Dr Dmitry Pugachevsky** (Quantifi),  
**Rohan Douglas** (Quantifi)  
and **Dr Roman Bedau** (Deloitte)

**IFRS 13 “Fair Value Measurement” became effective 1st of January 2013. The International Accounting Standards Board (IASB) issued IFRS (International Financial Reporting Standards) 13 in May 2011 to improve the consistency of fair value measurements. IFRS 13 establishes a single source of guidance for fair value measurements for all financial instruments. It clarifies the definition of fair value in general as an exit price and enhances disclosures about all fair value measurements.**

The definitions (*see table 1*) are not entity specific and are applied from the perspective of market participants. Therefore, it is necessary for the measurements to take into account all risk factors that influence the fair value.

<b>FAIR VALUE</b>
The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.
<b>ACTIVE MARKET</b>
A market in which transactions for the asset or liability take place with sufficient frequency and volume to provide pricing information on an ongoing basis.
<b>EXIT PRICE</b>
The price that would be received to sell an asset or paid to transfer a liability.
<b>MOST ADVANTAGEOUS MARKET</b>
The market that maximizes the amount that would be received to sell the asset or minimizes the amount that would be paid to transfer the liability, after taking into account transaction costs and transport costs.
<b>PRINCIPAL MARKET</b>
The market with the greatest volume and level of activity for the asset or liability.

**Table 1:** Key definitions  
– excerpt from [IFRS 13:  
Appendix A]

In this context, the pricing of OTC derivatives still constitutes a complex and challenging task as it has already been under IAS 39.

According to IFRS 13, model-based fair value measurements have to take into account all risk factors that market participants would consider, including credit risk i.e. the counterparty risk for OTC financial products. In order to reflect the credit risk of the counterparty in an OTC-derivative transaction, an adjustment of its valuation has to be made. Therefore, not only does the market value of the counterparty's credit risk (CVA) need to be taken into account, but also the company's own counterparty credit risk (debit valuation adjustment - DVA) has to be considered in order to calculate the correct fair value.

Bilateral CVA<sup>1</sup> adjusts the fair value to account for expected losses that result from the default of the counterparty and the company itself (CVA should be evaluated at the netting set level per counterparty). A comprehensive evaluation needs to take into account the time dependent dynamics of the derivatives' market values as well as an estimate for the probability of default of both contractual partners. Potential correlations between both should be factored into the model too. More common practical approaches waive complex correlation structures and reduce the problem of quantification for the following statistical values:

*The expected exposure (EE) determines the losses of the surviving contractual party should the counterparty become insolvent. Notably the expected exposure covers collateral agreements defined in the credit support annex (CSA) as well as netting agreements. The best practice methods which determine the expected exposure are Monte-Carlo simulations. Alternatively, less computationally intensive methods based on simpler approximations such as the current exposure with an appropriate add-on term may be applied.*

Probabilities of default (PD) and loss given default (LGD) provide an estimation of the probability of a counterparty's defaults over time. This information can be derived from market noted credit default swap spreads. Additionally, market implicit information can be used to determine the LGD.

## CALCULATING CVA

There is a relatively straightforward approach, occasionally referred to as Quasi CVA, whereby the counterparty credit spread is added to the discount curve applied to the cashflow values of the contract. For example, to evaluate Quasi CVA for 5-year swap, which receives a floating rate of 2% and pays a fixed coupon of 4% for a counterparty with credit spread 3%, one has first to discount cashflows at riskless interest rate (2%), discount them at risk carrying rate (5% = 2% + 3%) and then capture the difference between these two valuations. Note that this method only provides a reasonable approximation of the CVA for instruments with positive cashflows or trades heavily in-the-money. By oversimplifying the calculation, Quasi CVA methodology excludes certain key considerations, for example:

- **Default losses can be incurred if future MTM is positive, even if current MTM is negative**
- **Market volatility**
- **Bilateral character of CVA (DVA)**
- **Non-linear probability of default and effect of counterparty recovery rate**
- **Wrong way risk**
- **Effects of netting and CSA**

The reason that at-the-money or even out-of-the-money swaps produce a non-zero CVA is because CVA is an expectation of future losses, which are incurred by the bank if the counterparty defaults when MTM of the trade is positive. Therefore, CVA is proportional to a zero-strike call option on a future MTM, referred to as Expected Exposure (EE). In general, the exposure of the trade always depends on volatilities of underlying assets, even if the trade itself does not.

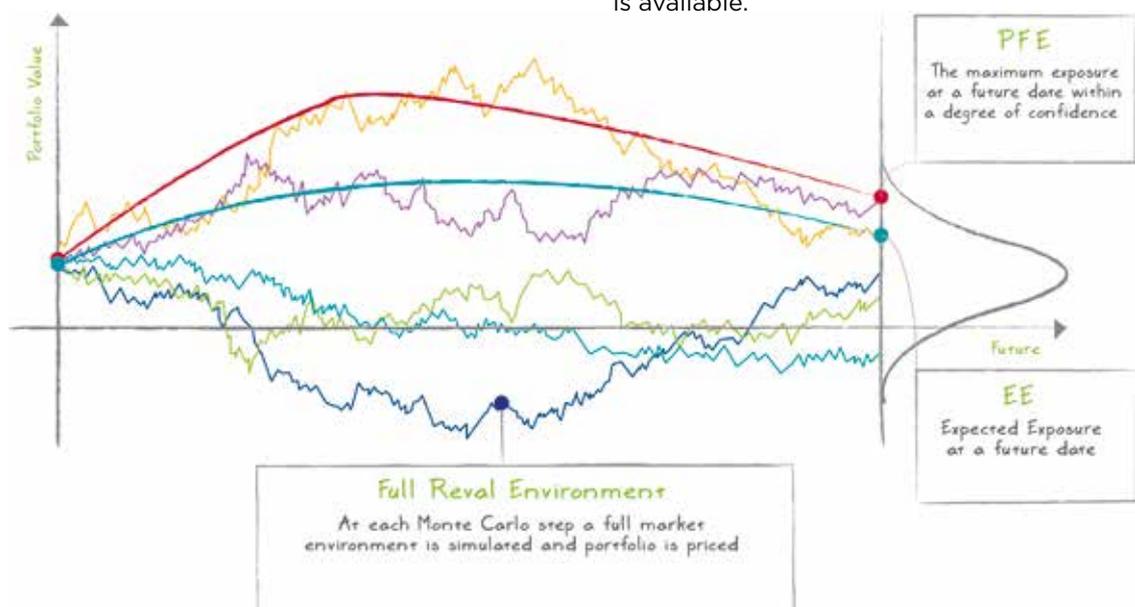
When calculating exposures for simple stand-alone instruments like swaps and forwards, one can use European swaptions priced with Black's formula. However, taking into account netting and collateral requires performing multiple valuations under a host of different scenarios. This allows netted exposure profiles, for any given portfolio of contracts, to be calculated and for collateral to be applied consistently, therefore reducing potential exposure for both counterparties.

<sup>1</sup>The bilateral CVA is calculated by netting CVA and DVA.

Specific collateral features to take into consideration include:

- **Independent amounts**
- **Threshold amounts**
- **Minimum transfer amounts**
- **Call period (frequency at which collateral is monitored)**
- **Cure period (the period of time given to close out and re-hedge a position)**
- **For trades cleared through a central clearing counterparty (CCP), risk specific to that CCP must be considered**

Consistent CVA evaluation involves running a Monte Carlo simulation of the market dynamics underlying the valuation of each financial instrument or portfolio. Each market scenario is a realisation of a set of price factors, which affect the value of the financial instrument; for example foreign exchange rates, interest rates, commodity prices, etc. Scenarios are either generated under the real probability measure, where both drifts and volatilities are calibrated to the historical data of the factors, or under the risk-neutral measure, where drifts must be calibrated to ensure there is no arbitrage of traded securities on the price factors. In addition, volatilities should be calibrated to match market-implied volatilities of options on price factors where such information is available.



Having calculated the EE profile, CVA is calculated by multiplying the EE with the probability of default (PD) and loss given default (LGD). CVA can also be approximated by multiplying the average of the EE, the so called Expected Positive Exposure (EPE), by

the credit spread and risky annuity. There are several techniques to obtain the credit spread, although the current Basel III requirement is to use CDS credit spreads of the counterparty or its proxy (see footnote 2).

<sup>2</sup>N.B. according to IFRS 13.67 those parameters are preferred, which are observable and close to the market.

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Note that the same Monte Carlo simulation can be used for calculating PFE (Potential Future Exposure) and EEPE (Expected Effective Positive Exposure). While PFE is important for calculating Economic Capital and setting internal limits for trading desks, EEPE is part of IMM (Internal Model Method) calculations for deriving RWA (Risk Weighted Asset). Therefore, by building comprehensive Monte Carlo models, consistent valuations for regulatory, accounting and internal limit purposes can be achieved.

The Fair Value adjustment for bilateral credit risk equals risk free valuation, minus CVA plus DVA. Therefore, to complete the calculation one must offset the CVA by the DVA. The DVA is calculated by taking into account the opposite side of the exposure profile (CVA from the counterparty's perspective). This can be achieved by calculating the Expected Negative Exposure, which can be performed during the same Monte Carlo run without any extra expenditure of time. Common market practice involves taking into account correlation between own and counterparty defaults. This is achieved by either using separate copula-like calculations or as part of a general wrong-way risk set-up. The latter approach makes it easier to incorporate correlations between own default, counterparty default and market factors.

#### **MARKET SUMMARY**

With the introduction of IFRS 13, the requirement to calculate complex variables, such as CVA and DVA remains. The introduction of IFRS13 will have significant implications for all firms, including corporates and those in the financial services sector that measure financial assets at fair value.



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## IFRS & AIFMD - MANAGING FAIR VALUE PRICING & THE TRANSPARENCY PARADIGM

**Jayme Fagas**, Global Head of Evaluated Pricing

**The spate of recent and upcoming regulations focused on valuations, pricing transparency and disclosure pose enormous challenges for the global financial services industry. Overall, the focus is on enhancing visibility into how financial markets function, and identifying and measuring systemic and institution-specific risks. For market participants, the key to complying with these changes lies in timely, accurate and transparent pricing and reference data.**

### MEETING THE DATA CHALLENGES

The post-crisis regulatory reform agenda shares common themes: robust asset and liability valuations, detailed risk assessment and stringent reporting responsibilities, underpinned by a doctrine of transparency.

The quality, integrity and transparency of an institution's pricing and reference data in particular will determine its ability to meet the onerous risk assessment and regulatory reporting requirements being enacted.

This emphasis on transparency focuses on substantiating the underlying methodologies; granular data inputs that go into formulating the prices of different asset types, positions and risk calculations that are reported.

### EVEN MORE TRANSPARENCY AND DISCLOSURE

Various regulations including Dodd-Frank, EMIR, UCITS and last but by no means least the AIFMD (The Alternative Investment Fund Managers Directive) – aim to increase transparency and disclosure of exposures to financial markets.

For example, the Form PF rule in the United States calls on registered private fund advisers (hedge funds, private equity funds and liquidity funds) to furnish regulators with regular,



detailed reports covering many areas of their businesses and activities. By enhancing transparency, the rule seeks to help supervisors monitor the buildup of risk in the system. Given the onus put on these disclosures, report inaccuracies or omissions could result in significant reputational, legal and financial damages.

On October 1st 2013, ESMA published guidelines on the reporting obligations for Alternative Investment Fund Managers (AIFMs), together with an opinion setting out supplementary information that should be reported for systemic risk monitoring.

The scope of the AIFMD is wide and, with a few exceptions, covers the management and administration of Alternative Investment Funds (AIFs). Its focus is on regulating the AIFM rather than AIFs.

The AIFMD was established as an EU-wide framework for monitoring and supervising risks posed by AIFMs and the AIFs they manage, and for strengthening the internal market in alternative funds.

#### **The objectives of the AIFMD are:**

- To improve supervisory practices among EEA (European Economic Area) competent authorities to support timely and pre-emptive action to limit market instability and the build-up of systemic risk in the European financial system
- To improve customer protection by imposing new depositary standards, enhanced transparency through new investor disclosure rules and mandatory reporting to competent authorities
- To foster efficiency, cross-border competition by deregulating national barriers and creating level playing fields through harmonized rules

Common requirements for the AIFMD and related regulations are crucial in achieving compliance, primarily the need for accurate, verifiable pricing and valuation data that adheres to fair value disclosure provisions. Robust and consistent data inputs serve as the foundations of the reporting process, since it is this data that feeds the downstream calculations regulators use when conducting their risk assessments.

#### **TIGHTER ACCOUNTING STANDARDS**

The way in which institutions must measure and disclose the value of their assets and liabilities has been redefined, standardized under the revised accounting rules developed by the US Financial Accounting Standards Board (Topic 820) and International Accounting Standards Board (IFRS 13 Fair Value Measurement).

The accounting standards provide a consistent definition of fair value, require the categorization of assets and liabilities changes make calculations subject to a “Fair Value Hierarchy,” which requires firms to categorize assets into one of three levels, based on the inputs used (“Fair Value Hierarchy”).

***“ The aim of IFRS 13 is to introduce a consistent global definition of fair value, along with enhanced disclosures for how fair value is measured.”***

#### **IMPACT ON INVESTMENT FUNDS**

Under IFRS (International Financial Reporting Standards) 13, investment management organizations, and where applicable their service providers, will be required to measure assets and liabilities using the new, standardized definition of fair value. Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (i.e. an exit price). Fund accounting and fund administration functions are likely to be particularly affected by these changes, potentially requiring updates to systems and controls to ensure data is captured, processed and reported in accordance with the new standard.



### TOPIC 820 AND IFRS 13 FAIR VALUE HIERARCHY

Entities should maximize use of observable inputs and minimize unobservable inputs when determining the fair value of assets and liabilities.

- **Level 1** – Quoted prices in active markets for identical assets/ liabilities (applicable for most exchange-traded instruments)
- **Level 2** – Inputs that are either directly or indirectly observable for the asset/ liability (other than quoted prices included within Level 1)
- **Level 3** – Fair value derived from unobservable inputs, involving significant investigation and judgment (typically applies to complex and/or illiquid securities)

### FINDING THE RIGHT MEASUREMENT

Meeting the fair value requirement is relatively straightforward where entities invest in securities traded on-exchange or in active markets, since an exit price is readily available. The process is more challenging when investing in complex, Over The Counter (OTC) and/or illiquid assets. The institution must then use a transparent valuation technique to establish the transaction price on the measurement date

***“IFRS 13 also enhances market participants’ disclosure obligations regarding fair value measurements, requiring entities to outline the valuation techniques and inputs used to arrive at those measurements.”***

The best indicator of the fair value of an asset/liability is a quoted price in an active market (Level 1). If no published price in an active market is available, the fund must use a valuation technique to establish the transaction price on measurement date. This valuation technique must use observable inputs wherever possible.

For traditional asset managers that tend to invest in securities traded on-exchange or in active markets where an exit price is readily available, meeting the fair value measurement requirement will be relatively simple.

The process becomes more complex for entities such as hedge funds and private equity funds that invest in complex and/or illiquid assets. Some of these instrument types, such as interest rate swaps, will benefit from well-established valuation models and a preponderance of observable inputs.

Furthermore other assets – for example certain structured products, OTC derivatives, unlisted papers will depend primarily on unobservable inputs, where significant investigation and judgment is involved in reaching a fair value measurement.

### APPLYING TRANSPARENT REPORTING

IFRS 13 also enhances market participants’ disclosure obligations regarding fair value measurements, requiring entities to outline the valuation techniques and inputs used to arrive at those measurements. This is particularly relevant in the case of Level 3 unobservable inputs, where disclosures will need to include detailed quantitative and descriptive information in order to provide transparency into the inputs and calculations used in determining a valuation.

For investment funds and fund administrators the added disclosure requirements may necessitate changes or enhancements to their fund reporting systems and processes.



Fund administrators in particular will need to be mindful that they leverage robust and comprehensive pricing data sources, and have sophisticated reporting capabilities, since they have to meet the different reporting responsibilities of the array of clients they serve.

Remaining disparities between the IFRS and US GAAP standards further complicate the processes. Funds and fund administrators, that calculate and report valuations under both standards will need to use high quality data sources and flexible infrastructures that accommodate the relevant pricing methodologies, and so enable the organizations to meet the different accounting requirements.

### COMMON REGULATORY REQUIREMENTS

#### ALTERNATIVE INVESTMENT TRANSPARENCY (FORM PF/AIFMD)

Purpose	Obligations
Enhance transparency to help regulators monitor systemic risk.	Submit regular reports detailing investment positions and exposures, using accurate and verifiable data.

#### Data Requirements

To populate their regulatory reports, and meet the tight filing deadlines, alternative investment firms need ready access to reliable, timely and transparent pricing and valuation data for relevant instruments. Only by using robust and verifiable source data that meets the fair value accounting standards can firms accurately determine their aggregate positions and exposures.

#### ACCOUNTING STANDARDS (ASC TOPIC 820, IFRS 13)

Purpose	Obligations
<ul style="list-style-type: none"> <li>Harmonize fair value measurement and disclosures</li> <li>Increase consistency and comparability in fair value measurements, especially in markets where trading activity is low</li> </ul>	<ul style="list-style-type: none"> <li>Defines fair value on the basis of a bid price (price to sell)</li> <li>Distinguishes fair values derived from exchange-traded financial instruments from non-observable market inputs, using a Level 1-3 pricing hierarchy</li> </ul>

#### Data Requirements

To comply with the requirements for each of the three levels set out in the Fair Value Hierarchy, institutions need access to a trusted source of fair value measurements, able to deliver:

- Latest quoted prices from listed markets
- Observed, reported prices from trusted market participants
- Robust evaluated prices for illiquid and harder-to-value securities, backed by detailed quantitative and descriptive information to provide transparency into the inputs and calculation methodology used

***“ ... it is ever more important therefore that market participants develop relationships with trusted data partners ... ”***



### THE VALUE OF TRUSTED PARTNERSHIPS

Non-compliance presents huge reputational, and potentially financial risks for organizations. With the cost and complexity of regulation escalating, it is ever more important therefore that market participants develop relationships with trusted data partners to help them navigate this evolving landscape.

### CAPABILITIES TO LOOK FOR IN A DATA PROVIDER

- **Pricing Scope** – An extensive and scalable listed markets and evaluated pricing service that can accurately price the full spectrum of assets, backed by knowledgeable staff and the technological capacity to value new and esoteric instruments as they emerge.
- **Transparency** – Meeting accounting disclosure requirements and other regulatory mandates demands a transparent process and workflow for collecting and reporting data, particularly valuations, in a consistent and auditable manner. This includes disclosure of the methodologies used, and an ability to drill down into the inputs to understand how a securities valuation was calculated.
- **Customer Service** – Having easy access to market experts who can explain how an instrument has been priced will ensure customers have confidence in the prices they use.
- **Responsiveness** – Providing clients with a rapid turnaround time to their pricing requests depends on having a combination of the right people, tools and market data.

- **Reference Data Coverage** – Understanding the attributes and associated risk profile of a firm's securities holdings is a vital part of regulatory-mandated calculations. Given the fragmentation of global markets, and proliferation of instruments and identification codes, a data provider's capabilities need to include support of all reference data standards, including new identifiers (e.g. LEIs and CICIs) and classifications.
- **Global Reach** – Evaluations and reference data support depend on in-depth jurisdictional knowledge of local financial markets. Partnering with a data provider that has a global on-the-ground presence and a wealth of local market expertise is crucial in ensuring user firms can meet regulators' and trading counterparties' demands.

Under IFRS 13 & AIFMD eligible market participants will need a data provider with a range of attributes such as:

#### Coverage Breadth

A provider with the ability to price the full range of securities in which a fund invests is vital if the investment organization is to avoid relying on a medley of pricing services. This breadth of coverage must be both geographically expansive and encompass the entire Level 1-3 fair value hierarchy. Having access to the full universe of securities pricing information is especially important for fund administrators that need to support the varied reporting obligations of their clients.

The IFRS 13 fair value framework also specifies that each transaction should take place in the asset or liability's principal market, or where no principal market exists in the most advantageous one.



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### Input Quality

IFRS 13 shines a spotlight on the inputs used to price all financial instruments, wherever they fall in the fair value hierarchy. Being able to demonstrate adherence to fair value best practices – that the valuations used are accurate and are derived from robust and transparent processes, especially for Level 3 calculations – is essential.

Quality of controls is also important. The IFRS 13 standard will result in more transfer of information from data vendors to clients. Since there is more transfer of information, there needs to be more due diligence around that information. The onus on data providers is to ensure they can provide clients with high quality prices that are calculated in a rigorously controlled SAS 70 compliant environment in order to mitigate operational risk within the service provider's infrastructure.

***“ A provider with the ability to price the full range of securities in which a fund invests is vital if the investment organization is to avoid relying on a medley of pricing services.”***

### Pricing Frequency

Reporting under IFRS 13 will be quarterly, and so data providers need the capacity to value the entire universe of securities on a regular basis.

In addition, Level 3 assets require activity to be reconciled throughout the period, to show Level 3 assets at the beginning of the period, the changes inter-period and the ending balances. End-of-period pricing will be insufficient. Rather, the ability to deliver prices for hard-to-value assets on a daily or more frequent basis will be vital for reporting entities such as hedge funds that need to capture this inter-period activity.



Flash for more insights on the challenges of the pricing and reference data community on [www.prdcpmmunity.com](http://www.prdcpmmunity.com)

# PRESERVE CAPITAL AS THE BUSINESS CYCLE SHIFTS

An invaluable guide for investors in today's post-crisis landscape

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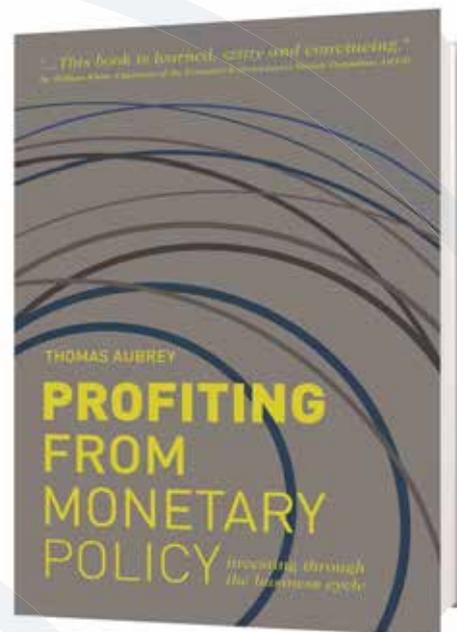
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The Financial Crisis has brought the pensions time bomb centre stage due to a decade of low returns increasing unfunded pension liabilities and lowering future retirement incomes. This is because most investors have been unable to avoid the substantial volatility in asset prices and capital destruction that has accompanied the business cycle. Until investors reject the prevailing monetary policy consensus as an investment framework based on price stability and general equilibrium, pension schemes will continue to suffer poor returns due to periodic downturns.

*Profiting from Monetary Policy* is a highly innovative book that provides new insights on the business cycle and exposes the flaws in current monetary policy. It advocates a new, credit-based framework which can provide investors with the returns they need whilst eliminating the volatility that has plagued the industry in recent years, and will prove to be an invaluable guide for investors in today's post-crisis landscape.

*Profiting from Monetary Policy: Investing Through the Business Cycle* by Thomas Aubrey  
Hardcover | 9781137289698 | £19.99 / \$30.00



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The background of the image is a blurred financial chart. It features a grid with various data series, including a candlestick chart at the top and a bar chart at the bottom. A dark purple horizontal band is superimposed over the middle of the chart, containing the text 'VALUATIONS USER SURVEY' in white, uppercase letters. The overall aesthetic is professional and data-oriented.

# VALUATIONS USER SURVEY



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**According to Christian Noyer, Governor of the Banque de France, the recent credit crisis had its roots in valuation. A lack of confidence in the value of assets such as US mortgage bonds resulted in an unwillingness to lend or trade, and a consequent collapse in liquidity in the global financial system. This issue was compounded by the development and use of more complex financial products such as derivatives – memorably termed ‘financial weapons of mass destruction’ by Warren Buffett - which accentuated both the valuation problem and the fallout from failing to do it properly.**

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The centrality of valuation in promoting the stability of the financial system was never more evident, and its role in the crisis has generated increased scrutiny from regulators, accountants and industry bodies, and proposals of new rules governing valuations of assets. We have covered the emerging regulatory and standards landscape in the first section of this Handbook, and it is fair to say that whilst there are a multitude of rules and regulations, there are consistent themes across them – fair value, mark to market, independence and transparency all feature in most cases.

There are as many different sources and methods for asset valuations as there are regulations (we cover the pros and cons of these in the next section), and financial firms need to choose the best approach to meet their regulatory, accounting and internal risk management obligations. Trade prices, dealer quotes, composite pricing, evaluations and models all have their uses depending on the asset type, its liquidity and the purpose to which the valuation is to be put.

The practical challenge for users of valuations is to choose the right method for the right asset based on their own requirements and those who oversee them. This section reports the results of a user survey performed by us looking at how firms are addressing these challenges.

## METHODOLOGY

During May 2014, Voltaire Advisors asked 220 valuations users ten questions on key issues related to their practical experience of valuation (*see Appendix*). These ‘users’ were selected as being directly responsible for valuations processes and/or policy in their firm. Whilst recognizing that there are valuation quandaries even in the exchange traded and liquid markets, to ensure the relevance of these results to the most problematic areas, we focused out attention on the more complex or illiquid aspects of the OTC markets.

The survey set out to assess how users approached valuations, how they use different sources across different asset classes, the frequency with which valuations are performed and the volumes they need to deal with, the regulations and standards with which they need to comply whilst carrying out their duties and the attributes they are looking for from valuation vendors.

The size and geographical breadth of the sample allow us to draw some important and illuminating conclusions about the practical business of valuation in financial institutions today.

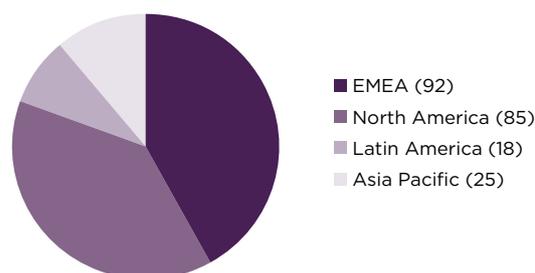
## SURVEY RESULTS

The first three questions of the survey endeavoured to place the results in a geographical and user context. It is to be expected that there will be differences in emphasis in each case, dependent on the regional or industry specific regulations (or lack of them!), but the key features of valuations users are generally consistent and increasingly convergent.

### Geographical Breakdown (Q1)

The location of valuation users is important because of different market structures in which they operate and different historical approaches to regulation of the local financial industry. Our survey was strongly focused on the main markets in Europe and North America, but we also include some representation from Latin America and Asia Pacific.

### GEOGRAPHICAL BREAKDOWN



The US, for instance, is the largest market for evaluated prices. The existence of large and diverse markets for mortgage related products and municipal bonds, many of which are thinly traded, has had some influence in this, but the main driver has been regulation. The regulatory regime in the US is strongly ‘rules based’ and prescriptive, often specifically requiring the use of ‘fair valuation’ and independent valuation sources. This is particularly apparent in the mutual fund industry covered by the ‘40 Act’. The interpretation and implementation of this law over the last few decades has led to the development of a unique sub-sector of the valuations business dedicated to servicing mutual funds in a time sensitive fashion and at a premium tariff.

The European region has historically been a dealer/contributed pricing market due to much looser regulatory oversight with ‘principles based’ regimes. This is changing however with pan-European initiatives such as MiFID and the implementation of more stringent valuation standards in accounts.

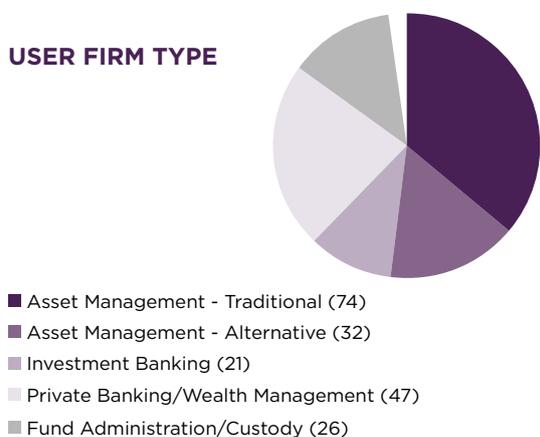
There is now much more attention paid to independent pricing sources and there is every reason to believe that the European market could grow to be as large as that of the US over the next few years.

Both Latin America and Asia Pacific are mostly in earlier stages of development, and valuations oversight has frequently been less robust than in the larger financial world. As these markets mature they have tended to abide increasingly with widely accepted global valuation standards (such as IFRS), both to increase the attractiveness of their financial products to global investors and to extend tougher consumer protection to local investors to promote more confidence in the financial system.

### User Type (Q2)

In addition to geography, the other main segmentation of user lies with the type of institution they represent. In the same way that different countries have distinct market structures and regulatory regimes, so different financial firm types are subject to varying rules and standards.

#### USER FIRM TYPE



The major segmentations here is between asset managers (buy side), banks and securities firms (sell side) and intermediaries and administrators (third parties) to whom many buy and sell side middle and back office functions are outsourced. Within these broad categories, we have also distinguished between traditional asset managers (investment funds, life insurers and pension funds) and alternatives (Hedge Funds and Private Equity) and also investment banks and private banks (who tend towards the buy-side with their wealth management functions). The small 'other' category encompasses a few large corporate users.

The buy and sell side can be seen as the ultimate 'end user' of the valuation, usually with final responsibility as to its accuracy. Administrators and servicers typically pass through the valuation and do not usually have any final sign off on its accuracy or appropriateness other than a level of QA due diligence (often specified by the end user). Dealers, of course, can also be 'producers' of valuations, with dealer quotes a widely deployed method for valuation of these types of assets.

There tends to be a difference in emphasis of the valuation oversight at these firms, with those managing client money heavily influenced by investor protection concerns, whilst the banks focus tends to be on risk management and financial stability issues.

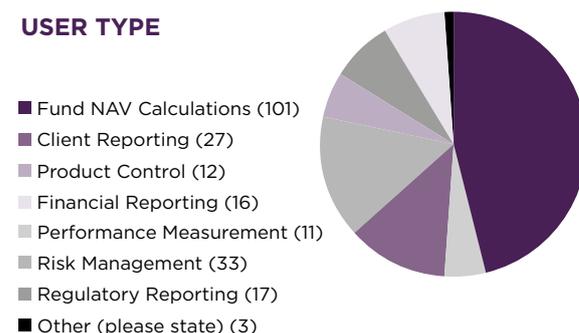
With a broad cross-section of different users, we get a wide perspective on the business of valuations in the various industry sectors. Our survey was heavily skewed towards the buy-side, who tend to be the main purchasers of external pricing to achieve an independent benchmark.

### Use Type (Q3)

In addition to the segmentation of user type, we also looked at differentiating the use to which valuations were put.

As mentioned in the section above, valuations used for client reporting, for instance, (fund NAV calculations, broker client statements, performance measurement etc.) tend to be overseen with regard to consumer protection. In such a case, the avoidance of fraud or conflicts of interest are paramount. Those valuations used for a firm's internal purposes (position and P&L reporting, bank capital calculations, repo and collateral management) tend to focus on the management of risk and financial stability. Each of these uses is governed by its own set of rules and standards.

#### USER TYPE



Reflecting the skew of our user types towards the buy-side, a large proportion of our survey were using their valuations for Fund Net Asset Value (NAV) creation. This use occurs not just with the asset managers, but also the fund administrators to whom this function is frequently outsourced.

On the sell-side, and in many Hedge Funds, risk management was the primary objective, and it can be assumed that, with the deployment of regulations such as Solvency II, Basel III and the like, post-Financial Crisis, risk management will assume an increasing importance for a wider variety of firms.

#### Valuation Methods & Sources (Q4)

Survey participants were asked what primary method they used to value specified asset classes choosing between an internal model or method, dealer or counterparty marks or external vendor pricing. There are sure to be variations within these broad categories, but we were interested in establishing the general trends for valuation.

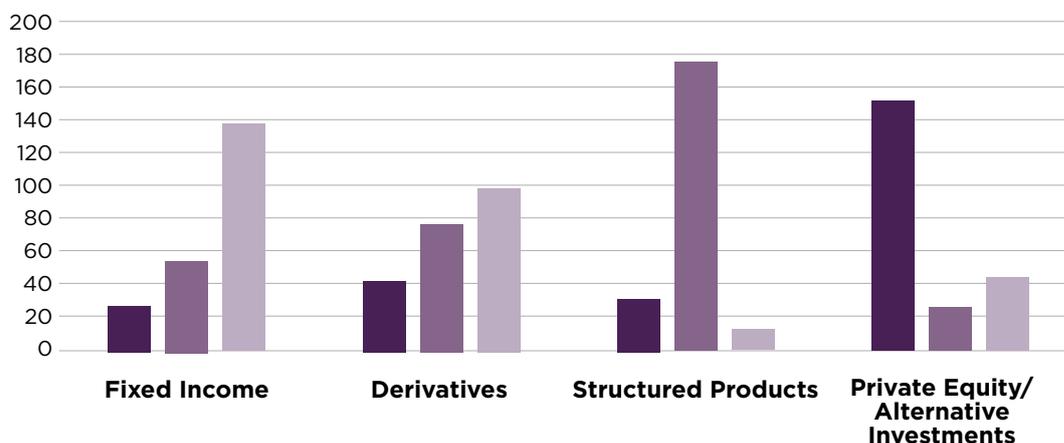
There was a notable variance of preferred valuation approach depending on the asset class in question. For fixed income products, the majority of users deployed vendor pricing, whereas for derivatives there was a much more even spread across. This likely reflects the more widespread availability and more long established nature of fixed income pricing vendors against the more recent development of those covering derivative products.

It is worthwhile noting that, in the responses to this question for fixed income and derivatives, whilst the primary method of valuation was noted, many respondents indicated that they use some kind of check or back-up in addition to the primary source. This is either a second vendor or an internal or dealer price to check against a vendor.

There was little vendor sourcing, however, for Structured Products – where dealer quotes were overwhelmingly used – or for Private Equity, where the strong preference was for internal models. Anecdotal evidence here suggests that there is both a lack of availability of vendor coverage for these asset classes, and also that, the services that were available were not commercially attractive.

#### VALUATION METHODS

■ Internal Model    ■ Dealer/Counterparty    ■ Vendor



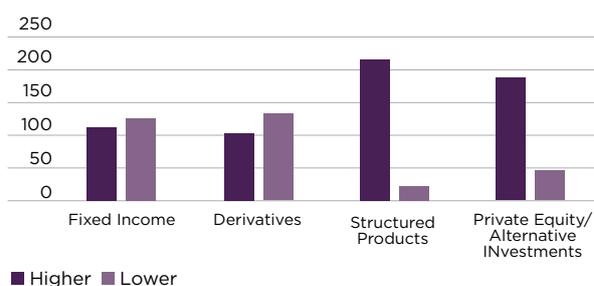
This would seem to be a worrying feature from an investor protection standpoint, since both dealer mark and internal model approaches entail the risk of significant conflict of interest. It is also noticeable that there is little or no second sourcing here, which would tend to compound the problem.

### Pricing Volumes (Q5)

The number of assets priced by the survey respondents, reflecting the broad base of firms polled, ranged from a few hundred up to many thousands. Unsurprisingly, it was the fund administrators and custodian banks who had the largest and most diverse volumes to deal with, but another interesting finding was that the private banks held significant numbers of Structured Products. Given the potential valuation issues for this asset class identified in the previous question, this is notable.

It should not be expected that this situation will change soon, since when asked whether they expected to price more or less of these products in the coming three years, firms overwhelmingly expect Structured Product holdings to increase, along with Private Equity investments. For fixed income and derivatives, the picture is much more evenly balanced.

### CHANGING VOLUMES



### Pricing Frequency & Timing (Q6-8)

Over 60% of the respondents price their holdings daily with most respondents expecting it to remain that way. No one surveyed valued less frequently than quarterly.

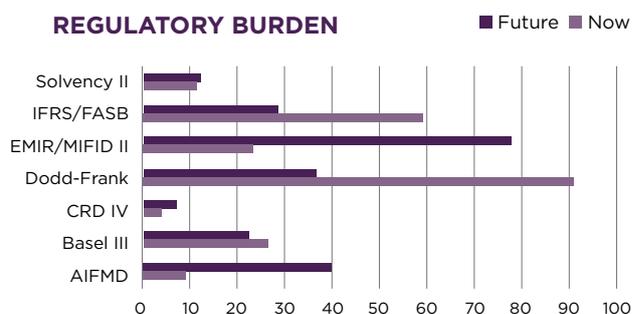
Most users still run their valuation processes overnight (T+1) but there were a significant number who are moving towards same day (T0) processing and therefore expecting their pricing sources to deliver as soon as one hour after market close.

Recent research has suggested that there was a trend towards intra-day asset valuations, but there was little evidence of that here.

### Valuation Regulation & Oversight (Q9-10)

In terms of regulatory oversight, it is clear that the various and wide reaching ramifications of the Dodd-Frank Act continue to exert the biggest pressure on valuations operations at the current time, followed by the recently revised accounting standards under IFRS/US GAAP.

### REGULATORY BURDEN



The picture changes, however, when one looks at the coming years. Here the biggest concern for most firms is the as yet unclear consequences of EMIR/MIFID II.

Amongst Hedge Funds, AIFMD is understandably seen as a major worry, whilst the responses for Solvency II and Basel III suggest that insurers and banks are already fully grappling with the regulatory issues in their part of the industry. One interesting finding is the relatively small concern over CRD IV, perhaps indicating a lack of knowledge?

### Key Vendor & Data Requirements (Q11-12)

Looking at the key requirements from vendors of valuations, there was one thing that virtually all the survey respondents could agree on – quality of the valuation was of the highest importance.

Attribute	Rank
Quality	1
Transparency	2
Reliability	3
Coverage	4
Independence	5
Timeliness	6
Cost	7

Some of the commentary that accompanied these results, however, suggested that users were less than happy with the vendor commitment to this quality goal.

There were remarks that vendors tended to focus on coverage at the expense of quality, to ensure that maximum billing volume was achieved!

Transparency was closely associated with quality, with a clear and open justification of price determination being seen as a necessary adjunct to ensure viability. Given the operational nature of many of the surveyed users, it is also no shock to see Reliability as an important factor. The best and most transparent price in the world is no good if it does not arrive!

Two slightly surprising results were the low priority placed on independence and cost (which was ranked lowest). Much of the thrust of new regulation is based on the notion of independent and objective valuations, so to rank independence of the supplier so low seems to suggest that this point has not been fully appreciated. The low ranking of cost would also seem to be odd, since much of the qualitative research reflected a range of complaints about the overall expense of valuations vendors.

## 10 KEY FINDINGS

**In summary, the 10 key findings of our user survey are:**

- Vendor pricing is widely used for fixed income and less so for derivatives
- Vendor pricing is hardly used at all for Structured Products (counterparties) and Private Equity/Alternatives (internal models)
- Volumes of fixed income and derivative holdings are not seen rising much, but large increases expected for Structured Products and Private Equity/Alternatives
- There is a growing move towards same day (T0) pricing from next day (T+1)
- Dodd-Frank and accounting standards are generating most regulatory work at the moment, but
- EMIR/MIFID II and AIFMD are expected to be the biggest concern in coming years
- Basel III and Solvency II are already in play for their respective industries and are expected to remain important
- Quality is the primary requirement from a valuations vendor, closely followed by transparency and reliability
- But users think that vendors focus on coverage to inflate their bills!
- Independence and cost are ranked much lower than expected



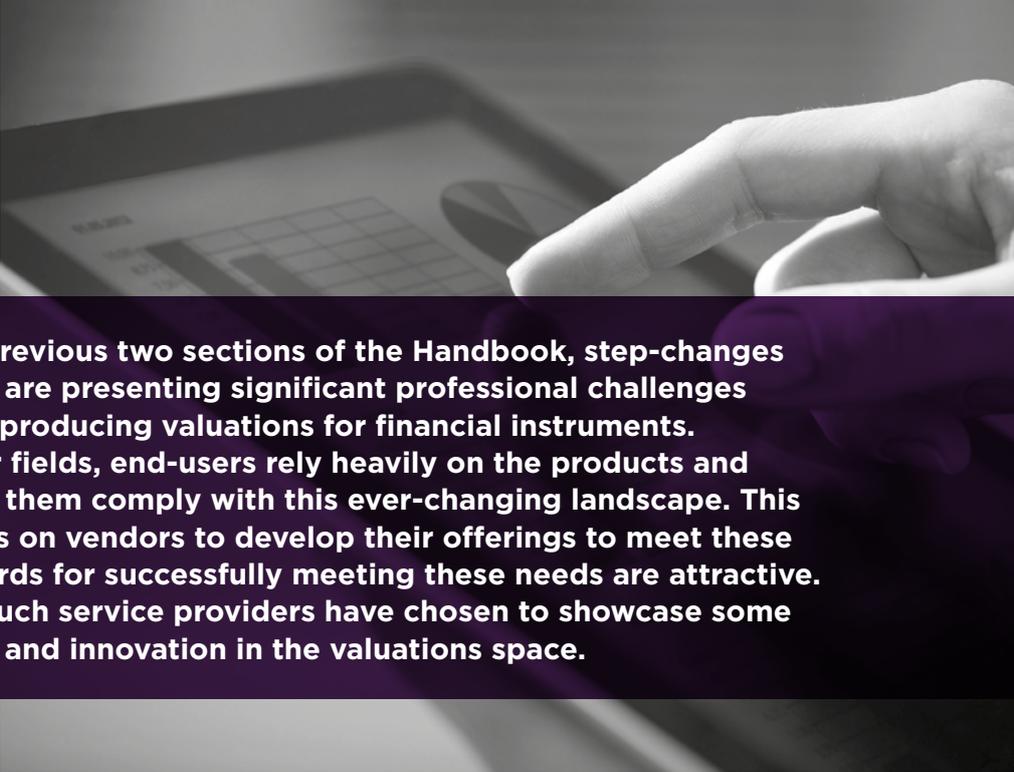
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<b>40</b>	Voltaire Advisors
<b>50</b>	Cbonds
<b>54</b>	Derivative Partners Research
<b>58</b>	European DataWarehouse
<b>66</b>	MTS
<b>70</b>	Numerix
<b>76</b>	Prism Valuation
<b>84</b>	Quaternion
<b>92</b>	Structured Credit Investor
<b>98</b>	Solum Financial
<b>104</b>	S&P Dow Jones Indices
<b>108</b>	SunGard
<b>112</b>	Value & Risk

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EXPERT MARKET REVIEWS



As we have seen with the previous two sections of the Handbook, step-changes in regulation and oversight are presenting significant professional challenges to those whose business is producing valuations for financial instruments. More so than in many other fields, end-users rely heavily on the products and services of vendors to help them comply with this ever-changing landscape. This reliance places a great onus on vendors to develop their offerings to meet these requirements, but the rewards for successfully meeting these needs are attractive. In this section, a series of such service providers have chosen to showcase some of their thought leadership and innovation in the valuations space.

This reliance places a great onus on vendors to develop their offerings to meet these requirements, but the rewards for successfully meeting these needs are attractive. In this section, a series of such service providers have chosen to showcase some of their thought leadership and innovation in the valuations space.

We start with our own practice, **Voltaire Advisors**, setting the scene with an overview of the pros and cons of various pricing and valuation options.

Specific market segment reviews look at asset class areas which are particularly 'hot' in terms of valuation issues at the moment. **Cbonds** review recent trends in the issuance of Emerging Market bonds, which, as the 'hunt for yield' continues in this low interest rate environment, have proved an extremely popular investment strategy. **S&P Dow Jones Indices** cover a specific area of the developing markets, by looking at Chinese corporate bonds. The more traditional markets in Europe, have had their own issues with the (not yet fully resolved) Euro crisis, and **MTS** look at developments in trading these markets.

Another market undergoing a boom - for pretty much the same reason - is that of leveraged loans, and **SCI** provide some insight into the CLO markets where much of this debt is repackaged. The lack of clarity in the risk profiles of such securitized investment products has borne a large part of the blame for some of the worst excesses of the recent financial crisis, but there have been a number of recent attempts to resurrect the market. Supported by the ECB, **European Data Warehouse** are leading an initiative to restore confidence to the European ABS markets via transparency of the structures. Their review here outlines their efforts in this market.

The other asset class commonly held to be at fault in the credit crunch was derivatives

- 'Financial Weapons of Mass Destruction' according to Warren Buffett! - and these have been the subject of much micro-prudential regulatory focus. **Solum Financial** give an overview of some of the new factors to take into account when pricing derivatives in the current environment. One of the main areas of change has been the need to factor in a number of new value adjustments - for debt, credit, liquidity, funding, etc. - and **Quaternion Risk** look in detail at these issues in a technical paper.

Structured Products are another fashionable investment vehicle where independent valuation has yet to catch up fully with product development. **Derivative Partners** look at a popular type of 'Struki' - autocallable certificates - and the considerations associated with pricing them. The use of analytic libraries and models is an essential component in the valuation of these types of financial products, so the review and validation of the models in question is a critical factor in producing a robust price. The article by **Numerix** looks at new ways being deployed to achieve this.

One of the features of regulation in the wake of the financial crisis has been the restatement of the responsibilities of asset managers for valuation, and their inability to delegate this obligation. The final three articles in this section all cover ways in which vendors can seek to provide comfort to users as to the quality of their service. **Prism Valuation** look at the factors required to provide "defensibility" in independent valuations. **Value & Risk** assess the impact and benefits of having an external review of process and controls in place - in this case, ISAE 3402 standard. When more than one source is used for valuation inputs, this represents an even more daunting challenge, and the **Sungard** essay reviews the best approach to multi-vendor price management.



## Valuation Methods & Sources for Financial Instruments

By **Ian Blance**, Managing Director, Voltaire Advisors

**The business of producing prices for financial assets effectively falls to four main players – an exchange where the instrument might trade, the institution which holds the asset (internal solution), other firms who interact with the holder and may have a level of knowledge of the product (counterparties/dealers) or independent third parties producing pricing (vendors).**

A feature of the many financial markets is that, except in a small number of cases, there is rarely a definitively 'correct' price. At any point in time, there can be a range of prices, all of which can be argued as being 'correct' depending on the use to which the price will be put and the regulatory and oversight rules or guidelines which need to be met.

For example, a price which is required for buy-side purposes (to calculate the Net Asset Value of a fund and to measure the performance of the fund manager) will be subject to different constraints than that required for sell-side purposes (to execute or settle a trade, or to calculate the P&L and risk of a trading book).

In the former case, there is an element of consumer protection involved and this has a big influence on the way prices for the buy-side are viewed. There is a strong presumption in favor of independent, third-party pricing in these kinds of situations. This is enshrined in many regulations and guidelines governing fund valuation – indeed, it is a legal requirement for US Mutual Funds, governed under the '40 Act'. In addition there is an increasing requirement for transparency surrounding such valuations. Not only must prices be independent, but it also must be completely clear how such valuations have been arrived at.

In short, valuations used for funds must be absolutely justifiable and defensible. This has a major influence on where such pricing is sourced and how it is verified. The business

of vendors providing external pricing to the buy-side depends on these concerns, and their services have developed over time to encompass the transparency needed to meet these requirements.

On the sell-side, however, much of the concern surrounding pricing relates to their own protection, rather than that of the consumer. In valuing their own inventory and trading books, whilst they are subject to the usual accounting rules relating to prudence and defensibility, the main loser if the pricing is not appropriate is likely to be the dealer themselves. Again, this has an influence on how pricing is sourced and verified. In most cases, the sell-side primarily use the pricing provided by their own trading desks and not from outside vendors. If third parties are used, they are typically deployed as a check to ensure that the desk price is within acceptable tolerances.

Firms who require regularly updated valuations of their holdings of financial products have a number of different sources available to them. Each source has its pros and cons and the final choice – or as is much more likely, mix of choices – will be governed by a combination of factors including:

- Regulatory requirements
- Accounting standards
- Industry 'best practice' guidelines
- Internal risk and compliance policies and procedures
- Internal budgets and cost constraints

As noted above, the exact mix of these sources will also vary according to type of firm using the valuation, and the use to which it will be put. Sources which are deemed to be perfectly sound for some uses might be seen as deeply flawed and unacceptable in other cases.

All of these issues need to be taken into account when looking at the various pricing methods that currently exist. Just as there is no definitively 'correct' price for most outstanding financial assets, equally there is no definitively correct source, regardless of what some vendors would have one believe in their marketing material!

The review below covers the main types of prices available for financial instruments and briefly reviews the benefits and drawbacks of using each of them.

## EXCHANGE TRADES

A recently recorded trade in the specific asset in question has traditionally been regarded as the best indication of its current value. This notion is enshrined in much of the regulatory and accounting framework that surrounds asset valuation.

This is a relatively straightforward approach when dealing with liquid, exchange traded instruments such as large cap stocks, on the traditional stock exchange venues. For a liquid stock, FX or futures or options contract, traded on a major exchange such as NYSE, LSE or Deutsche Boerse, market prices are produced in a real time fashion during trading hours. Trades are tracked on a 'tick-by-tick' basis by the exchange infrastructure and these ticks (usually together with additional information such as trade size and whether the trade was on the bid or the offer side) are made public by the exchange.

From a pricing perspective, using the most recent trade of a highly liquid instrument on a major exchange during trading hours is as close to nirvana as one can come. However, as only a small number of believers apparently achieve nirvana, so does this method only represent a small proportion of the outstanding assets that need to be priced!

Accordingly, when looking at exchange prices for financial assets, there are a number of issues to take into account when assessing the quality of the reported trade, and its relevance for valuation purposes.

### Liquidity / Trade Size

Perhaps the most important factor in assessing the usefulness of a reported trade is its size. Large, liquid, trades at decent volumes do not need much further analysis. Trades that take place at lower than usual volume for a particular market or instrument should raise a cautionary flag. These 'odd lot' trades could be small scale 'throwaway' executions, not representative of the real value for that instrument. One way of addressing this individual trade dependency is to use some kind of aggregating technique such as Volume Weighted Average Price (VWAP) over a period of time to minimize such distortions.



### Applicability of the Trade

Another issue is the assumption that a recorded trade represents an arm's length transaction between a willing buyer and seller. In certain cases such as 'fire sales', where an investor is forced to dump their investments, a case can certainly be made that these trade levels reflect a single firm's distress and not general market conditions. In such a case, applying this trade level to value a non-distressed holding, which does not need to sell at any price, would seem unjustified.

### Time of Trade

Another factor to bear in mind is the time of the trade. Last trade does not necessarily mean a recent trade or, for that matter, current value. For more illiquid products where trading is infrequent, the last trade could have occurred some time prior to the valuation point and if so, there will almost certainly have been some change in the asset's value during that time.

### Exchange Closes

The time of trade issue is accentuated further, and for all instruments on a market not just the smaller ones, when an exchange is closed (either out of hours or during market holidays). In such a case, the further away in time the valuation point gets from the market close, the less valuable the closing price is for assessing the current value of the asset. The use of market close prices to value instruments at points much later than the timing of the close was recently exploited by some arbitrageurs (especially in the US Mutual Fund industry) to make significant profits at the expense of fund holders (called the 'market timing' strategy).

### Trade Venue / Alternatives

A further complication arises when the product in question trades on more than one venue.

The fragmentation of trading venues means that a recently traded price on one platform may conflict with that on another, possibly at exactly the same time and in the exactly the same size. In these cases, further judgment is required from the user as to what value to use from what venue.

In summary, where there is a recent trade price available for a financial instrument on a credible exchange platform, during trading hours at a reasonable volume of liquidity on both sides of the market, then this probably gets as close to the 'true' current value of the asset in exchange as is possible. This, though, is a very specific occurrence, as the tight conditions would imply, and it should not be assumed that any price derived from an exchange meets all these criteria. Prices emanating from exchanges may be distorted from illiquid trading or may not represent the 'best' price available where multiple trading venues are possible. Also, where the relevant exchanges are closed - either after hours or during market holidays - it is possible, even likely, that the last trade does not represent the true current value of this asset.

### OTC TRADES

If the use of trade prices from exchanges for valuation purposes is more complicated than might be first thought, the situation becomes even more Byzantine in an off exchange environment. At least the exchanges typically report the trades that take place on their platforms and usually give some additional data such as time of trade and volumes. This allows the professional user to exercise their judgment as to the quality and applicability of this trade for use in a valuation process. Over the Counter markets have much more variable reporting requirements and together with other issues, this makes the use of OTC trades a minefield requiring significant due diligence.

Below are some of the key issues to be considered when using OTC trade prices as a source of pricing for financial instruments:

### Lack of Trades

It is the nature of many OTC products that the proportion of the overall market that trades on a regular basis is quite small. For example, using data from the Eurobond market in 2005, the FSA reported that on a typical trading day, only around 5,000 issues traded out of a total outstanding of 200,000 – some 2.5%. Furthermore, around 1,900 of these issues only traded once, 1,700 twice or three times and 1,200 between four and nine times. Fewer than 500 traded ten times or more and only 13 traded more than 100 times.

No. of Trades	No. of Issues Traded
400+	1
300-399	2
200-299	3
100-199	7
50-99	25
10-49	434
4-9	1197
2-3	1713
1	1891

Source: ICMA/FSA

Activity is slightly higher in the US, where the tradition of retail and mutual fund activity in the bond markets is greater, but even here FINRA estimates that, of 30,000 outstanding issues, only 20% typically trade at least once per day and only 5% at least five times.

For private and bespoke OTC deals there are usually no trades at all after the initial issue has been placed. Clearly, where there have been very few trades in an issue during a period, then some assessment needs to be made as to the quality and relevance of those trades for valuation purposes.

### Reporting of Trades

Assuming a trade has taken place, there are then issues with obtaining information related to the trade and level of activity. In the off exchange environments in which OTC instruments trade there are varying requirements for reporting transactions ranging from comprehensive to none at all.

In some financial markets, there have been a number of initiatives from industry bodies to institute robust trade reporting to enhance transparency and liquidity, such as TRACE for US corporate bonds. Whilst such initiatives are to be encouraged, it is worth noting that large sections of the OTC markets – notably US Treasuries and money markets and the mortgage and asset backed markets outside the US – are not yet covered by any trade reporting requirements.

### Applicability of Reported Trades

Trading by large institutions which dominates many markets occurs primarily OTC. Trading of the same types of products reported on exchanges tends to be composed mostly of 'odd lot' and retail activity. This has issues for the use of these reported trades for valuation purposes. The chart below shows the price of a US\$ bond reported on trace over a period of time, compared against the equivalent valuation created using an evaluated price method (see later). It can be seen that the reported trading is significantly more volatile than the evaluated price, which purports to represent the larger institutional market.





There are two other developments on the horizon that may result in a change in the landscape when it comes to OTC product trade reporting.

First, policy makers and regulators are strongly in favor of requiring instruments currently trading OTC to be moved into an exchange environment. By trading, settling and reporting through a formal exchange channel they believe that transparency and regulatory control will be improved and ensure that financial crises can be curtailed. These plans are still very much in their infancy, and the jury is still out as to whether they can be practically implemented, but should this come to pass then much of the trading currently unreported in the OTC world would be much more formally and systematically broadcast.

Second, the MiFID revolution which was applied to equity trading in 2007 looks likely to be extended in some shape or form to the bond markets via MiFID 2. Since these regulations had important implications for pre- and post-trade transparency and 'best execution' reporting by financial institutions there will clearly be a major impact for OTC markets.

In summary, relying on current trade activity to value OTC products is only really applicable for the most liquid securities such as benchmark government bonds, where there are lots of transactions that are widely reported and there is little room for distorted levels due to peculiar and specific counterparty circumstances.

#### **DEALER QUOTATIONS**

This valuation method relies on obtaining a 'quote' for an asset from a dealer or broker firm - frequently the trade counterparty. The number of instruments which can be valued this way is larger than the traded universe, since dealers will typically have inventory on which they are willing to make a market even

though an actual trade may not have taken place. Counterparties are also usually willing to support deals that they have been involved in or have sold to investors.

Dealer pricing is available to the user in a number of different formats and channels. Desktop systems such as Bloomberg and Reuters have dealer contributions in their services, either publicly available or via some kind of restricted 'permissioned' pages. The websites of the major dealers also offer pricing pages, again usually in a secure client login format. By far the most common method of retrieval though is in an ad hoc 'manual' fashion, via email, fax or telephone. Indeed, even the data vendor or dealer website options usually require some kind of manual intervention or process.

#### **Issues related to dealer sourced pricing are:**

##### **Continued Coverage Issues**

Even though this 'quoted' universe is larger than the universe of traded products it remains small in proportion to the overall level of outstanding issues. It is typically the more active and popular issues that dealers are willing to make markets in and, not being buy and hold investors, they usually confine themselves to assets that are relatively liquid. It should be noted, however, that this type of pricing can apply to a variable and inconsistent universe because the most active and liquid issues change over time and the dealer quoted universe will respond accordingly. It is typical in the OTC product markets that most assets tend to be active only in the first few weeks after they are issued. Liquidity drops off markedly over time as the issue finds its way into buy and hold portfolios. The result is that a dealer quote that is available today for an asset may not necessarily be available tomorrow.

### Quality of Quotes

The quality and freshness of the quotes can and does vary enormously. Many dealers will only update quotes infrequently and without much real care and attention unless required to 'firm up' the quote in response to real buy or sell demand. For the bulk of dealers, ongoing valuation support of a deal is a chore. Remember that their primary function is as traders not valuation agents!

### Conflict of Interest

One of the most serious failings of counterparty pricing – particularly in the current febrile regulatory environment – is that there is an inherent conflict of interest in using the same dealers or counterparties with whom trading activity is engaged to provide ongoing valuation for the trades resulting from that activity. It is in the interests of the dealer to keep their buy-side clients happy so that they will continue to do business with them, and producing a price that keeps the investor happy is never a good foundation for an objective valuation!

### Operational Risk

One problem of using the dealer quote approach is the increase in operational risk that the manual nature of this process entails. All valuation processes will involve some degree of operational risk – e.g. a file may not arrive or be corrupted – but when there is a heavy degree of manual intervention the level of risk is elevated. The potential for problems such as typing errors, omissions, unavailability of knowledgeable staff and staff turnover, make this approach particularly susceptible.

Despite these significant and potentially serious failings, it is perhaps surprising that dealer quotation remains a popular and widespread method for financial instrument valuations. This is most apparent where firms are not required to use an independent and

objective source. It may well be that this approach is seen as 'free' since there is no external vendor invoice for the data, but it does not take much analysis to see that the direct costs in manpower and the indirect costs in risk make this anything but a 'free' lunch. It is equally surprising that many regulators and auditors do not seem to take issue with firms using this technique given the potential for conflicts of interest.

In summary, it would seem that prima facie, one of the most widely used methods of valuation in use today offers some of the more serious drawbacks.

### CONSENSUS / COMPOSITE PRICES

In recognition – tacit or implicit – of the issues surrounding single dealer pricing there have been a number of attempts to reduce the potential for conflicts of interest and quality issues by collecting quotes from a number of dealers and, usually after some basic statistical work, produce an 'average' quote for the asset. The most basic technique involves eliminating the highest and lowest quote values (or quotes falling outside some stated tolerance or standard deviation) and calculating an average of the remainder.

Most of the vendors who are involved with the collection of dealer contributions also produce some form of average pricing. Bloomberg offers its Bloomberg Generic (BGN) for bonds and Thomson Reuters provides composites for cash fixed income, while Markit, CMA and Fitch all have composites for Credit Default Swaps, and there are a number of other sources used in indices such as iBoxx. The Xtrakter service for Eurobonds and Government bonds is an average price service based on quotes from their contributing dealers.

Where there are lots of different quotes from reputable dealer sources, this is an excellent approach and it produces entirely acceptable and justifiable results. As the caveats in the



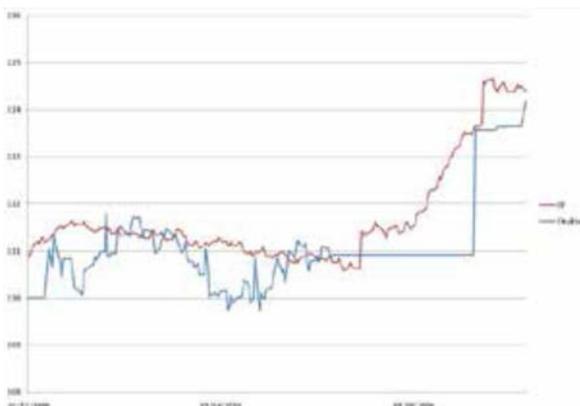
above statement would imply though, this method is only really sound when particular circumstances exist. There are two main problems with this technique, namely, coverage and quality.

### Coverage Issues Again

The averaging method relies completely on the availability of quotes to produce the composite. Indeed, given that, by definition, more than one quote is required to produce a composite, the universe covered by this method will be smaller than that of the single dealer quote. Coverage of illiquid, private, bespoke deals and counterparty trades will not be covered at all as in these cases there is usually only one quote available, if that.

In addition, the covered universe is entirely dependent on the availability of dealer quotes. As mentioned above, the dealer quoted universe tends to be variable, and this is magnified when more than one quote is required. This can result in composite prices becoming 'stale' for periods if insufficient quotes are received to create a price.

To illustrate some of the issues with the composite approach, the following chart shows the price for the same TRACE eligible bond used in the previous example, but this time with the composite price provided by Xtrakter.



### Garbage In, Garbage Out

Where there are only a small number of quotes available for a particular instrument and/or the quality of the quotes are suspect then the technique can lead to a distorted output. Averaging lots of poor quotes does not magically lead to a good one – it is very much a case of 'garbage in, garbage out'.

To summarize, the aggregation of dealer quotes to produce composite prices is an excellent way of eliminating or reducing the problems of single dealer pricing and in the right circumstances, with a good number of high quality prices from reputable sources, produces as good a valuation outside of a liquid trade as one is likely to get. However, where these circumstances do not pertain, the issues of quality and coverage remain.

### 'MARK TO MARKET' EVALUATIONS

There are a wide range of techniques and methodologies used in the mark to market approach (sometimes known as evaluations, matrix pricing or benchmarking) but the key feature in all is that activity in the liquid, traded market will be extrapolated in some way to illiquid, thinly traded assets. The link between the active instrument and the inactive instrument is typically expressed via some form of spread, and is most commonly deployed in the fixed income markets.

A number of specialist providers of mark to market evaluations have evolved over the years in response to the need for updated valuations of OTC fixed income securities. The largest is Interactive Data (IDC), whose business has been driven by the needs of the US Mutual Fund industry, but S&P, Thomson Reuters, PricingDirect and now Bloomberg, Markit and SIX Financial Information also have fixed income evaluations businesses.

The mark to market method allows for a significant expansion of valuation coverage since the non-traded and unquoted universe

that would not be covered in the previous approaches can now be assigned a value. For the vast bulk of holdings, some variation on this method is the only way to produce valuations that can be updated in some kind of systematic and justifiable way.

**Challenges involved in evaluations methodology include:**

**Monitoring Limitations**

The limitations to this technique revolve around the sheer number of assets that need to be addressed on an ongoing basis – Interactive Data claim to evaluate 2.8 million bonds every day! The key to achieving an accurate result is maintaining an appropriate spread from the active asset to the inactive one. When we are talking about possibly thousands and thousands of inactive assets, keeping on top of this is a Herculean task, even when market conditions are stable. In times of volatility such as recently in the US sub-prime mortgage markets, it is near impossible.

**Generalizations**

The main providers of mark to market evaluations have large numbers of staff monitoring markets and maintaining spreads on a day to day basis. In addition, they tend to 'bucket' securities with similar characteristics together, which makes the monitoring and adjustment process easier but at the expense of security specific accuracy. Out of necessity the vendors tend to generalize.

**Problems with Complex Structures**

The nature of the generalizing approach that the mark to market vendors adopt to deal with the huge volumes they have to cover does not work for more bespoke and complex product types. For these complex asset classes, such as structured finance and more

esoteric instruments, a much wider range of assumptions and inputs are required than can be accommodated by the relatively simplistic matrix approach.

In summary, the mark to market evaluations approach is probably the only way to consistently update values for the vast numbers of assets that are not regularly traded or quoted. Appropriately staffed and monitored, this method works well for those security types such as simple cash fixed income and 'vanilla' derivative structures that can be 'generalized' in the pricing model. For more complex and bespoke assets, however, this generalist approach tends not to work.

**'MARK TO MODEL' VALUATIONS**

In cases where more complex product structures are involved, or where there are few or no similar deal types actively traded, the only solution is to mark to model. This technique involves modeling the product using either industry standard analytical packages or in-house systems, calibrating the models to reflect assumptions necessary to generate a valuation (e.g. probability of default, prepayment speed) and then periodically running the valuation engine using up-to-date market inputs (typically yield curves or swap curves).

This is a very specialist business since few people outside of the large investment banks have the expertise or qualifications needed to perform such complex financial gymnastics. Indeed, the providers of such mark to model evaluations tend to come from banking or analytics backgrounds and have usually been involved in structuring or valuing complex product structures in the dealer or hedge fund world. Specialist in nature, these vendors also tend to be small in scale and relatively new like Derivative Partners, Pricing Partners and Prism Valuation. In addition to these specialist firms, some of the larger administrators or prime



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or visit [voltaireadvisors.com](http://voltaireadvisors.com)

brokers who service the sophisticated investors in these assets have set up teams to value their clients' complex holdings. GlobeOp and SocGen Securities Services have such operations.

The benefit of this approach is that, theoretically all instruments can be valued in this way. For particularly complex deals, and bespoke and/or private issues, this is often the only way an updated valuation can be produced. There are, however, a number of potential and serious problems with this approach. Some challenges are:

#### **Subjectivity of Assumptions**

There are typically highly significant subjective options involved at every stage of the mark-to-model valuation process – what model to use, how to calibrate it, what inputs to use, from what source etc. The choices made at each of these stages can have a dramatic impact on the end result. Clearly, if these choices are made simply to achieve the desired end valuation then this invalidates the independence of the price. More than any other method, the choice of assumptions here needs to be justifiable and transparent to avoid the result being compromised and self-serving.

#### **Sensitivity to Key Assumptions**

To make matters even more difficult, not only are the assumptions highly subjective, but even small differences in them can have substantial and significant differences in the end result. Minor changes in model choice, calibration parameters and input data can produce wildly different end results.

#### **Lack of Available Data**

Many product types that require a mark-to-model approach are hugely complex – frequently having embedded derivative features – and the correct valuation of these

instruments typically requires highly specialized data, both to calibrate the models and to act as market inputs. Much of this data is not readily available, usually residing only in the spreadsheets of the originators, dealers and brokers trading the assets. Not only is it hard to access, but it is often highly prized and protected owners and wider distribution in the interests of transparency is resisted.

#### **Modelling of Deal Terms**

A further complication is that the term structures of these products are frequently complex and arcane, which makes it difficult to appropriately model the deals in question. Spreadsheets are the option of choice for most dealers, but this is a highly questionable approach for ongoing, systematized valuation processes. Some firms have attempted to create their own modeling languages to address this problem (e.g. SunGard) but this raises yet further questions about the transparency of the method.

#### **Model Validation**

Under the 'mark to model' approach, it is not only the model inputs that need to be justified, but the model itself. For the more complex asset structures in particular, there are often a choice of pricing models available and under most regulatory guidelines the user must satisfy themselves that the model they, or their vendor, are using is suitably robust and justifiable.

In summary, the mark-to-model approach is the only non-counterparty option available for many complex and bespoke structured products, but its application should be handled with care. Complete transparency is necessary in this approach more than any other, since the assumptions and calibration of the model – and the choice of model itself – have such a huge impact on the end result. Poorly done and without total transparency it is less 'mark to model' and more 'mark to make believe'

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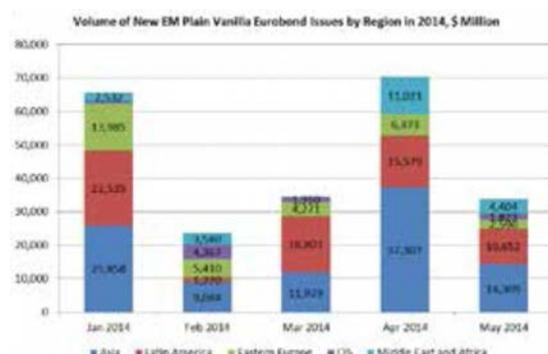
## Review of Emerging Markets Eurobonds for May 2014

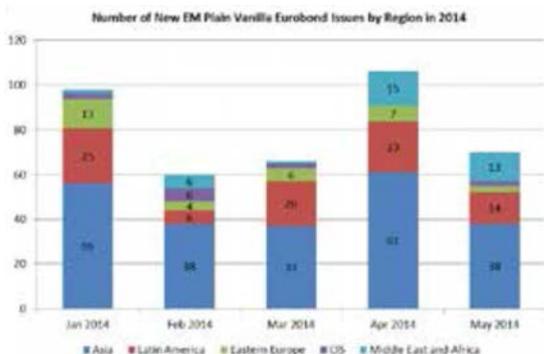
By **Konstantin Lysenko**  
 Head of Russia & CEE Fixed Income Group

**Regardless of interest rates reduction, after record April, issuers' activity in EM Eurobonds primary market decreased by half, mainly due to the fact that most companies that need financing preferred to enter the market in the first 4 months of the year.**

Total in May, 70 plain vanilla Eurobond issues worth \$ 33.4 billion were placed in emerging markets, which is over 2 times less than in the preceding month. The top position, as in the past month, is maintained by Asian issuers who placed Eurobonds for \$ 14.3 billion. Almost 2/3 of this amount is accounted for issuers from China. Following the leader, Latin America was accounted for \$ 10.7 billion of Eurobonds. Companies of Mexico and Brazil showed the greatest activity in this region, having placed 12.6 % and 8.5 % of the total issues in May.

For the second month in a row, high activity is demonstrated by companies of Middle East and Africa, who placed 13 issues in May (compared to 15 in April), totaling \$ 4.4 billion. Not many issuers of CEE region can afford themselves to place in conditions of remaining nervousness and uncertainty associated with the events in Ukraine. As a result, only 5 Eurobond issues were printed in CEE, three of which were sovereign ones of Ukraine, Croatia and Montenegro.





Source: <http://em.cbonds.com/>

New Issues of Emerging Market Sovereign Eurobonds in May 2014

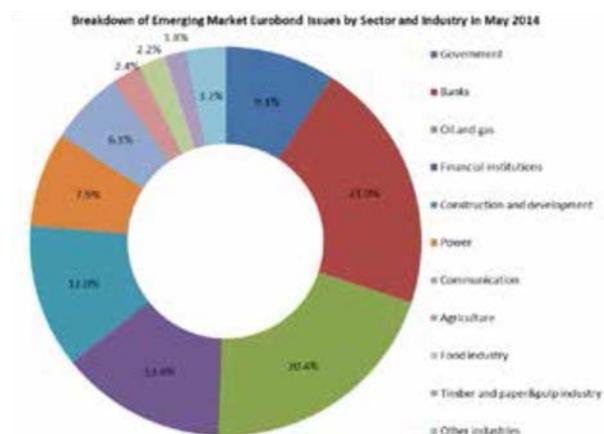
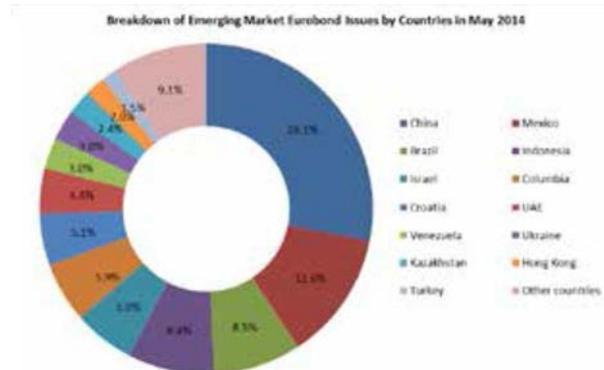
Issue	End of placement	Maturity date	Amount, mln.	Currency	Coupon, %	Credit ratings	Issue managers
Montenegro, 2019, EUR	13/05/14	20/05/19	280	EUR	5.375	Ba3/BB-/—	Citigroup, Deutsche Bank, Erste Group
Ukraine, 2019, EUR	14/05/14	16/05/19	1,000	USD	1.844	Caa3/CCC/CCC	JP Morgan, Morgan Stanley
Croatia, 2022, EUR	22/05/14	30/05/22	1,250	EUR	3.875	Ba1/BB/BB+	Banca IMI, Deutsche Bank, JP Morgan, Societe Generale

Source: <http://em.cbonds.com/>

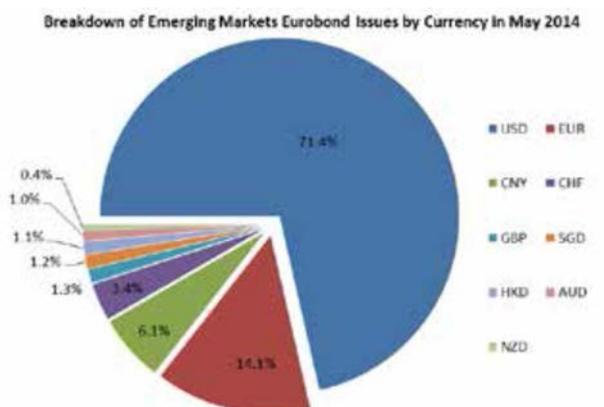
The Government of Ukraine, with the support of the U.S., attracted \$ 1 billion in 5-year Eurobonds under USAID guarantees with the unprecedented yield of 1.844%. On April 14, 2014 the governments of Ukraine and the United States signed an agreement for providing Kiev with \$ 1 billion of financial aid. As pointed out by the Ministry of Finance of Ukraine, the purpose of this agreement is to support economic reforms in the country, aimed at restoring economic activity and ensuring appropriate social protection for people. Two American global banks - JP Morgan and Morgan Stanley acted as the deal bookrunners.

Montenegro placed the largest in its history sovereign Eurobond issue for 280 million Euros, with 5 year maturity, a coupon rate of 5.375% and a yield of 5.5%. In addition, the sovereign managed to exchange some of its old bonds due in 2015 and 2016 for 80 million Euros of the new issue, thereby reducing significantly the cost of its total debt. The amount of new funds raised equaled 200 million Euros and it completely covers the financial needs of Montenegro in 2014.

Another sovereign of CEE, who ventured to use the limited supply of Eurobonds in the region, was Croatia, which placed Eurobonds in euro for the first time in the last 3 years. Originally, the sovereign was aiming to borrow 1 billion Euros, but considering the large book for 4 billion Euros, the final amount of the issue was increased to 1.25 billion Euros.



Despite the overall decline in placements, in May the market was distinguished by a variety of currencies the issues have been nominated in. As usual, the largest volume accrued to Eurobond issues in the US dollars (71.4 %). The second and third places are traditionally taken by Euro and Chinese Yuan, occupying 14.1 % and 6.1 % of the market respectively. Beside from that, the market received Eurobonds in six other currencies: CHF, GBP, SGD, HKD, AUD and NZD. The greatest diversity was shown by Asian issuers, who placed issues in all the currencies designated above except Euro.





EM sovereign benchmark yields continued their downward trend. The yield of 10-year issue of Brazil fell by 25 bp to 3.65% this month, of the issues of Indonesia and Turkey by 53 bp and 38 bp respectively, reaching 4.32% yield. The largest drop of yield was observed in 10-year Russian sovereign Eurobonds. During May, the yield decreased by 113bp to 4.49%.

The major question that is on everyone's lips is - when will the Eurobond market be open again for Russian borrowers. It is difficult to make any predictions here, but one thing is clear - the situation is gradually stabilizing and prices of Russian securities begin to return to the levels before the "Crimean crisis". According to Cbonds, for the first 5 months of 2014 Russian issuers placed 8 market Eurobond issues for \$ 4.6 billion, which is 7 times less than in the same period in 2013, when bonds for \$ 32.1 billion were issued. International capital market is an important financing source for Russian borrowers, so in case of continuation of peaceful settlement of the situation in Ukraine, we are likely to see an upsurge in new Eurobond issues of Russian companies till the end of the year.

### Cbonds EM Eurobond Bookrunner League Tables

Following the first five months, in the emerging markets Eurobonds bookrunners League Table a change of leader took place. Due to successful placements in Asia and Latin America HSBC bypassed Citigroup, having taken part in the placement for \$ 24.5 billion and occupied a market share of 10.75%. Citigroup is behind by \$ 1 billion, having issued for \$ 23.5 billion. JP Morgan is in its confident third place with the placement volume of \$ 20 billion.

League Table positions were improved by - Godman Sachs (moved from 6th to 5th place), Credit Suisse (up from 10th to 8th place) and Morgan Stanley (joined the top 10 from 11th position). Bank of America Merrill Lynch and BNP Paribas, in contrast, dropped to 6th and 9th respectively, while UBS flew out of the top 10.

Top 10 EM Eurobond Bookrunners as of 1 June 2014,

As of 01/06	As of 01/05	Investment bank	Volume, mln. USD	Market share	Number of issuers	Number of issues
1	2	HSBC	24,464	10.75%	114	162
2	1	Citigroup	23,450	10.30%	96	134
3	3	JP Morgan	20,070	8.82%	77	113
4	4	Deutsche Bank	19,407	8.53%	81	107
5	6	Goldman Sachs	12,034	5.29%	38	53
6	5	BAML	11,760	5.17%	56	67
7	7	Barclays Capital	10,911	4.79%	41	49
8	10	Credit Suisse	8,503	3.74%	38	49
9	8	BNP Paribas	8,367	3.68%	35	50
10	11	Morgan Stanley	7,824	3.44%	37	51
		<b>Total top 10</b>	<b>146,790</b>	<b>64.49%</b>		

Top 5 CEEMEA Eurobond Bookrunners as of June 1, 2014

As of 01/06	As of 01/05	Investment bank	Volume, mln. USD	Market share	Number of issuers	Number of issues
1	1	Citigroup	8,819	14.16%	25	34
2	2	JP Morgan	8,312	13.34%	20	31
3	3	Barclays Capital	5,480	8.80%	13	15
4	5	HSBC	5,216	8.37%	20	27
5	4	Deutsche Bank	5,164	8.29%	17	21
		<b>Total top 5</b>	<b>32,991</b>	<b>52.96%</b>		

Top 5 Latin America Eurobond Bookrunners as of June 1, 2014

As of 01/06	As of 01/05	Investment bank	Volume, mln. USD	Market share	Number of issuers	Number of issues
1	1	HSBC	6,782	10.15%	15	25
2	4	Deutsche Bank	6,544	9.79%	22	26
3	3	Credit Suisse	5,868	8.78%	17	20
4	2	JP Morgan	5,583	8.35%	17	29
5	5	BAML	4,547	6.80%	15	17
		<b>Total top 5</b>	<b>29,324</b>	<b>43.87%</b>		

Top 5 Asia Eurobond Bookrunners as of June 1, 2014

As of 01/06	As of 01/05	Investment bank	Volume, mln. USD	Market share	Number of issuers	Number of issues
1	1	HSBC	12,466	12.66%	79	110
2	2	Citigroup	10,253	10.41%	55	78
3	3	Deutsche Bank	7,699	7.82%	42	60
4	5	Standard Chartered Bank	6,310	6.41%	47	61
5	7	JP Morgan	6,176	6.27%	40	53
		<b>Total top 5</b>	<b>42,904</b>	<b>43.56%</b>		

Source: <http://em.cbonds.com/rankings/generator/>

For further information please contact [lysenko@cbonds.info](mailto:lysenko@cbonds.info)  
or visit [www.cbonds.com](http://www.cbonds.com)

**New Issues of EM Corporate Eurobonds over \$1 billion in May 2014**

Issue	End of placement	Maturity date	Amount, mln.	Currency	Amount in USD, mln.	Coupon	Issue managers
Ecopetrol, 2045 (Columbia)	20/05/14	28/05/45	2,000	USD	2,000	5.875	Deutsche Bank, Goldman Sachs
PERTAMINA, 2044 (Indonesia)	22/05/14	30/05/44	1,500	USD	1,500	6.45	Barclays Capital, Citigroup, HSBC
Perusahaan Gas Negara, 2024 (Indonesia)	12/05/14	16/05/24	1,350	USD	1,350	5.125	ANZ, JP Morgan, Standard Chartered Bank
Caixa Economica Federal, 2019 (Brazil)	06/05/14	13/05/19	1,300	USD	1,300	4.25	BTG Pactual, Itau Unibanco, Bank of America Merrill Lynch, Banco do Brasil, Banco Bradesco, JP Morgan
Corporacion Andina de Fomento, 2021, EUR (Venezuela)	22/05/14	29/05/21	750	EUR	1,024	1.875	BBVA, Credit Agricole CIB, Credit Suisse, Deutsche Bank, HSBC
China Cinda Asset Management, 2019 (China)	07/05/14	14/05/19	1,000	USD	1,000	4	ABC, UBS, Standard Chartered Bank, Morgan Stanley, ICBC, DBS Bank, Credit Suisse, CITIC Securities, China Cinda Asset Management, CCB International, Bank of China, Bank of America Merrill Lynch, Wing Lung
Grupo Televisa, 2045 (Mexico)	08/05/14	13/05/45	1,000	USD	1,000	5	Credit Suisse, Deutsche Bank, HSBC
Banco Inbursa, 2024 (Mexico)	29/05/14	06/06/24	1,000	USD	1,000	4.125	Bank of America Merrill Lynch, Citigroup, Credit Suisse

Source: <http://em.cbonds.com>



## Autocallable Certificates - A Yield Enhancement Strategy

By **Andreas Kropf**, Managing Director  
Derivative Partners Research Ltd.

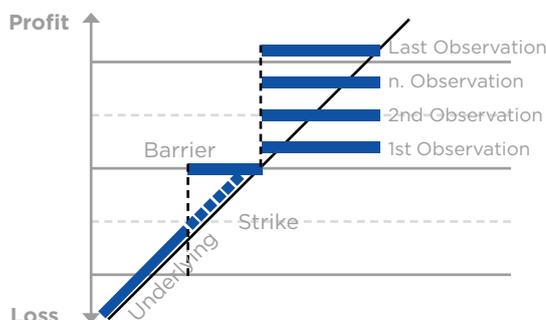
**Autocallable (or Express) Certificates are very popular exotic derivatives, particularly attractive for investors that wish to yield enhance their portfolio. Despite being common, the mechanics of these instruments are quite complex and there is no substantial secondary market. This often evokes a need for independent valuation.**

### PRODUCT IDEA

The idea is quite simple: The investor buys the certificate with some investment amount and in turn obtains several opportunities in time to earn an above-market-level coupon on top of receiving back the investment amount. Once coupon and investment amount are paid, the certificate expires. The payment is not decided by the investor but by market conditions (hence “Automatic Callable”), i.e. whenever the underlying spot price trades above a predefined level (the so-called “Autocall Trigger Level” or “Strike”) at one of several predetermined future observation dates. To enforce the attractiveness of the payoff, the investor additionally shorts a barrier down-in-put option, whose premium is projected into the coupon. The products are generally structured such that the down-in-put option’s barrier is comparatively low and the likelihood of termination at the next observation is decent. The consequence of the short barrier option is that, once the underlying price decreases and the barrier is hit, the investor is not protected anymore and fully participates with downside movements of the underlying.

The expected short tenor of the structure at issuance mitigates the counterparty default risk and is therefore particularly appealing to the investor in cases of issuer credit uncertainty. Understanding the certificates is crucial, since there might be some counter-intuitive caveats waiting within their life-cycle risk management.

The following graphic displays the payoff profit and loss diagram of an Autocallable Certificate.



Source: eusipa - European Structured Investment Products Association

### EXAMPLE AND SCENARIOS

As an example let's consider a 4 year Autocallable with 70% Barrier, 110% Autocall Trigger Level and coupons of 10%, 20%, 30% and 40% for the 4 consecutive years. The graphic as well as the table display different underlying spot price scenarios:



Source: Derivative Partners Research

Stock price as a percentage of price at inception

	Year 1	Year 2	Year 3	Year 4
Scenario 1	98%	80%	101%	104%
Scenario 2	88%	92%	130%	
Scenario 3	106%	98%	67%	76%

Source: Derivative Partners Research

Let's take the first scenario. The stock is above the barrier at the end of each year and at the same time it never breaches the Autocall Trigger Level. As a result the note pays no coupon for each of the 4 years. The buyer gets back the investment of 100% at the end of the fourth year.

In the second scenario, the stock breaches the Autocall Trigger Level in the third year. Consequently, the trade expires in the third year. The buyer gets back the investment plus 30% coupon at the end of the third year.

In the third scenario, the underlying spot does not reach the Autocall Trigger Level but breaches the down-in-put barrier at the end of the third year. This means protection is lost and the investor receives back the spot price level of 76% at the end of the trade's lifetime.

### PRODUCT FEATURE ENHANCEMENTS

Typical extensions of the payoff are either more features or more underlyings. Typical features are conditional coupon and/or memory coupon payments (independent of the Autocall event). While more features extend the product to clientele with more steady income flow needs, the second generally leverages the coupon.

- Conditional Coupons are paid if the underlying spot price quotes above some second level ("Conditional Coupon Trigger Level") on the given observation schedule, which is typically significantly below the Autocall Trigger Level. Whenever the underlying trades above the Conditional Coupon Trigger Level, an above-market-coupon is paid and the structure continues unless the Autocall Trigger Level is hit.
- On top of the simple Conditional Coupon extension, the Memory Coupon variant pays all past coupons, in case they were not paid due to a missed out coupon condition.
- With more underlyings the Autocallable property is valid only, if each of the underlyings quotes above the Autocall Trigger Level. Moreover the short Down-In-Put will be activated, if any of the underlyings trade below the barrier. These two facts certainly drive the size of the coupon to even more attractive regions. The product is called "Worst-Of Autocallable", since the worst performing underlying counts.

***"Autocallable Certificates allow for a wide range of risk appetite."***

### RISK MECHANICS

**Volatility:** Since the standard Autocallable pays a fixed amount whenever the underlying quotes above some trigger level, it can principally be decomposed into a series of knock-out digital options. These options are issued around at-the-money in most cases and are hence vega-neutral, that is with low sensitivity with regard to shifts of the underlyings' market implied volatility surface. Autocallables show negative vega whenever the underlying spot rises above the Autocall Trigger Level, since the upside of a digital option is limited and the short down-in-put has negative vega in all market constellations. If the underlying spot price decreases, the digital options provide positive vega, which is partly compensated by the short down-in-put. For slight underlying spot dips, the structure shows positive vega whereas it becomes negative again for far out of the money digitals not being able to compensate the short barrier option.

**Underlying Price:** The delta profile of an Autocallable, meaning the price sensitivity with respect to movements in the underlying spot price, can be tricky as well. While in the basic version, it is clearly a bull product with positive delta throughout the entire spot regime, it gets more intricate when conditional coupons are involved. Certainly delta is positive whenever the digital options are way out of the money and the spot lies below the Conditional Coupon Trigger Level, since the short barrier option dominates the situation. This changes though, when spot ranges between the Conditional Coupon Trigger Level and the Autocall Trigger Level, since the more likely future conditional coupon flow starts driving the present value of the structure. The increasingly probable

Autocall event will be disadvantageous to the investor, since it also means losing the above-market-coupon flow. If the digital options are deep in the money delta is positive and approaches zero, since the structure is automatically called almost surely at the next observation date and the conditional coupon flow does not matter anymore.

**Dividends:** The sensitivity on dividends is not trivial, particularly since their size and payment dates are not known. In general high dividends drive prices down, since the trigger levels might be harder to meet due to the negative spot price drift.

**Correlation:** Of course risk mechanics get more involved with multiple underlyings, the basic idea stays the same though. We will now have to take into account correlation between underlyings as well. Worst-Of Autocallables are expensive, if the correlation between underlyings is high, i.e. it is a classical correlation bull product. Since correlations can generally not be read from the market, the pricing of these products often allows a significant range. Typically the issuer takes the correlation bull side, since the product is more profitable and there is more hedging cost buffer.

***“Derivative Partners enable their customers a better view on structured product pricings.”***

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### A NOTE ON MODELLING

**Pricing Models:** Digital options are usually captured well with local volatility models, which is also market standard. Black-Scholes has its limitations particularly for out-of-the-money digitals, since distribution tail modeling becomes crucial. Due to the bullet payment character of the options, the entire payoff occurs for rare events only in these market scenarios. Local volatility again has its limitations when the lifetime of the Autocallable structure becomes uncertain and it is not per se clear which digital plays the dominant role. In those cases, interest rate modeling becomes more relevant and turning to hybrid models will be more appropriate.

**Numerics:** Due to the lively risk profile of an express certificate, the numerical computation of sensitivities becomes interesting as well. Certainly, if computed by a standard Monte Carlo approach, a combination of stabilizing methods is suggested. This ranges from quasi random number generation to actual payoff-smoothing, mitigating the discontinuity of the payoff profile and hence the numerical sensitivity of the payoff with respect to rare events.

## European DataWarehouse: An initiative to improve transparency for European securitization markets

**Markus Schaber**, Managing Director and **Eirini Kanoni**, Business Consultant, European DataWarehouse GmbH

### BACKGROUND AND DEVELOPMENT

**The significant setback of the development of an efficient European securitization market caused by the financial crisis has many reasons – one reason mentioned very frequently is the lack of transparency for investors. While the credit performance of European asset-backed securities (ABS) has been actually on average quite positive throughout the crisis years, market and liquidity risks have been heightened by the perception of securitizations as “opaque”. This notion typically describes the lack of detailed information on the underlying risks and the perception that certain parties to a transaction and in particular investors have not been given access to relevant information consistently.**

In this context European DataWarehouse (ED) was created as a new market initiative specifically aimed to increase transparency and restore investor confidence in the ABS market. ED is the first centralized and independent platform to upload and download European ABS loan-level performance data on a realtime basis accessible to all ABS market participants, including loan originators, servicers, trustees and investors.

While transparency for structured finance transactions includes a number of different areas, the focus is specifically on loan-level data of the underlying loans forming the securitized portfolio. This information was typically not readily available in the past and hence investors had to rely on aggregated data which was preconfigured by issuers and arrangers. A key development point for ED was to have a highly standardized format which would allow market participants to analyze underlying portfolios in a more efficient way and to be able to compare portfolios on a systematic basis including performance trends. This aids investors as well as rating agencies in enhancing their due diligence efforts around ABS transactions.

The European Central Bank (ECB) was the key driver in this project and in the development of ED. The fragmentation of the ABS markets

following 2008 resulted in many asset classes and/or countries effectively being closed to issuers as investors had limited or no appetite for certain ABS transactions. This resulted in a higher degree of some banks to rely on central bank funding and hence banks started securitizing loan portfolios primarily for liquidity purposes, using them as collateral in refinancing operations with the Eurosystem.

Given these developments it was felt that there is a clear need for transparent and timely information on the underlying loans and asset pools of ABS, including their performance, to restore investor confidence.

On 23 December 2009 the European Central Bank (ECB) launched a public consultation on loan-by-loan information requirements for ABS in the Eurosystem collateral framework. A decision was made to create the concept of a fully transparent data handling infrastructure external to the Eurosystem which would process, verify and manage the data and facilitate the disclosure and timely access to ABS information. Moreover, there was the requirement to introduce the concept of standardized loan-level reporting that would eventually be accessed through a centralised database or portal. In December 2010, the Governing Council of the ECB announced its intentions to establish loan-by-loan data requirements for ABS in the Eurosystem collateral framework, with the aim of improving transparency and helping to restore investor confidence in the European securitisation markets (the “ABS Loan-level Data Initiative”).

An important element of the initiative was to reach out to ABS market participants to ensure a broad consensus on what the format for loan-level data should be in order to capture all relevant requirements for the development of data templates. Hence a number of Technical Working Groups (TWG) were formed to advise and assist the ECB to in formulating and finalising the specific ABS reporting templates for Residential Mortgage-backed Securities (RMBS), Small and Medium-sized Enterprises (SME) ABS, Commercial Mortgage-backed Securities (CMBS), Auto ABS, Consumer Finance ABS, Leasing ABS and Credit Card ABS. The TWG members were chosen from leading investors, originators, rating agencies, industry associations and five National Central Banks.

A similar initiative was also launched by the Bank of England (BoE) for UK based ABS transactions and the resulting templates have a high overlap with the ECB developed ones. The BoE initiative also includes transaction documentation and cash flow analysis but no centralized portal has been developed to store all BoE loan-level data as we write.

In June 2012 European DataWarehouse GmbH was founded in Frankfurt as the central data portal of the initiative and it started its operations officially on 3 January 2013. ED has in total 17 shareholders at present and is in principle as a market initiative open to new shareholders. A specific corporate governance structure has been created to ensure the nature of ED as a “utility” whereby ED should follow a “costs-plus” approach rather than a profit margin. To that effect, ED maintains an independent pricing committee that sets the fee structure for ED clients and services.

With the functional requirements and with the service being used by financial entities and banks, ED needed to be hosted from a central and independent data platform enabling the upload and download of data on a realtime basis. At its operational core lies the database system called “Edwin” which has been specifically created for ED. Edwin is an integrated software platform with high performance data processing capabilities specifically designed to collate ABS loan-level information into a single, centralized database. Edwin offers a standard interface to integrate with analytical applications of ED data users, enabling them to perform their own analysis and build their own transaction models for valuation purposes.

### **ECB LOAN-LEVEL REQUIREMENTS FOR ABS IN THE EUROSISTEM COLLATERAL FRAMEWORK**

The following outlines more specifically the loan-level requirements of the ECB for asset-backed securities (ABS) accepted as collateral in Eurosystem credit operations.

ECB Loan-level reporting requirements for RMBS and ABS backed by SME loans are in place since 3 January 2013. For CMBS, they started on 1 March 2013. Reporting requirements for the remaining relevant asset classes, i.e. for Consumer Finance ABS, Auto

loan ABS and Leasing ABS started on 1 January 2014 while for Credit Card ABS started on 1 April 2014. The reporting requirements apply to both existing and newly issued ABSs and as of the implementation date for each of the asset classes loan-level performance data must be provided to ED in order to become or remain eligible for the Eurosystem monetary operations.

The ECB published a series of reporting templates for each asset class defining a number of mandatory and optional data fields to be completed and reported at least on a quarterly basis, no later than one month

following the due date for interest payments. An important point is the anonymisation of data in line with the various data protection laws across Europe. A key concept is hence the absence of any personalized data such as name or address details.

The ECB templates need to be completed on a 'comply or explain' basis, therefore ECB has introduced seven predefined "no data" ("ND") explanations which clarify the reasons for any unavailability of data for particular fields. Figure/Table 1 exhibits the various "ND" options and their meaning.

**Figure/Table 1**

No Data Option	Explanation
ND 1	Data not collected as not required by the underwriting criteria
ND 2	Data collected at application but not loaded in the reporting system at completion
ND 3	Data collected at application but loaded in a separate system from the reporting one
ND 4	Data collected but will only be available from YYYY-MM
ND 5	Not relevant at the present time
ND 6	Not applicable for the jurisdiction
ND 7	Only for CMBS loans with a value less than EUR 500,000 i.e. the value of the whole commercial loan balance at origination

Source: ECB

Loan-level performance data files uploaded to the ED platform are automatically validated for compliance with the ECB taxonomy by the ED software and a score is generated and assigned to each ABS transaction following the submission and processing of loan-level data. This score reflects the number of mandatory fields reported as "ND 1" and the total number of mandatory fields reported as "ND 2", "ND 3" or "ND 4" (relative, in both cases, to the total number of mandatory fields). The options "ND 5", "ND 6" and "ND 7" may, in this regard, only be used if applicable to the relevant fields in the data reporting template. The two thresholds are combined to produce a matrix indicating the range of possible scores for loan-level data (Figure 2).

There is a 9 month phase-in period based on the implementation date of each of the respective asset classes, whereby each ABS

**Figure 2**

Scoring matrix		ND 1 fields			
		0	≤10%	≤30%	>30%
ND 2, ND 3 or ND 4	0	A1	B1	C1	D1
	≤20%	A2	B2	C2	D2
	≤40%	A3	B3	C3	D3
	>40%	A4	B4	C4	D4

Source: ECB

is assessed with reference to the availability of information for mandatory fields in the ECB loan-level template. Each quarter a higher score need to be reached in order to retain ECB eligibility<sup>1</sup>.

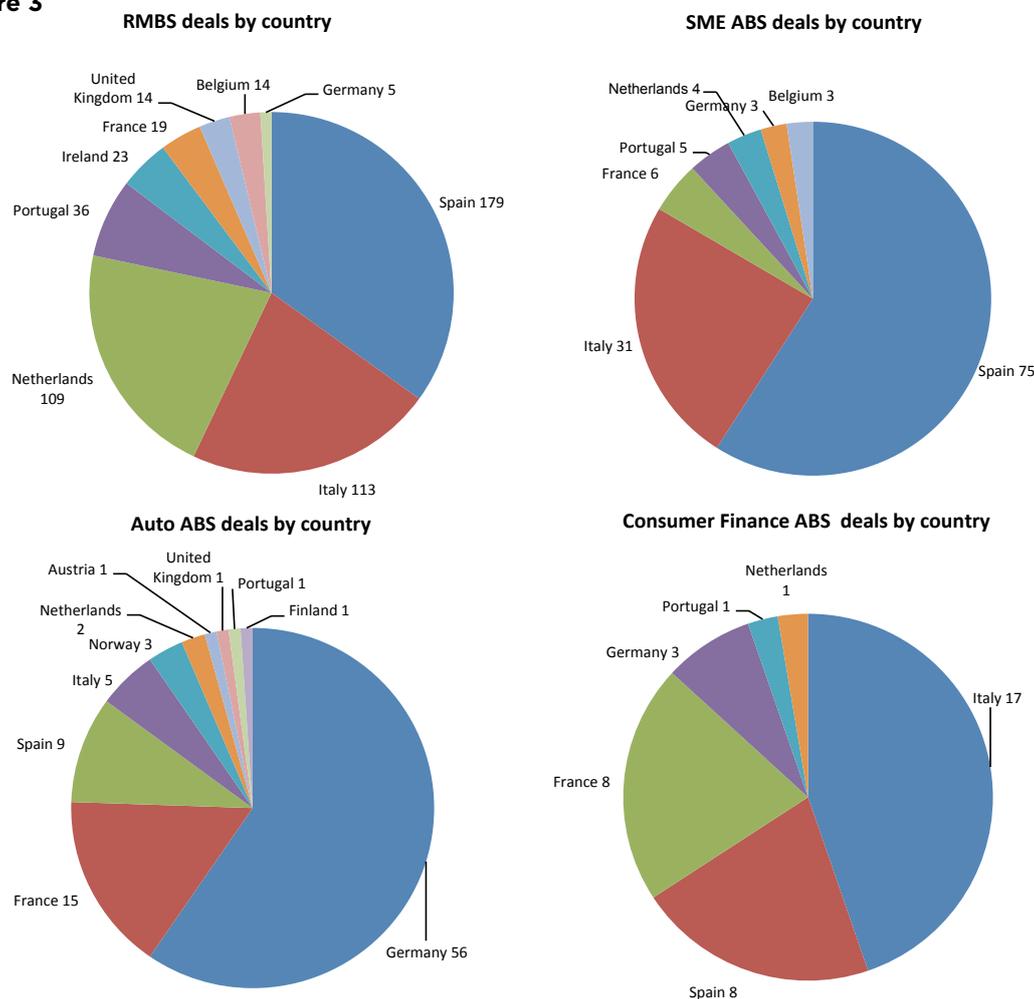
#### CURRENT STATUS OF IMPLEMENTATION

Overall more than 800 RMBS, CMBS, SME, Auto, Consumer Finance, Leasing and Credit Card ABS deals have been created and loan-level files have been uploaded in ED as of Q3

2014 complying with ECB loan-level reporting requirements. Figure 3 charts exhibit the breakdown of ABS deals in ED by asset class and by jurisdiction. ED started on-boarding Auto, Consumer Finance and Leasing ABS transactions in Q4 2013 ahead of the start date of the implementation of ECB loan-level reporting requirements on 1 January 2014. In September 2013 the ECB introduced loan-level reporting requirements for ABS backed by credit card receivables which started on 1 April 2014.

ED coverage by countries and asset classes is broadly representative of the underlying ABS markets with the exception of UK RMBS. There is a focus at present on ECB eligible deals but increasingly voluntary reporting will become relevant, in line with the mission to be a market initiative benefiting investors and issuers, thus some sectors such as the UK non-conforming RMBS market or more generally transactions in non-Eurozone countries are expected to be available over time.

**Figure 3**



<sup>1</sup>Further information can be found on ECB website at the following link: <http://www.ecb.int/mopo/assets/loanlevel/implementation/html/index.en.html>

**Figure 3 (cont)**

**Leasing ABS deals by country**

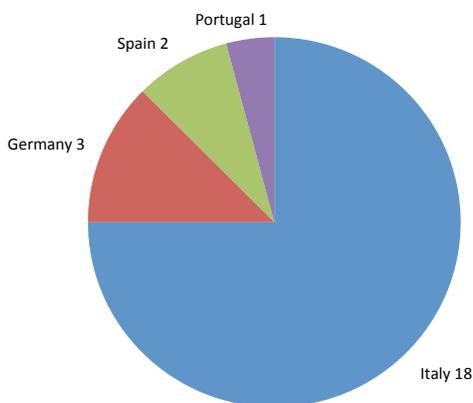
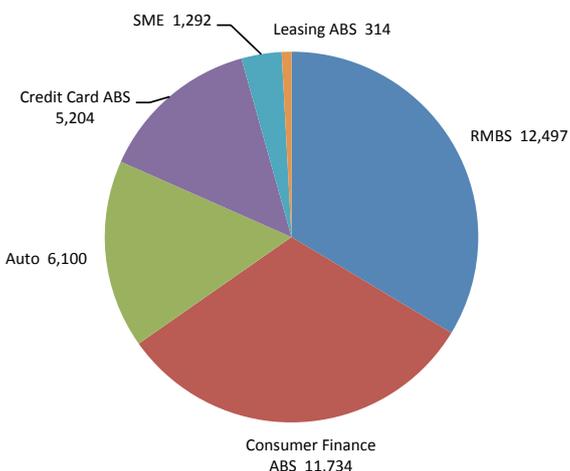


Figure 4 chart shows the split by loans or loan parts by asset class of the securitized loans uploaded to the database and Figure 5 displays the breakdown of the RMBS loans or loan parts by country of assets. These charts are not entirely representative of the underlying market as they are slightly skewed due to some countries such as e.g. the Netherlands having a high proportion of loan parts in the securitizations.

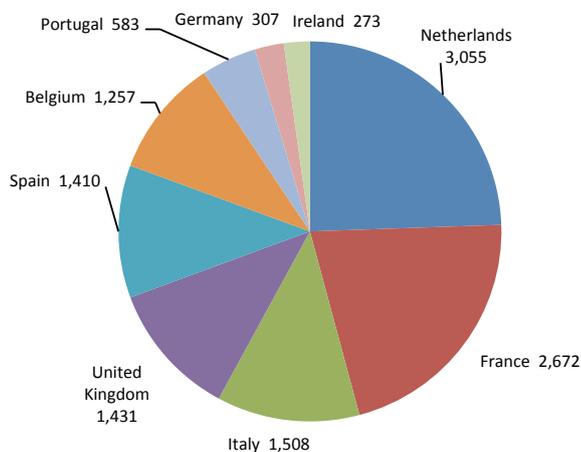
**Figure 4**

**No. of loans or loan parts\* by asset class**



**Figure 5**

**No. of RMBS loans or loan parts\* by country**



Initially loan-level data files uploaded to ED are validated in terms of completeness of mandatory fields and compliance with the specific published ECB taxonomy. ED also monitors timeliness and security aspects of the uploaded data and performs certain data consistency and accuracy checks.

It is important to stress that ED does not make any judgments on the quality of the loan or portfolio quality though performs internally a number of data consistency and accuracy checks to ensure that the loan-level data accurately reflects the underlying collateral and are presented in the correct format. Detailed analysis of the uploaded data as well as rating or investment considerations are clearly performed at the data user level rather than by ED itself.

Analysis of the loan-level data has shown that data quality can vary between transactions. Since the end of last year ED is performing continuous data consistency and accuracy checks on the loan-level data files. In the beginning the purpose of the checks was to detect the widespread data formatting issues

\* All amounts in '000s (K). The loan count calculation is based on the total number of loans reported for each transaction in ED to date

in the loan-level files. While there are many underlying reasons, a key issue remains the IT infrastructure of issuers and servicers in the ABS space. Since February this year ED has developed a more systematic rules based approach and performs regular checks on the uploaded loan-level files identifying and communicating to the data providers data quality issues that need to be addressed. Looking at the experience of the US markets, where loan-level data has been more prevalent, albeit in non-standardized format, data quality and timeliness issues have taken a relatively long time to result in high-quality loan-level reporting. Over time, the building up of a historical loan-level performance database will also allow the analysis of credit performance trends on a detailed basis.

#### **A CLOSER LOOK AT BENEFITS AND LIMITATIONS FOR ABS INVESTORS**

In the absence of loan-level data the market had to rely on rating agencies and market analytics companies to build so called “replines”, i.e. group of loans within a portfolio with similar characteristics most commonly used in order to perform e.g. scenario analysis or to generate specific cashflow models. Disclosure of loan-level data allows investors to custom build their own transaction models necessary for their own valuation purposes. Analysis of historical loan-level data available could reveal some key insights about the performance as well as the main drivers of the credit performance for specific ABS sectors, allowing the better assessment of credit risk inherent in the pools. Insofar investors have now largely the same information as e.g. rating agencies to evaluate an ABS transaction.

Standardization of the ECB loan-level templates has allowed the harmonization of reporting and provides greater consistency in a still fragmented ABS market. This also

greatly helps the comparability of transactions and portfolios across markets and allows more systematic statistical analysis and due diligence, particularly once more loan performance information is added over time through the upload of updated quarterly data.

Feedback from the market indicates that even without longer historical time series the loan-level data brings important transparency especially for hard to value sectors, examples include Spanish and Irish RMBS. It has been suggested that insofar the loan data has price relevant information to investors and traders.

Limitations for investors should be however not omitted and broadly go in two directions: first, while the templates are standardized, the underlying loan market clearly is not harmonized and e.g. different default definitions across countries make a full “apple-to-apple” comparison not yet straightforward. Secondly, rating agencies and analytics companies are still relevant in the assessment of ABS transactions in our view as they have built up considerable experience and time series which can be typically only replicated by larger institutional investors with a commitment to invest in systems and know-how. Moreover, a rating allows for both a quick assessment and a second or third opinion about a particular ABS. Also analytics providers remain important as the “raw data” needs to be filtered, aggregated or otherwise be analyzed in order to distill the essence of the portfolios for investment decisions. ED is expecting that ABS analytics tools will be enhanced through the loan data as it allows for much more detailed analysis in terms of e.g. scenario tools or forecast models.

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### **CONCLUSION**

Since the onset of the crisis, significant reform efforts have been undertaken to improve the disclosure and transparency of ABS loan-level information in a more standardized, systematic and sustainable way. ED as one of these market initiatives which has been developed and is owned by market participants, and which is endorsed by the Eurosystem, will continue to contribute to increasing transparency in the European ABS market. While transparency alone will not suffice, the authors believe that it will be one cornerstone to the recovery of the securitization market.



# Restoring confidence through transparency

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## An evolution in European electronic fixed income and transparency

### SUMMARY

- **Market participants are moving towards e-trading in their fixed income operations as a better way of doing business ahead of regulatory decisions**
- **New regulations such as MiFID II are having strong emphasis on best execution, and therefore accurate and reliable market data is assuming a more critical role than ever before**

Fixed income markets in Europe are about to change. The MiFID reforms being formulated in Brussels will have a profound impact on all market participants, buy-side and sell-side, execution venues and infrastructure providers. But while the policymakers have been debating the final calibrations, a paradigm shift has been taking place in the market itself.

Three years of crisis in the eurozone have thrust the government debt market into the public spotlight and transformed the way bonds are viewed, valued and traded. Slowly but surely, fixed income market participants have taken it upon themselves to instil their trading operations with the transparency that has formed the basis of the regulators' discussions – thereby setting best practice for the new market landscape before the authorities had even put pen to paper. And the levels of transparency required in today's risk adverse and compliance-sensitive environment can only be achieved through one method – electronic trading.

While the new regulations are unlikely to actually make electronic trading mandatory, the European Commission has stated that they do not see that the regulatory objectives can be achieved through the use of pure voice trading. Although the specific details are still being thrashed out, there are a number of clear intentions in MiFID II including a significant focus on increasing levels of pre- and post-trade



transparency, which regulators believe can be achieved largely by shifting more participants towards trading on electronic platforms.

### MARKET DATA AND THE DEMAND FOR TRANSPARENCY

Irrespective of asset class, informed trading and management decisions rely on access to optimal market data.

However in fixed income, before the crisis erupted, money was made or lost on moves of one hundredth of a percentage point - one basis point - or less. Now, much larger swings happen daily and so price discovery, verification and validation are more important than ever before.

MTS Data delivers real-time tradable - never indicative - prices across the entire European government, quasi-government and covered bond market, allowing fixed income dealers to set best practice in this field.

New regulations such as MiFID II will have a strong emphasis on best execution, and therefore accurate and reliable market data will assume an even more critical role than currently. Inevitably all platforms offering best execution will need connectivity to sources of reliable market data.

While the influx of electronic trading volumes will introduce new data sourcing and management challenges, the idea is that eventually the introduction of a consolidated tape and best execution will protect the market. The mechanisms and timing of such a system are still under discussion, but again it will depend crucially on the wide distribution and use of accurate market data.

On the back of both regulations and client demands, banks have also started to move from end-of-day valuations to intra-day or even real-time checks to drive accurate analysis, pricing and risk management decisions.

Increased scrutiny on valuations has evolved the way this data is viewed and the additional information provided with valuation data is in direct response to this need for transparency. Valuations providers now frequently publish their methodology, provide detailed responses to challenges and work to offer a complete understanding of how a valuation is created, something that just a few years ago many were unwilling to share is now expected.

This requires very rich market data, delivered with minimal latency. MTS has always put client demand at the forefront of its technology development and innovation, and with the market asking for low latency fixed income data, the company has developed MTS Live, a new ultra-low latency data distribution facility, offering participants comprehensive un-aggregated order information for the most liquid bonds traded on the MTS Cash market.

Data is based on the constant tradable pricing for the bonds traded on the platform, giving participants access to the full range of information in between ticks. This kind of service is likely to see significant uptake in the near future as market participants require ever-increasing levels of data granularity to be as transparent as possible.

### THE VALUE OF HISTORICAL DATA

The industry is also consuming more historical bond data, as regulators, DMOs and buy-and-sell-side institutions use it to back-test strategies in order to analyse their performance against real market conditions as well as for research purposes. The transparency and accuracy of the historical data is of paramount importance to back-testing; it must give a true reflection of the market at any given point in the past. Understanding the risks and opportunities of a particular strategy before trading is more critical than ever when managing complex products in a market with increasing reporting requirements and regulatory oversight.

### CONCLUSION

There is no doubt that the landscape of the European fixed income markets is changing driven by the natural evolution combined with regulation such as MiFID II. There will be much work needed to prepare for clearing and trade reporting requirements, and certainly a move towards electronic trading. In terms of execution, it is likely that even a number of electronic trading venues themselves will not meet the requirements and will require substantial changes. Participants will need to examine their execution, clearing and reporting arrangements, evaluate which providers are compliant and which are not, and get ready for change.



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or visit [www.mtsmarkets.com](http://www.mtsmarkets.com)

Transparency is set to remain at the forefront of the agenda as regulations take shape over the coming period and the fixed income market evolves at a more rapid pace than ever before. Market data has already taken centre stage as participants across the buy-side and sell-side attempt to set best practice ahead of the final regulatory decisions, and by choosing the most accurate, transparent data providers, the market can rise above the aftershocks of the financial crisis and become more efficient as a whole.

**TO FIND OUT MORE ABOUT MTS DATA,  
PLEASE CONTACT:**

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## Model Validation: New Approaches in Testing Mathematical and Financial Correctness of Models

**David Eliezer**, PhD, Vice President, Head of Model Validation, Numerix LLC (June 2014)

**Driven both by regulators and internal pressure to avoid losses due to poor modeling, the validation of derivative pricing has received a burst of renewed interest in recent years. An onslaught of new regulations and revived attention to this field have lit the spark for exploration into best practices for model validation - including enlightened new approaches in testing mathematical and financial correctness of models and using automated model tests to improve derivative pricing models.**

Basel 3, Dodd-Frank, Solvency II, and of course, the Supervisory Guidance on Model Risk Management (OCC Bulletin 2011-12) all continue to force a major shift in model risk governance and current model validation best practices. This has led us to explore new model validation approaches, including testing with mathematical identities.

### **NEW TESTING APPROACHES, COMPUTE POWER AND SATISFYING REGULATORS**

We all know that the validation of derivative pricing models can be a slow, labor intensive and expensive exercise. In addition, it often provides a limited amount of certainty on the correctness of the pricing models, because methods for validating pricing models are often generic methods that can be applied to any kind of software. However, since pricing models are mathematical models, they satisfy mathematical identities which can provide strong tests that leave very little possibility for error. Furthermore, these tests provide failure conditions that require no human judgment, that can be automated, and that can therefore run over tens of thousands of test scenarios.

Significant advances in computing power such as the cloud and grid computing now make automated testing more accessible to market practitioners—making the testing inexpensive, rapid, and easy. (Testing of this kind is completely and straightforwardly parallelizable,



and small-scale experiments have shown speedups as large as a factor of 12). Automated, parallelized testing results in a faster time-to-market for validating models, and a stronger case can be made to regulators that models are thoroughly tested and correct. In this article, we will examine model validation as it is typically practiced today and then explore new approaches, including the benefits of testing with mathematical identities.

### MODEL VALIDATION AS IT IS PRACTICED TODAY

How can we begin to seriously mitigate the risks due to model failure? A model's dynamics are implemented by a fairly large set of complicated code. How can we be certain that such a mass of computation is free of bugs? Model validation, when implemented correctly, is one form of protection.

#### Parallel Implementation

The current standard for validation of stochastic dynamics is the method of parallel reimplementations—in which the model is validated by having another quant independently implement the model from the model documentation alone. This alone doubles the cost of the model development. Then, the two models are reconciled in a point-by-point fashion, and through this fairly laborious process, the bugs are hopefully worked out. Model development is expensive to begin with, and validating that model by parallel reimplementations makes it far more expensive.

Parallel reimplementations relies on the improbability of two quants not making the same errors. This works well most of the time, but there are occasionally misconceptions that are common to many quants, and errors of this kind can get through this test. One example of this is the reflecting boundary condition that is necessary in CIR-type processes: It was very commonly omitted in implementations, until a flurry of papers in the literature cleared up this point.

#### Convergence and Stress Tests

In addition to this, sanity checks, such as convergence tests and stress tests can also be performed. Stress tests involve taking market

inputs, payoff parameters, or model parameters to extreme values, and looking for unreasonable behavior, such as singularities, or violations of arbitrage conditions. This is designed to detect problems of implementation that don't reveal themselves under ordinary conditions, but only when conditions are extreme (as in a crisis, when debugging suspicious behavior in pricing functions falls to the bottom of the priority list.) Stress tests like this require human judgment, and cannot be automated, because most of the failure conditions are not easily definable.

Convergence testing involves simply evaluating the pricing function at various values of its approximation parameters (e.g. number of paths, number of timesteps) in the hope of observing either visual or analytical evidence suggesting that the function is settling down to an asymptote as the approximation parameter approaches its limit. A proof of convergence, in the sense understood by mathematicians, is not feasible in a numerical setting—but, empirical evidence suggesting convergence is adequate for the purposes of finance.

### TESTING WITH MATHEMATICAL IDENTITIES

Derivative pricing is a mathematical process, and it satisfies mathematical identities. These identities are what guarantee the model is what it is. By checking them, we can actually come up with tests that make use of the certainty that theorems provide. They aren't full mathematical proofs, but they come as close as we can get with numerical experiments. Identities are far easier to check, and can be checked far more thoroughly. The conditions, being mathematical, require no judgment, and can be automated.

This approach has the advantage that it is not labor-intensive, and does not rely on the unlikelihood of two quants making the same errors. It uses computer time instead of human time, and so is less expensive. What this means is that we can check this condition not for just a few, typical values, but thoroughly, over a large testing domain, by choosing thousands of examples from within the domain, on which to run the test. The clear-cut nature of the failure conditions means that a human need not examine each such example to decide with his judgment whether the test passes.



### Partial Differential Equation (PDE) Test

The simplest check one can make is to use the uniqueness theorem for equations of heat type, which states that the function that satisfies the boundary conditions given by the payoff and the PDE of the model is unique: it is the model's price for that payoff. This means that one can simply check the model's payoff (i.e. this can be done by setting the volatility to zero, and adjusting the model's drift parameters until every desired payoff scenario is confirmed to yield the quantity specified in the payoff.) The only requirement then, is to check that the function satisfies the PDE of the model it is using.

How can this be done? It is tricky, because a pricing function is an approximation, and is not expected to satisfy the PDE exactly. We cannot evaluate the exact PDE operator on the solution anyway, in a numerical setting. The key is to have not just a single function, but a family of functions, indexed by a single approximation parameter, along which we may take limits. It is straightforward to show rigorously that the limit of the solutions does satisfy the exact, limiting PDE, if an approximate PDE operator acting on an approximate function vanishes in the simultaneous limit of both approximation parameters reaching their limits—along with a few other convergence conditions.

Of course, when probing a pricing function numerically, mathematical proofs of convergence are not really possible. Instead, one can amass evidence for the convergence conditions that the testing theorem above requires, in the same way that one does for ordinary convergence tests. Note that testing throughout the domain is a necessity for the PDE test to conclude that the pricing function is valid, otherwise the pricing function, even at tested points, might be very different from the true solution to the PDE.

### Calibration Round Trip Test

The PDE test does not address the selection of model parameters, by the process of calibration. Calibration is a difficult problem, famously so, and is often ill-defined. In fact, most models in use today encapsulate dynamics represented by just a few-parameter-family of volatility surfaces with which to fit the full universe of possible option prices that we see in the market. When the market's volatility surface is very similar to the model's, then the solution to the calibration problem is likely to be meaningful, if not unique. But if the market volatility surface is very different from any of the model's volatility surfaces, a least squares solution defining the model's parameters won't be very meaningful, because the calibrated volatility surface won't look anything like the market volatility surface. The result will depend sensitively on details of the definition of the problem, such as the choice of objective function; and, in particular it is very difficult to know whether the solution that the calibrator has found is near to the optimal solution. Furthermore, it is irrelevant, as such a solution is unlikely to lead to conspicuously better hedging.

Therefore, the calibration problem is really only financially meaningful when the market volatility surfaces are "close" in some sense to the model's volatility surfaces. In this situation, the sensitivity to the problem setup is greatly reduced, and the problem becomes very well defined—precisely when the market data comes from the model, although not with a unique solution. In this case, there is an exact solution, and the optimal solution is one in which the error in all option prices is zero, although there may be more than one solution. We may decide very simply whether the calibration problem has been solved - the calibration error should be within the calibrator tolerance.



Thus, one may construct a strong test for the calibrator by picking some model parameters for our model, and some calibration instruments (i.e. options), with their strikes and maturities, and we price the options in the model with its given parameters. This will provide us with a volatility surface that is exactly compatible with the model we are testing. Calibrating another instance of the same model to these options should result in zero calibration error, and if it fails, the calibrator did not find the optimal solution.

As in the PDE test, the availability of a well-defined failure condition means that one may run this test thousands of times, with different input parameters. This allows the tester to discover regions where the calibrator performs well, and where it performs poorly.

Even with the narrowed scope of this test, calibration is still a very difficult problem to solve. It generally requires some analytic work to find smart initial guesses, as purely numerical solvers rarely can find the true global minimum in such a complex problem as this one. Finding a calibrator that can always pass even this narrow test may not always be possible. In this case, calibrators should be compared by the percentage of cases that pass, and by how much the calibrator failed.

### **Financial Correctness and Hedge Performance**

Is the model suitable to the current market? The previous tests were designed to test the mathematical conditions defining the pricing equation for the model. But there is a deeper mathematical condition that can be tested against the market data, forming a test that evaluates how similar are the model's dynamics—including both marginal and conditional distributions—to those realized in the market data.

Recall that the defining condition of the Black-Scholes Merton pricing framework in any framework is the minimization or elimination (when markets are complete) of the variance in the portfolio consisting of the derivative together with its hedge. In practice, even models with complete hedges will not actually experience zero variance in real life because the model is not perfect. The variance that is experienced, when compared with that of the portfolio without the hedge, is an excellent measure of the quality of the model, and of its model risk.

The hedge ratios can be thought of as regression coefficients, and so the model's quality can be measured exactly as we do that of a regression, by the fraction of variance that the model's hedge removes from the instrument's performance, (i.e. by  $R^2$ .)

How can this be done? One takes a path of historical data, and just as is done in real life, calibrates and prices the model every day, and computes the hedge ratios. With this data, one may simulate actual trading and hedging of the instrument, keeping track of the PnL attribution, and hedge bleed, etc., just as traders do in real life. The change in the instrument's price, set against the hedge's change in value, is the hedging error.

This error is not supposed to be zero. In fact, it should be the cost of hedging the upfront price. But, it is supposed to be non-random, even though derived from random quantities (the remarkable fact of the Black-Scholes-Merton arbitrage-free pricing.) How can this be checked?

The difficulty is that we have only one true past history, and measurements of hedging error randomness (i.e. by variance or some other measure) requires many historical paths. This problem is addressed in other context (i.e. historical VaR) by constructing



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pseudo-historical paths. This is done by a variety of methods, but one common method is to compute all the daily increments of asset prices, or yields or implied volatilities, and store them as a probability distribution of asset price/yield/volatility movements. Then, paths can be constructed by starting with an initial set of market data, and choosing a succession of increments to add on to the initial market data. Within this framework, there are many different ways to compute the increments, but it is straightforward to find methods that preserve all basic qualitative behavior—ensuring that overall volatility, skews, kurtosis, yields and asset prices all go up and down when they are supposed to.

In this way, one may construct the paths necessary to compute the variance of the hedged portfolio. Additionally, we may regress the hedge error back on the hedge instruments. The hedge is supposed to be optimal, so the regression coefficients should come out close to zero. Their nonzero value serves as another measure of the imperfection of the model, and in fact guides as to how to improve the model. If the regression coefficients are significantly positive, then the hedge is an under-hedge—if negative, it is an over-hedge. The level of significance can be estimated by the increase in  $R^2$ , due to replacing the hedge ratios with 'optimal' ones according to this regression. If the improved hedge ratios lead to a significantly greater  $R^2$ , then it is clear that it is worth changing the hedge to improve the model. This may even be done with new, proposed hedge instruments.

The variety of incrementization methods means that this test should properly be done with several such methods, to ensure that a consistent message emerges. If consistency is found, however, the test may be used as an effective measure of the fidelity of the model to the true market probabilities.

### MODEL VALIDATION WRAP-UP

Great improvements to our process and to our industry are possible through a smart approach to model validation. Increasing regulations and significant losses due to model failures have beefed-up interest in the field of model validation, paving the way for new approaches. Mathematical identities of models can be used to provide a strong and automatable testbed for pricing model implementations. Backtesting of pricing models can similarly be strengthened by testing the mathematical properties the model is designed to have, the optimal reduction of variance. This kind of backtesting provides tremendous opportunities for deeper analysis to find the causes of model breakdown, and the path to model improvement.

### AUTHOR BIOGRAPHY

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Mr. Eliezer has been a quant on Wall Street for 18 years, at Goldman-Sachs, Morgan Stanley, General Re Financial Products, and Bloomberg, among others. He has published work on option pricing, and on modeling liquidity in finance. He runs the internal testbed for Numerix models, and he leads the Model Validation group at Numerix.

1 References: Board of Governors of the Federal Reserve System, Office of the Comptroller of the Currency, Supervisory Guidance on Model Risk Management (OCC Bulletin 2011-12) dated April 4, 2011

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## Defensible Valuations of OTC Derivatives and Structured Product Assets

By **Dr. Greg Cripps**, President, Prism Valuation

**What are the important attributes of quality derivative and structured product valuations?**

**In this article we discuss some key terms and concepts in the valuation of OTC derivatives and structured products and discuss the various attributes which render valuations defensible.**

**We begin with some definitions of “valuation”:**

**1. Common usage (OED):**

*“An estimation of the worth of something, especially one carried out by a professional valuer: it is wise to obtain an independent valuation”*

**2. Accounting (IFRS13, SFAS 157(ASC 820-10):**

*“Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date”*

Valuation, or the calculation of a fair value, is one of the basic components of financial accounting and risk management. It is implicit in successful asset management that any assets or liabilities held need reliable valuations which reflect an estimate of the likely trade price if one were to transfer the asset or liability in an orderly fashion. Therefore fully transparent and independent valuation is market best practice.

Reliable and transparent valuations are sometimes easy to obtain but more often there is some difficulty involved in producing regular valuations that are both independent and defensible. By a defensible valuation, we mean a valuation which:



- Uses high quality, timely and independent underlying market data,
- Uses industry standard modeling techniques,
- Uses a proper and robust model calibration process,
- Ensures calculations are fully converged,
- Is totally transparent,
- Is supported by a responsive and informative valuation challenge framework.

In short, a defensible valuation is one which will meet or exceed requirements for quality and transparency set by auditors, regulators, risk management departments and clients.

### VALUATION APPROACHES

In some situations, valuations are performed intra-day but typically for buy-side firms they are reported at the end of the day (EOD) or end-of month (EOM) for more complex deals. Secondary market prices, often referred to as “Mark-to-Market” prices, by which we mean actual timely traded prices for some instrument as reported by a recognized exchange, trading venue or clearing house are naturally the best data to mark any held positions. The big issue here is that, particularly in the derivatives and structured products world, the instruments for which there are frequent and reliable secondary market prices is a small subset of the universe of instruments, and hence “Mark-to-Model” valuations must often be relied on as the best timely estimate of value.

As an aside, thinking more deeply about any definition of valuation, it is reasonable to say that all financial assets are in reality always marked in some type of model framework where the model reflects the mean price where a trade between two parties will occur. Even valuations for positions that trade on an exchange or trade generally in recognized secondary market venues could still be reasonably thought of as being derived in a modeling framework. In particular, such real world elements as timing, volume and liquidity are generally not considered when marking such positions at for example EOD published market prices.

This is certainly not to cast aspersions on such valuations, but simply to say that in all cases it is important to understand the assumptions that underpin the valuations and that there is really no such thing as “mark-to-market” pricing for held positions - only mark-to-model where there are assumptions applied and varying degrees of complexity and defensibility of the model.

When underlying data is patchy, intermittent or non-existent, or when the pay off structure is complex, possibly including dependence on correlation and/or unobservable abstract model parameters (e.g. mean reversion), the valuation framework has to be more sophisticated in order to provide a set of logical arguments that lead to a defensible valuation. Depending on the liquidity of the underlying instruments, the nature of the pay-off structure, credit issues and so on, the framework can be complex and the set of logical arguments to defend the valuation methodology lengthy.

In the past, many institutions relied solely on counterparty mark for their OTC derivatives and on structured product broker dealers for their structured product valuations. There is, however, a significant hazard inherent in this approach, since the provider of the valuations has an obvious interest in them. Therefore current conventional wisdom is that it is important to have a fully explainable, transparent valuation and an independent valuation process, housed outside of the front office and not reliant on dealers or other potentially biased sources. In many jurisdictions this is compulsory. These valuations with explicit explanations could be produced in-house or through the use of an independent valuation vendor.

There is a consensus that more and more derivatives will be centrally cleared in future and transparent pricing via the exchanges will be forthcoming for more and more deals. However it is also likely true that many non-vanilla and non-standard deals will remain OTC for the foreseeable future. In addition, derivative exchanges often do not give the granularity of information and timing of valuations required by asset managers and investors to satisfy reporting requirements and best calculate inherent risks.



Hence independent valuation and risk analysis of even exchange traded derivatives will be provided by vendors to holders of cleared derivatives. In this case, the value of the vendor's offering will be largely measured by time of delivery and comprehensiveness of data offering; the core defensibility of such valuations will be determined by comparisons to clearing house data. Variations will be easily tracked by analyzing historical performance. For simple products with liquid underlyings, there should be little or no difference between timely vendor valuations and EOD clearing house prices.

Structured products and complex derivatives will continue to be offered for the foreseeable future by dealers wishing to satisfy their customers' bespoke risk requests. In addition, it is highly likely that the evolution of products offered to customers will outpace the adoption of these deals into central clearing. However, regulations including Dodd-Frank and EMIR will push these OTC deals to be centrally reported and trade terms and conditions (T&Cs), valuations and related data (risk analysis, credit exposures, initial margins etc.) will need to be sent to governing authorities. This will naturally increase the scrutiny of valuations in future and compliance will force all agents to better understand valuation issues. Defensible valuations will make this process easier allowing for continued investment choices in the world of increased regulation.

It is also worth reiterating that all risk analysis begins with a reliable, accurate and defensible valuation. A valuation is an essential building block for all subsequent calculations of key risk parameters (market sensitivities, CVA/DVA/FVA, PFE, and VaR) of which many are or will be eventually included in regulatory reporting and are essential for providing the measures to help answer the following pertinent risk questions:

- **Attribution** – can a change in valuation be predicted by all the relevant sensitivities (hedge instruments) and market factor movements? What is the magnitude and reason for any deviance from this prediction?
- **Credit Exposure** – What is the credit exposure to each side of a trade?
- **Exposure Limits Monitoring** – Are any sensitivity limits or other risk limits being breached?
- **Margin** – What is the Initial and Variational Margin?
- **Investment Performance** – What is the performance of an investment relative to an index or other investment?

Compliance to the new and evolving regulations are part of the fabric of investment management, having transparency and scrutiny of the regular valuation process is critical to good risk management and is also a vital part of ensuring that the optimal return is achieved relative to the risks taken for any investment portfolio.

#### STRUCTURE OF A VALUATION FRAMEWORK

Most OTC derivative (unique to two counterparties) and structured product deals (most often private placements) must be valued in a "bottom-up" valuation framework approach where each deal is modeled individually referencing original deal documentation (prospectus or deal confirm) and synthesizes: a mathematical model, underlying market data, a calibration strategy and adds any other necessary adjustments (for example, credit, funding, counterparty relationships,...).

In more detail, the bottom-up approach consists of the following steps to yield a logically consistent valuation method: a rigorous mathematical modeling and computational framework combined with model targeted calibration strategies constructed using the maximum of the available liquid underlying data which effectively covers all of the inherent risks in the deal, while also minimizing the use of any un-observable parameters and should also be generally well-behaved (converges and allows for sensitivities to be easily calculated). This contrasts with the grid pricing method, where benchmark deals, either real or constructed, are used as “points on a grid” and deal valuations are obtained by linear interpolation or extrapolation methods from the points on the grid. A grid method is often used for valuing asset backed bonds but is not suitable for complex structured bonds and anything but the most trivial derivative deals.

The bottom-up approach requires both financial modeling expertise, access to the best sources of underlying market data and number-crunching capability. Thus we arrive at the three cornerstones of a successful valuation – People, Data and Models. All of these components are important but it is safe to say that the process to obtain reliable and independent underlying data is often the hardest element to sustain and most often drives the models used and the complexity of the calculations required.

Defensible valuations generated by a bottom-up framework require full transparency on the following elements:

### 1. Appropriate Model Choice:

What is the most appropriate way to value a given trade? In general there is a tradeoff between model complexity and the ability

of the model to fit underlying market data. Hence in general the simplest model which can capture all of the relevant, liquid underlying risks is to be preferred. The specific choice of model is dependent primarily on what underlyings would be used to hedge the deal, the model distribution (e.g. normal, log-normal, multi-factor, stochastic volatility, etc.) that should capture the pay-off possibilities correctly and the ability to calibrate to the necessary hedge instruments. It may be that dependence on additional parameters such as correlation, generally not directly observable in the market, may be important for pricing the trade; in this case these parameters must be determined in a way which is appropriate and consistent with methodologies used by market participants. This may require the model to have a certain dimensionality and possibly further introduces other non-directly observable parameters that need to be calculated. For example, for a deal type that depends on the volatility of volatility such as a cliquet equity option will need to be calibrated to a stochastic volatility model (e.g. Heston) in order to capture the significant risk this deal has to the variance of volatility. Even though some of the stochastic volatility parameters may not be directly observable, it is important to estimate these as best as possible and capture resulting volatility surface evolution to which this deal pay off is sensitive. Finally, it is crucial that the chosen model be implemented in an appropriate and stable fashion (analytic formulae where possible, fully converged grid or Monte Carlo methods where this is not possible).

### 2. Unbiased Underlyer Data

It is important to determine the best data to use to calibrate the selected model and capture this data in a reliable fashion.



The data must be independent, unbiased and timely. Market data processing such as bootstrapping, interpolation and extrapolation, should be performed in a consistent and market standard manner. Linear methods should be preferred unless there is compelling reason to use higher order methods. Other model inputs, correlations, mean reversions, and so on, are created using accepted methodologies, generally inferred from observable market data if possible and calculated using historical analysis if no data is available. (Special attention is required when calculating correlations for deals that may have very high sensitivity, for example, some basket options.) When valuations for particular deal types can be intermittently benchmarked against observed market levels, it may be possible to back out some non-directly observable parameters as adjustments to statistical calculations using historical data; this is particularly true for correlations. Any observed market prices for complex and/or illiquid deals can be analyzed to provide tests on model choice and/or un-observable model variables. The data is preferably obtained via an inter-dealer broker where any bias adjustments are negligible. However, any data is useful for benching as long as any bid/offer or credit/funding biases can be estimated and explained. Often there is no or only intermittent liquidity and therefore no price transparency for underlyings. With care though, proxy methods can yield useful data to provide reasonable ways to value a deal dependent on such underliers. Replicating the actions of a good trader, using liquid underlyings as a starting estimate of the value for any deal type that has not traded recently is a reasonable way to value illiquid trades. Complexities include choosing a good proxy and determining correlations. There may be more than one way to provide a reasonable

proxy for an underlyer and hence valid differences of approach.

### 3. Adjustments

Additional adjustments may need to be considered to account for aspects not explicitly covered by a model or market data. The relationship between derivative counterparties can play a role in each party's valuation, particularly concerning mutual credit and funding exposures and also any possible relationship value between two counterparties.

## VALUATION CHALLENGES

An important component of defensible valuations is the valuation challenge process. Where valuation differences are observed they can generally be attributed to one or more of the following factors:

**1. Trade Terms and Conditions (T&Cs):** It is obvious that one must have a full set of correct terms and conditions details in order to value a trade. However, valuation differences are often due to differences in trade setup. There is impetus here for more standardization and this will be welcomed by all parties, however it is likely that deal-type evolution will work faster than the standardization of deal terms and that effort will always be expended in ensuring accurate trade capture. Valuation vendors (Prism, Markit, Super Derivatives, and so on) are offering more and more tools to resolve this issue and there are specialist product providers that can offer matching engines to resolve T&Cs between parties (e.g. Coretexa, Trioptima).



**2. Valuation Timing:** A frequent cause of differences between valuations is the timing. This issue is easily resolved when underlying market data is provided with valuations as a point of reference.

**3. Model differences:** These are not very often seen as there is general consensus of valuation models suitable to use for most deal-types. They do on occasion occur though, particularly for more complex trades with dependence on more subjective factors such as evolution of volatility surfaces and/or correlations.

**4. Data sources:** In defending a valuation, it is very important to understand exactly where any challenge value is coming from and what underlying market data is being used. The best sources of data are independent and reliable secondary trading venues such as exchanges. Independent inter-dealer brokers, like ICAP, Tradition, Tullet Prebon and GFI are also excellent sources as the data provided reflects independent, unbiased information regarding trading prices or good two way indications. When using data aggregators as data sources, attention must be paid to where market data points are actually originating from, it isn't always from the people who are delivering the numbers. If there is no independent data potentially biased data is the next best thing as long as it is clear where it is coming from and there is some estimate of any "dealer spreads" inherent in the data; it also useful for deal valuation benchmarking or reality checks. An example of this phenomenon is the issuer of a structured note providing valuations of their paper discounted not on their secondary

market credit curves, where any other agent would likely buy or sell the asset, but at a higher price. The issuer is effectively adding a "relationship" adjustment to their valuation, this assumes that their customer will likely buy future new issues where traditionally there are significant premiums paid. It is important for any asset holder to understand these costs and hence the value of the note were they to sell in the secondary market and not back to the issuer.

**5. Theory of Relativity for Valuations:** Each party to a derivative has their own relative position in mind when valuing it, where future cashflows would be potentially funded and how any exchanged collateral might be treated. Therefore derivatives valuations will not generally be the same for both counterparties. There can be significant differences between two counterparties depending on the makeup of their mutual portfolio: their internal funding rates, their mutual CSA and netting agreement and their collateral management process.

Specific questions that should be answerable in a defensible valuation:

- How reliable are the Terms & Conditions of each deal. How are changes to deal details monitored?
- What underlying data is used? Where is the underlying data being sourced and how reliable and independent is it? Are there any potential biases in the underlying data?
- If the deal or deal type itself can be intermittently benchmarked, how well does the model perform and how reliable is the benchmark data.

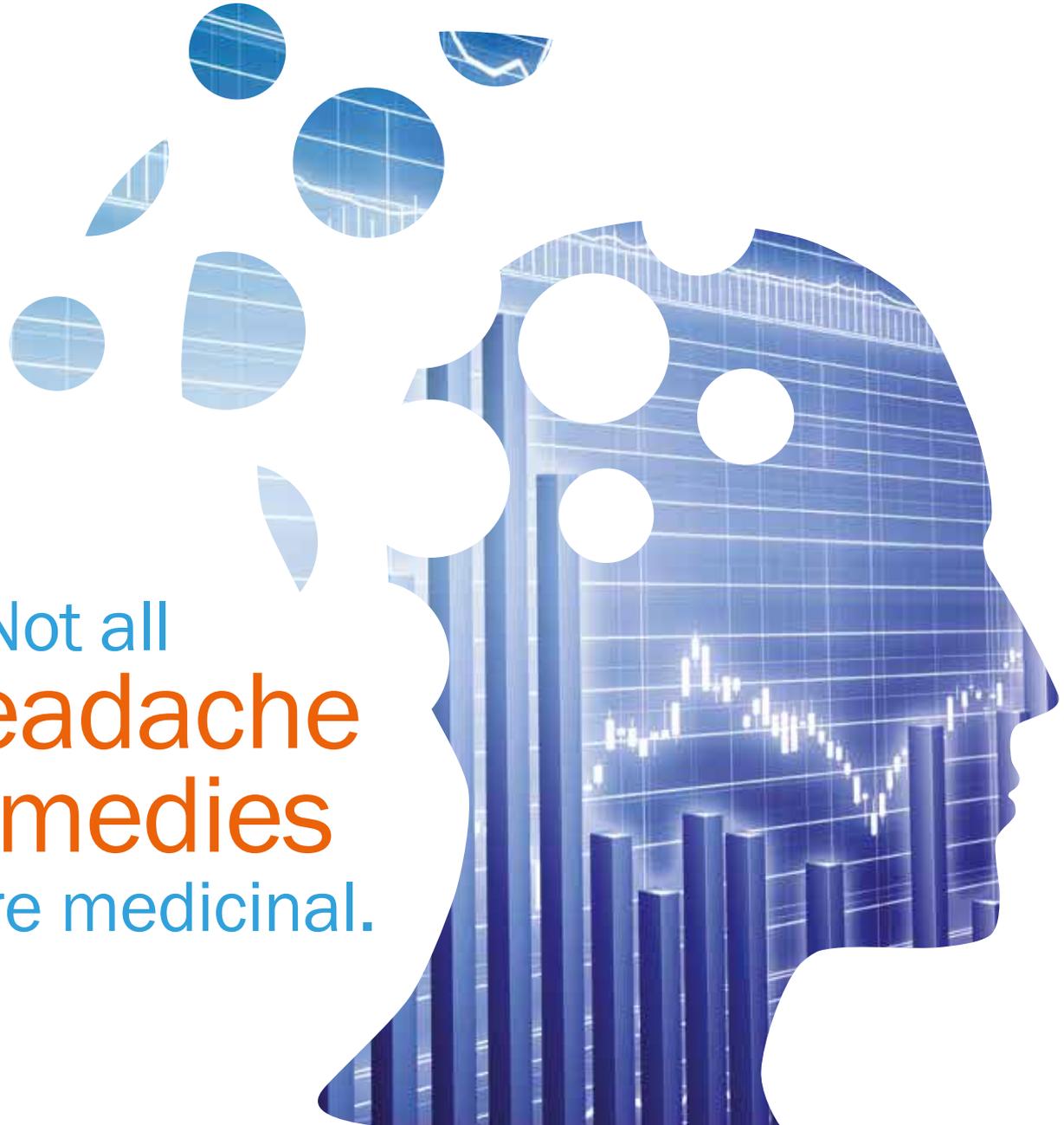


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- What primary risks are involved in a given deal and why was a given model chosen against any other? Is the model capturing all the risks, if so it is the simplest version that can do this? Is this model widely used in the financial industry?
- What is the credit risk and credit risk sensitivity and do counterparty funding levels explain any value variation?
- Is there any relationship value inherent in the deal? Can this explain any seen valuation differences?
- Can the day-over-day value changes be reasonably attributed, i.e. explained with the underlying data changes?

#### **SUMMARY**

In summary, the importance of independent valuations in the financial derivative and structured asset space is growing, driven both by evolving best practice and the ever-stricter regulatory environment. As oversight of independent valuations sharpens the importance of the defensibility of the valuations increases. Defensibility is a multi-faceted concept which addresses reliability, accuracy, transparency and support. A purchaser of independent derivative valuations should place great importance on ensuring that their vendors provide defensible valuations.



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Roland Stamm



Roland Lichters

## Modern Derivatives Pricing – CSA Discounting and XVA

By **Roland Stamm** and **Roland Lichters**,  
Quaternion Risk Management

### Abstract

**The past 10 years have brought significant change to the world of derivatives pricing. An interest rate swap that used to be a simple product has become a most complex product by applying CSA discounting and adding a host of value adjustments.**

**Keywords:** OIS discounting, CSA discounting, Funding, Counterparty Credit Risk, Central Clearing, CVA, DVA, FVA, KVA.

### 1. INTRODUCTION

The past 10 years saw an incredible change in the pricing of derivatives, a change which has not ended yet. One major driver for the change was the credit crisis which started in 2007 with the near bankruptcy of Bear Sterns, reached a first climax with the implosion of the US housing market and the banking world's downfall, and then turned into a sovereign debt crisis in Europe. While the worst seems to be over, the situation is far from normal: Central banks around the globe inject ridiculous amounts of cash into a system which is still struggling to find its way back to growth and prosperity. As with many other crises, people learnt from this one that they had made serious mistakes in pricing OTC derivatives: Neglecting the credit risk and funding led to mispricing.

The second major driver, which was itself triggered by the banks' heavy losses and the near-death experience of the entire financial system, is regulation. Banks are or soon will be forced to standardise derivatives more, clearing them through a Central Counterparty (CCP) whenever possible, thus increasing the transparency and, supposedly, robustness of the derivatives markets. Derivatives that are not cleared are penalized by increased capital requirements. Dealers are therefore caught in a

bind: They either face increased funding costs due to the initial margin that has to be posted to the CCP, or higher capital costs if they trade over the counter.

## 2. THE NEED FOR NEW DISCOUNT CURVES

The near-default of Bear Sterns and later the default of Lehman Brothers showed that a LIBOR member bank could default. The assumption that LIBOR was a good proxy of the risk-free interest rate turned out to be a fiction.

If a LIBOR member can default, that means that the credit risk of borrowing unsecured money to another bank increases with the time to maturity. Therefore, a LIBOR rate for 6 months contains a higher risk premium than that for 3 months, which in turn contains a higher premium than the rate for 1 month. The rate with the lowest credit risk attached to it is the overnight rate; if I can change my borrower every day, I can react almost immediately to a deterioration in its creditworthiness. As a result, I am not able anymore to predict the 3 month LIBOR rate in 3 months' time from today's 3 month and 6 month rates, simply because the 6 month rate contains a premium (the basis spread, see figure 1) which is not contained in the 3 month rate or the forward. See, for instance, [1] and [14], and figure 2.

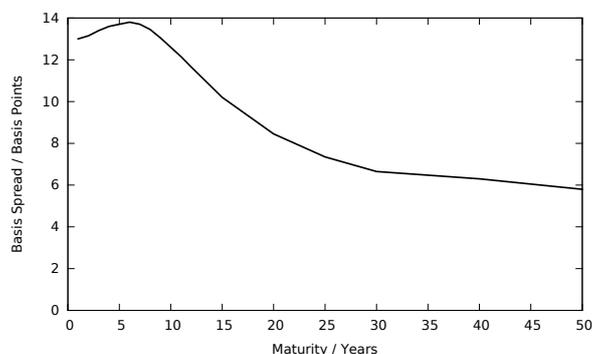
Because it is so important, we present the old formula for replicating a forward rate here: If we want to project the LIBOR rate  $f(t, t + \delta)$  for a future time  $t$  and a period of length  $\delta$  (in years), then we need the two discount factors  $df(t)$  and  $df(t + \delta)$  to compute:

$$f(t, t + \delta) = \frac{1}{\delta} \left( \frac{df(t)}{df(t + \delta)} - 1 \right) \quad (1)$$

As a result, the present value of the forward payment on a notional  $N$  is given by  $N(df(t) - df(t + \delta))$ .

What is more, the fact that virtually all derivatives between banks are collateralised nowadays means that they can also be seen as being almost risk-free (more on that later). This in turn means that derivatives are now in a different class of credit risk from LIBOR cash rates. To price them, one has to use the truly risk-free rate, which is best approximated by the overnight rate (see [10]).

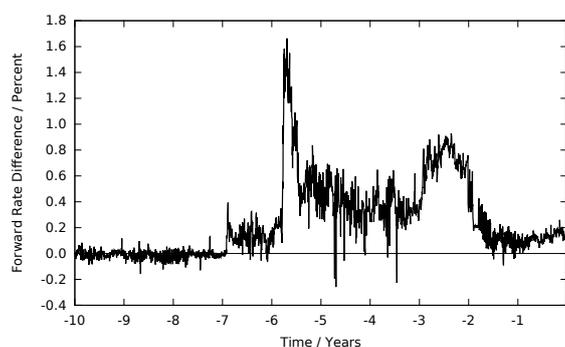
**Figure 1:** Basis spread between 6 month and 3 month EURIBOR as of 15/05/2014



### 2.1 CENTRAL CLEARING

Trades with a CCP can indeed be viewed as being virtually risk-free: Collateral has to be posted up to three times a day for positions decreasing in value (variation margin); an initial margin has to be posted to cover adverse moves of a portfolio in the period between a counterparty's default and the portfolio's liquidation; there is a safety net in the form of a fund filled by the members of the clearing house; and finally, members of the clearing house have to replenish this fund in case one of them defaults<sup>1</sup>. Any collateral with the clearing house accrues interest at the overnight rate (or sometimes slightly less). It can be shown that this also implies that the overnight rate is the one to use for discounting any cash flows from collateralized trades (see, e.g. [1]).

In order to predict the overnight rate and hence the discount factor for times in the future, we use the quotes for overnight-indexed swaps (OIS), a swap type which exchanges a fixed rate for a daily compounding overnight rate.

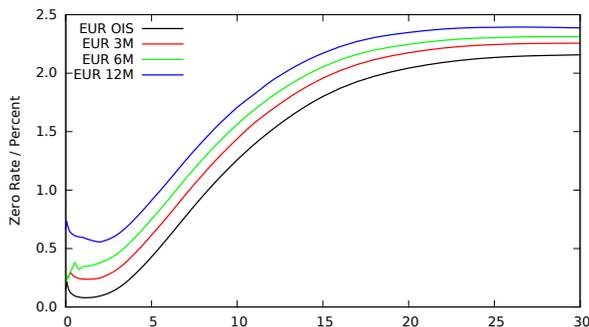


**Figure 2:** Difference between the replicated (theoretical) 3 month forwards as computed off a 6 month EURIBOR curve, and the quoted forwards, in %

<sup>1</sup>Note that this implies that a clearing member has a counterparty credit exposure to each of the other members over which it has no control



As we saw on the previous page, we cannot use the resulting discount curve for predicting LIBOR forwards; rather, we need one forward curve for each tenor (1, 3, 6 and 12 months). So, when dealing with a central counterparty, we need up to five curves for each currency in which we have trades. We refer to this framework as the *Clearing House Approach* for obvious reasons. See [13] or [1] for details, and figure 3.



**Figure 3:** The OIS, 3 month, 6 month and 12 month EUR zero curves as of 15/05/2014 (Rates in %).

**2.2. PERFECT COLLATERALIZATION FOR OTC DERIVATIVES**

Many derivatives between banks are not yet centrally cleared because either they are too old or their structure is not supported<sup>2</sup>. Nevertheless, they are collateralized under a Credit Support Annex (CSA) to mitigate counterparty credit risk. Let us assume for the time being that collateralization is as perfect as with a CCP. The main difference between a CCP and a CSA is that the CCP will demand and post collateral in the trade currency, while the CSA generally only defines one or sometimes a few collateral currencies. This means that it is quite common for a bank to have a swap denominated in EUR but collateralized in USD, or vice versa. We would like to handle this case like before: Given a future amount  $A$  in currency 1 payable at time  $t$  which is collateralized in currency 2, we could either discount  $A$  with the

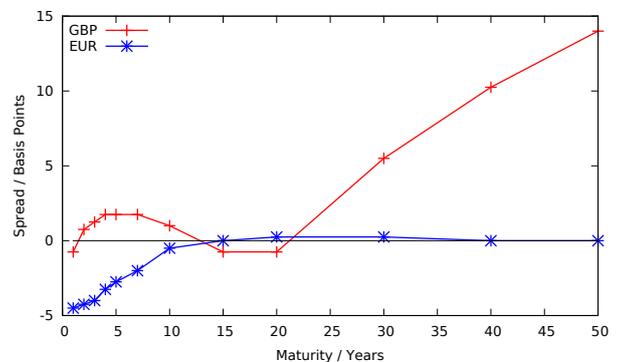
<sup>2</sup>A simple call feature is enough to make a swap non-clearable

discount factor  $df_1(t)$  and convert it into currency 2 via today's exchange rate  $X(0)$ , or we could use the forward exchange rate  $X(t)$  to convert  $A$  into currency 2 and then discount using  $df_2(t)$ . In other words,

$$X(0) \cdot df_1(t) = df_2(t) \cdot X(t) \quad (2)$$

Text books from before the crisis tell us that we could use (2) to define the forward exchange rate<sup>3</sup>; nowadays, that does not work anymore if we merely plug in the two OIS curves for the respective currencies. Rather, we have to use quoted forwards and (2) to define the discount factor in currency 1! The reason is the cross-currency basis in the market, see figure 4.

As a result, we see that we need more curves: Five per currency for the clearing house approach, and an additional discount curve for each trade currency/collateral currency combination. Fortunately, it is market practice to assume that the forward rates remain the same regardless of the collateral currency, so



**Figure 4:** The cross-currency basis spreads between USD and GBP, and USD and EUR, as of 15/05/2014.

we do not need additional projection curves for each currency pair. We refer to this pricing framework as the *Global Curves Approach*. See [6] or [13].

<sup>3</sup>This was not exactly correct even at the time, there already was a cross-currency basis for currency pairs like USD/JPY.

### 2.3. CSA DISCOUNTING

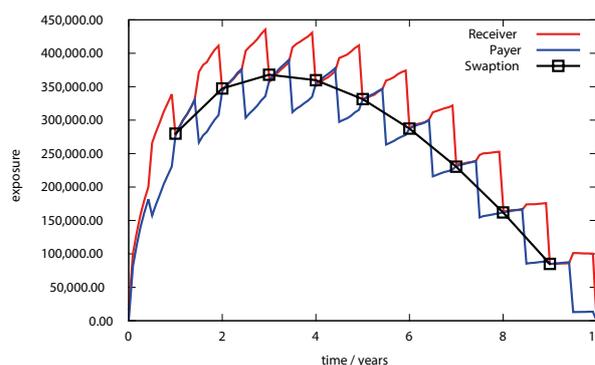
In practice, collateralization of OTC derivatives is far from being perfect. CSAs commonly contain complexities such as

- Currency options: Collateral can be posted in several different currencies
- Thresholds and Minimum Transfer Amounts (MTA): Collateral only has to be posted if the exposure exceeds a certain level
- Alternative collateral: Not only cash, but bonds may be posted, with a predetermined haircut
- Triggers:
  - Thresholds may vary over time or with the rating of either counterparty
  - Terminations possible with downgrades
  - Independent amount may be triggered by downgrade
- Rehypothecation: Cash and sometimes assets can be reused as collateral; sometimes forbidden
- Assets can have a different haircut under different CSAs
- Asymmetry:
  - Thresholds or MTAs may be different for the two counterparties
  - One party may have to post an independent amount (CSA equivalent of initial margin)
  - CSAs with certain counterparties are one-sided (e.g. public entities)

Since most CSAs do not prescribe an independent amount, one of the counterparties is exposed to adverse moves upon default of the other counterparty due to the market risk of the position for the time until the position can be closed. This period is called the Margin Period of Risk (MPR) and is one of the main drivers for credit exposure in collateralized positions.

### 3. THE NEED FOR CREDIT RISK ADJUSTMENTS

Even before the crisis, banks realised that an uncollateralized derivative posed a (potential) credit exposure which had to be taken into account (see, e.g., [3]). The expected loss due to a future default of the counterparty is called *Credit Value Adjustment* (CVA). For a simple trade it is not difficult to compute from available market data. While tier 1 banks computed and managed this already, many smaller banks did not at all or dilatorily. The methods used to compute CVA range from high-grade simulation engines that compute the future exposure, to really poor estimates of future exposure by current exposure plus some fixed fraction of the notional. For the exposure profile of a plain vanilla interest rate swap, see figure 5.



**Figure 5:** The expected exposure profile (from simulation) of a 10 year plain vanilla interest rate swap on a flat interest curve paying/receiving the fair swap rate, as seen by the payer resp. receiver, in comparison to analytical prices.

#### 3.1. THE RISE OF CVA

The crisis made it clear that counterparty credit risk in derivatives transactions can be a killer<sup>4</sup>. The Basel Committee for Banking (BCBS) states in [2] (alas, without a source): “... during the financial crisis [CVA] was a greater source of losses than those arising from outright defaults.”

<sup>4</sup>In hindsight, one wonders why this came as a surprise when counterparty credit risk has always been the most important risk in the lending business. Apparently, loan originators and derivatives dealers didn't talk to each other.



As a consequence, the Basel III accord requires banks to hold capital for potential CVA-related losses for all derivatives transactions which are not centrally cleared. The expected loss for a derivative due to a counterparty default is approximately given by

$$CVA = LGD_C \sum_{i=1}^n PE(t_i) \cdot P_C(t_{i-1}; t_i) \cdot df(t_i), \quad (3)$$

where  $LGD_C$  is the loss given default,  $PE(t_i)$  is the positive expected exposure<sup>5</sup> at time  $t_i$  and  $P_C(t_{i-1}; t_i)$  is the probability that the counterparty defaults between  $t_{i-1}$  and  $t_i$ . In writing this formula, we assume independence between the exposure and the default probability.

### 3.2. FEARFUL SYMMETRY

We only talked about CVA from one counterparty’s perspective so far. But what about the other side’s view? It also has to take CVA into account, which for them will also be a negative adjustment to their risk-free fair value. To restore symmetry and (hopefully) the law of one price, both parties’ CVA values have to be considered. From my point of view, my counterparty’s CVA is a positive value adjustment, the so-called Debit Value Adjustment (DVA). It represents the expected value (for myself) of my own default occurring at some future time and can be written approximately, symmetric to equation (3):

$$DVA = LGD_B \sum_{i=1}^n NE(t_i) \cdot P_B(t_{i-1}; t_i) \cdot df(t_i), \quad (4)$$

where we have replaced the default probability of the counterparty by that of the bank (B), and the positive by the negative expected exposure<sup>6</sup>. Note that DVA increases when my credit quality deteriorates. This seemingly paradoxical effect is observable in the market, and even enforced by the international

<sup>5</sup>i.e. the expectation of all positive exposure values at time  $t_i$ .

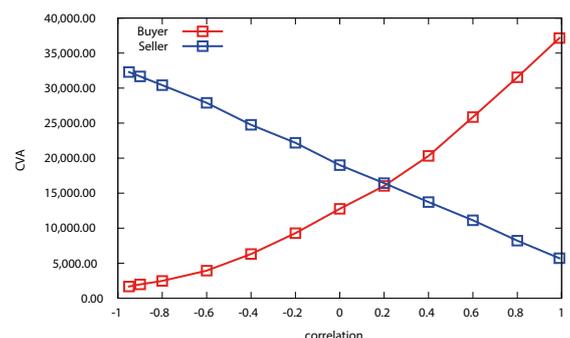
accounting standards (see, e.g., [12]). However, because it would give perverse incentives, Basel III does not allow to neutralize CVA losses with DVA gains. The sum of CVA and DVA is often referred to as bilateral CVA.

Even collateralized OTC derivatives still have a remaining credit exposure which has to be computed according to IFRS 13. The reason are the CSA features we already discussed, especially thresholds and the MTA, and the MPR. To properly compute the CVA and DVA for a set of trades under one CSA, it is necessary to simulate all involved risk factors on many future dates on several thousand paths, net prices on the way and subtract collateral in order to get the right exposure estimate at any given future date. There is no easy way out of this!

Note that the CVA/DVA number is based on a portfolio calculation. Therefore, the fair value of a derivative does not only depend on its cash flows anymore, but on the CSA with all its features and the existing portfolio of trades as well.

### 3.3. WRONG-WAY RISK

There are exposures that increase and simultaneously reduce the creditworthiness of the counterparty, contrary to our independence assumption behind equation (3).



**Figure 6:** Wrong-Way Risk: Varying the correlation between hazard rate processes of reference entity and counterparty. CDS: 10m EUR notional, 10Y term, at-the-money.

<sup>6</sup>i.e. the expectation of all negative exposure values at time  $t_i$ .

The most obvious example of that kind of behavior is protection in the form of a CDS that party A sells on itself. The value (and hence exposure) of the CDS increases in unison with the deterioration of A's credit. The effect is labelled *Wrong-Way Risk*, and can be much less obvious than in the example, yet still present. No one would buy a CDS on A from A, but they might buy one from A on B's default which is highly correlated with A's, see figure 6. And don't forget DVA in this!

Generally, when the portfolio contains credit derivatives, one needs to model credit spread processes for each reference entity and counterparty, and drop the independence assumption we made earlier. This increases the CVA model's complexity yet again.

### 3.4. MODEL RISK

It is important to realize that the computation of CVA (and the other adjustments we will introduce below, in short XVA) involves a consistent, global pricing framework and a simulation engine that evolves all risk factors in a given portfolio simultaneously. To make this work, one has to make many assumptions and estimate many parameters from historical data, such as default probabilities, volatilities and correlations. There are therefore many mistakes that can be made in the implementation, the model choice and the parameter estimation. Furthermore, the number of the risk factors involved in a portfolio may be so large that the computations become numerically unstable; small changes in the parameter set can then lead to large differences in the outcome. Finally, other model choices and assumptions may lead to very different results. All these factors are usually summarized as *Model Risk*.

It is often said that XVA is the most complex derivative a bank has to handle. To prove this statement, imagine you had a more complex derivative on your books. But then you would have to compute its XVA as well.

The higher the complexity of a problem, the more model risk is involved. To manage that risk, one has to make sure that assumptions and estimates are stressed, that there is a quality assurance process in place during the implementation, that analytical solutions are matched when available, and that the models used are state of the art.

### 4. THE NEED FOR FUNDING ADJUSTMENTS

When a bank buys an asset or lends money, it has to raise funds. The quality of the asset determines what funding rates the bank has to pay; if the asset can go into a coverpool or can be otherwise used as collateral, the bank will have to pay a secured funding or repo rate. If the asset quality is poor or the bank needs the money to post collateral or pay interest that is not hedged by an offsetting trade, it will most likely have to pay its unsecured funding rate, which is determined by the banking sector as a whole together with the bank's individual creditworthiness<sup>7</sup>.

Now if a bank (A) trades an uncollateralized derivative with some client and an offsetting one with another bank (B), it is in an asymmetric situation: If the client's derivative moves in favor of A, A has to post collateral to B, which has to be raised at the unsecured funding rate but only receives overnight rates as interest (and, in addition, faces the credit risk of the client defaulting). If the opposite happens, A receives collateral for the overnight rate in return from B, which it can normally use for other activities. This funding cost or benefit has to be managed by bank A. Note that centrally cleared derivatives in general have a funding cost attached to them because of initial margin. Nevertheless, it is possible to optimize this funding cost by trading with several CCPs, since a derivative that increases initial margin at one CCP might reduce it at another because of its risk profile.

<sup>7</sup>As for CVA, this is not new to lending desks. The cost of funding has been a component in loan pricing for decades.

#### 4.1 THE FVA DEBATE

Many banks manage funding costs by making another adjustment to the derivatives price, the Funding Value Adjustment (FVA). As a first approximation, you do a calculation which is very similar to the one for (bilateral) CVA, see [9]:

$$FVA = \sum_{i=1}^n PE(t_{i-1}) \cdot S_C(t_{i-1}) \cdot S_B(t_{i-1}) \cdot df(t_i) \cdot FB(t_{i-1}; t_i) \cdot \tau_i \\ + \sum_{i=1}^n NE(t_{i-1}) \cdot S_C(t_{i-1}) \cdot S_B(t_{i-1}) \cdot df(t_i) \cdot FL(t_{i-1}; t_i) \cdot \tau_i$$

where  $S_X(t_{i-1}) = 1 - P_X(0; t_{i-1})$  is the probability of entity  $x$  surviving until time  $t_{i-1}$ ,  $FB$  resp.  $FL$  are the spreads over OIS for borrowing resp. lending money, and  $\tau_i$  is the length of the period from  $t_{i-1}$  to  $t_i$  in years. This formula again assumes that exposures and the two entities are independent.

A hot debate began in 2012 whether this FVA is part of the market fair value or just a cost/benefit that the bank has to manage but cannot pass on to clients. The cost side was led by Hull and White and was opposed by most practitioners and many academics (see the long discussion in RISK magazine over the course of 2012 and [4]). The reasoning of Hull and White boils down to: If I buy something in a fair market, the seller will not care where I get my money from. With the acceptance of FVA as a part of fair value, the risk-neutral pricing paradigm would be dead because no two parties could agree on a price anymore.

#### 4.2. FUNDING COSTS ARE REAL

By now, FVA is a widely accepted fair value component, and many Tier 1 banks report it explicitly. Even Hull and White have agreed that at least the part of funding cost that is the same for all banks can be seen as a fair value adjustment<sup>8</sup> (see [11]). It is therefore only a question of time until banks will be forced

<sup>8</sup>However, they still insist that the idiosyncratic part of the funding cost is each bank's own problem.

to incorporate it in their fair value numbers by the IFRS and/or auditors. However, FVA is even more complex to compute than CVA because we have more moving parts to consider for it: the lending and borrowing spreads over OIS, as far into the future as the longest maturing derivative in the netting set, which can be 50 or more years. In addition, FVA also depends, not surprisingly, on the funding strategy of the bank, see [5].

There is no market standard for calculating or rather estimating it, which is probably the reason why auditors are not enforcing it yet.

It goes without saying that FVA, like CVA, is a portfolio number depending on the CSA under which a derivative is traded.

### THE NEED FOR A CAPITAL COST ADJUSTMENT

#### 5.1 BASEL III AND NEW CAPITAL REQUIREMENTS

We saw above that Basel III requires banks to hold capital for any derivatives transactions that are not cleared via a CCP. Banks can either use a standard approach formula prescribed by the Basel Committee, or implement an internal model to calculate the CVA capital charge.

Since the rules for calculating required capital for derivatives are the same for every bank, it makes sense to incorporate the cost of capital in the valuation as well - in the form of yet another value adjustment, sometimes referred to as KVA - which amounts to projecting the capital charge into the future up to maturity<sup>9</sup>.

Finally, once it has computed all these complicated adjustments, a bank now has to optimize its fair value adjustments and funding strategies. See, for instance, [7] and [8].

#### 5.2 THE CHALLENGE OF BACKTESTING

If a bank chooses to use an internal model for computing the CVA capital charge, it has

<sup>9</sup>It may sound like a broken record by now, but the capital cost has also been incorporated in loan pricing for a long time in many banks.

to show that the model performs well in that it predicts the actual exposure realizations well. This is even more difficult than it sounds, because CVA is a price component, and as such, it has to be computed based on market inputs like volatilities and correlations. Pricing happens under the so-called risk-neutral measure. The backtesting, however, looks at actual values and compares their historical dynamics with the projected ones. It is therefore based on what is called the real world measure. The two measures do not match; for instance, historical comparisons show that the risk-neutral measure systematically overestimates forward rates. This means that a bank has to either tweak its valuation models in order to pass backtesting or accept a penalizing capital charge. This is a delicate yet very important part of CVA calculation.

## 6. OUTLOOK

We have seen that the derivatives market has moved from using simple models to price complex structures to using complex models to price simple products. The CSA complexities show that changing the discount curve is no panacea. Rather, the trend is to use a single discount curve (which may depend on the collateral currency) and then add or subtract all kinds of value adjustments which are computed using one big Monte Carlo simulation engine. The risk function will have to ensure that model risk in this complex system is under control. IT has to ensure a performant execution of the calculations, which include running real-time analyses for Front Office. In order to make a profit, banks will have to optimize the value adjustments which means that they have to be managed by a centralized function. With these challenges ahead, it seems that only large banks with economies of scale and very specialized niche players will be able to survive in the long run.

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## CLO investing in an evolving regulatory environment

**Corinne Smith**, Editor, Structured Credit Investor

**Representatives from Thomson Reuters, Prudential Fixed Income and Guggenheim Securities discussed the CLO investment landscape in an evolving regulatory environment during a live webinar hosted by SCI in March 2014. Topics included the impact of risk retention requirements and the Volcker Rule, as well as current drivers of relative value. This Q&A article highlights some of the main talking points from the session.**

### **Q: How has the regulatory environment impacted new issue volumes and secondary supply?**

**A: Matthew Rose**, head of CLO pricing at Thomson Reuters: The US CLO new issue market started the year off slowly, with just US\$2.6bn priced in January, compared to US\$4.4bn in December while the market awaited clarity on the Volcker Rule. Since then, volume has picked up strongly, with US\$8.4bn issued in February and US\$10.8bn in March as the market begins to implement structural alternatives that are Volcker-compliant.

Although geo-political events caused a slow-down in secondary markets earlier in the year, BWIC activity has also picked up recently, focusing on US and European senior bonds with shorter average lives. Also making the headlines is the refinancing of CLO 2.0 deals as 2012-vintage transactions exit their non-call periods.

**Mario Verna**, md at Guggenheim Securities: Some players are predicting full-year issuance of US\$55bn in 2014, compared to US\$85bn last year, which sounds somewhat pessimistic - especially considering the run-rate we've seen so far, albeit at a compressed arbitrage. There is an active pipeline, especially later on in the year when the number of transactions expected to be refinanced spikes.



**Q: How are spreads likely to react if the regulatory uncertainty lifts?**

**A: Verna:** If the situation is resolved with a positive outcome, triple-A CLO spreads at least in the US are likely to tighten by 10bp-15bp, as there will be less pressure for banks to divest their triple-A rated holdings. Mezzanine bonds probably won't come in that much because they've already seen significant tightening.

There are no fundamental reasons for spreads to tighten by more than 10bp-15bp. However, we've seen different investors entering the market to take advantage of repo financing - for example, reposing triple-A and triple-B bonds by putting up a 20% margin. More investors results in more capacity, which tends to drive rates lower.

Indeed, insurance companies are increasingly participating in US managed CLOs and now account for around 30% of the buyer base, compared to 10% previously. These players seem to be filling in many of the gaps that the banks have left, although some large US banks have indicated that they're looking to get back into the market.

We're also seeing a rise in warehouse providers entering the sector, which is indicative of the drive in the market a present. Warehouse terms are now more advantageous to the borrower, typically featuring longer terms, with fewer market value triggers or perhaps no market value triggers.

CLOs remain an attractive alternative to other asset classes, such as investment grade bonds and CMBS, which trade about 60bp-65bp tighter.

It remains to be seen what impact the Volcker Rule will have, if any, on loan spreads. While Volcker may not have a direct impact, Fed action more generally will.

If rates rise within the next year, as many expect, the beneficial effect of the Libor floor will diminish. However, in a rising interest rate environment, floating rate product is advantageous.

**Q: What are the latest developments with respect to the skin-in-the-game debate?**

**A: Rose:** The risk retention requirement under Dodd-Frank allows for the exemption of CLO-eligible loan tranches, where the lead arranger agrees to retain 5% of the entire notional tranche. They would be prohibited from selling or hedging the exposure for the life of the transaction. But this arrangement seems unworkable for banks, which face new capital restrictions.

The LSTA has introduced an alternative concept - the 'qualified CLO' - which would be subject to six criteria around asset quality, portfolio composition, structural protection, alignment of interest between managers and investors, transparency and disclosure, and regulatory oversight. If a CLO were to meet all these criteria, then the manager could meet the risk retention requirements by holding 5% of just the equity tranche, rather than 5% of the entire deal.

One of the key points to remember here is that - unlike other securitised products - CLOs are not originate-to-distribute deals, but are diversified credit portfolios that are actively managed by asset managers, most of whom are registered advisors.

**Edwin Wilches**, senior associate and portfolio manager at Prudential Fixed Income: Not being an originate-to-distribute product, it's unfortunate that CLOs have been caught up in the broader effort to address the shortcomings of structured products. The qualified CLO route is a positive step forward for the industry, as a 5% vertical slice would be quite cumbersome for many managers to retain.

**Verna:** The LSTA has been vocal about alignment of interest occurring through the subordinate fee structure for managers, but somewhat surprisingly this hasn't been met with a lot of enthusiasm from the regulators. They seem unconvinced that this would provide enough alignment of interest, despite managers being incentivised to manage CLOs properly with respect to investor interests. Risk retention is necessary in any structured transaction, but the point that the industry is trying to make is that such alignment exists by virtue of the manager's fee structure.



The fixes suggested so far aren't ideal; for example, the open market approach where banks retain the risk goes counter to the need for them to syndicate the risk. And the qualifying loan proposal seems to be more suited to MBS. It's frustrating that, despite all of the industry's efforts, there is still a lot of discussion around how risk retention requirements will play out.

**Q: Continuing the risk retention theme, how is the implementation of CRD Article 122a progressing in Europe?**

**A: Verna:** Article 122a has been in effect in Europe since January 2011 and was revised in May 2013 to the Capital Requirements Regulation. Under the CRR, the 5% risk retention needs to be held by one of three participants - the originator, the sponsor or the original lender. The burden of proof is on the investor.

CLO volume in Europe picked up in the second half of 2013. In most issuances, the sponsor was a large manager that was able to finance the risk retention piece itself. But this would be a significant burden for smaller managers.

One change that occurred in December allows US managers to qualify as the risk retention provider; previously only EU or MiFID institutions could qualify. The definition was revised to allow any manager of a securitisation programme to qualify.

Under the revision, the originator purchases the loans for its own account and sells them to the CLO or otherwise securitises them. This also provides for other investors in the capital structure to qualify.

Article 122a seems to offer more flexibility than Dodd-Frank; for example, it allows a participant to further leverage/finance the vertical slice.

A manager can, for instance, borrow 80% say against the 5% - effectively creating an equity-like return. However, the 80% financed also needs to be retained for the life of the deal, thereby satisfying the 5% requirement.

This probably applies more to the US, but if the 5% needs to strictly be held by a manager, the risk is that there will be a further consolidation of asset managers and ultimately a reduction in issuance and funding for corporates.

**Q: The passage last month of the Barr bill shows that there is broad bipartisan support for relief for CLOs under the Volcker Rule. This was followed by the regulatory agencies announcing an extension of the compliance period until 21 July 2017. Where do these developments leave CLO market participants?**

**A: Wilches:** The Barr bill was a little mixed. Although it demonstrated the House's agreement on the importance of CLOs, much of the original grandfathering language was eliminated from the bill to achieve bipartisan support.

But I believe grandfathering remains the number one issue. US banks hold an estimated US\$75bn of legacy CLOs, while Asian accounts hold another US\$25bn-US\$50bn. What happens to these portfolios now remains to be seen - I think this is what is really keeping spreads back.

The Barr bill has addressed some market concerns with regards to the 'ownership interest' definition, however, CLO 3.0 transactions are doing a good job of complying with the ownership interest piece and there is a place for the market to exist just by doing loan securitisations.



Ultimately banks have a few options available to them. One option - and we're already seeing this being implemented - is for them to waive the right to replace managers under certain outcomes.

If this is something that their credit departments will not allow or the bank is unwilling to accept, it's difficult to see how deals can be amended. In these cases, when the call periods come up, banks may take a lower spread to where the market is just to get a fix and make the transaction Volcker-compliant retrospectively.

**Verna:** It's doubtful that other types of investors could fully replace banks if they were precluded from the CLO market entirely. But this is an extreme scenario, since banks can give up control language to make deals compliant.

The type of exemption used under the investment act - whether it's 3c7 or 3a7 - also dictates whether a CLO respectively falls under or is exempt from Volcker. Historically, most deals were done under 3c7, which allows for active trading of the underlying loans. But 3a7 deals have been done by managers that are comfortable with a somewhat more restrictive trading covenant. It depends on the intention and style of the asset manager.

**Q: How are managers compensating for the loss of spread from eliminating bond buckets?**

**A: Wilches:** Managers are compensating for the loss of bond buckets in a variety of ways. The natural place to look for extra juice outside of bonds is in second-lien loans. An alternative is to move down in liquidity by looking at smaller facility sizes.

Equity has also capitulated a bit on the required return, while management and dealer

fees have compressed. Credit enhancement in many pre-Volcker CLOs is in the high-30%/low-40% range, but - given the lack of bond buckets - rating agencies are allowing managers to lever some of the more recent deals a little more, so that credit enhancement now stands at around 35%.

**Verna:** Eliminating bonds doesn't seem to have impacted many managers. Across all CLOs, the bond bucket was only utilised to the extent of 1.2%-1.5% of the traditional 10% for US deals. The figure is higher for European transactions, at 9.7%.

Many managers are including second-lien loans, but they have lower recoveries, so cushions need to be added with respect to the rating agency test. We're seeing other managers raising financing privately or via managed accounts as a way to earn fees and increase AUM, and either retaining the equity or syndicating it. This is a way of effectively creating the economics of a CLO, potentially with less regulatory impact.

Other financings are done almost as an extension of the warehouse facility, with the senior lender providing a TRS, for instance. It remains unclear whether these transactions are really CLOs and therefore should fall under Volcker.

**Q: In terms of relative value, which factors influence investment in middle market versus broadly syndicated loan CLOs?**

**A: Verna:** Middle market deals represent a strong relative value proposition. A middle market loan is generally made to a US\$50m EBITDA company and the facility sizes tend to be US\$150m or lower.

Yields tend to be higher than for broadly syndicated loans, at around 535bp margin, with a higher Libor floor. For equity providers, the



returns tend to be one point higher than for broadly syndicated CLOs.

Middle market loans also tend to be less levered, while covenants tend to be stricter and historical recovery and default rates have been more advantageous. Structures usually result in higher credit enhancement due to the rating agency assumptions around recovery rates.

Middle market CLO debt trades around 25% wider than broadly syndicated loan CLO debt. There is a fair amount of liquidity for these deals in the secondary market, but not as much as for broadly syndicated loan CLOs.

We're expecting around US\$15bn of middle market CLO issuance this year, up from US\$11bn last year. Growth is being driven by BDC originations, as well as new money coming into the sector.

**Wilches:** I think broadly syndicated loan CLO triple-A and double-A bonds are cheap relative to the risk. Based on underlying loan spreads of 350bp-375bp and CLOs yielding 150bp-160bp, the spread capture of 35%-50% is significant, considering the credit risk-remote nature of the deals.

The floating rate nature of broadly syndicated loan CLOs means that they are more attractive to banks than insurance companies or pension funds. I would expect there to be a floor to spreads until a deeper investor base emerges or a mechanism is developed that makes CLOs more attractive to fixed-rate buyers.

#### **Q: How do European and US spread levels compare for CLO 2.0 deals?**

**A: Verna:** European spreads are tighter at the triple-A level. But this is difficult to justify, given that there is less liquidity and less collateral available.

**Wilches:** European spreads are tighter on a nominal basis and is likely due to the scarcity value, given the paucity of supply. That being said, when buying a US CLO, there is a loss of spread for European-based investors when the cross-currency swap is executed.

#### **Q: How significant is manager style when analysing CLO investments?**

**A: Wilches:** Assessing a CLO manager is one of the first screens we make, in order to ascertain their character, as well as their style. If those two aspects don't match up for us, we won't be able to get comfortable with the structure.

In terms of character, the past actions of a manager and their interpretation of the indenture are paramount because it shows how they treat amend-to-extends and long-dated buckets and so on. This is very indicative of potential future action.

Another important factor is franchise value and how much CLO managers are willing to put at risk to eke out extra returns to the potential detriment of debt holders. The depth of the team is another factor.

Initial portfolios are telling in terms of what a manager intends to do - albeit we understand that underwriting on day one is challenging, given the revolving nature of the pools. Our general philosophy is high quality, high yield investing, so we tend to focus on managers who fulfil that requirement.



For further information please contact [cs@structuredcreditinvestor.com](mailto:cs@structuredcreditinvestor.com) or visit [www.structuredcreditinvestor.com](http://www.structuredcreditinvestor.com)

**Q: How have CLO calls, refinancings and repricings impacted the market?**

**A: Wilches:** CLO refinancings have been healthy for the market in the sense that investors in the refinanced tranches are typically new accounts coming into the asset class, such as managed short-duration or floating rate funds. One interesting technical is that the term structure of triple-As has become clearer: anything with a WAL of under 3.5-4 years is eligible for these funds. Investors are almost rolling their deals and perhaps losing a few basis points in coupon, but receiving an extra two years of call protection.

**Verna:** Refinancings are mainly driven by equity investors, who can achieve a pick-up of a point or 1.5 points. I expect this trend to accelerate further as spread compression continues.

**Rose:** We're seeing a lot of focus on refinancings in the secondary market, where there appears to be sensitivity to trading as deals approach the end of their non-call periods. Investors buying into the refis seem to be attracted to the short duration and seasoned portfolios on offer.

**Q: How should investors approach tail risk in CLO portfolios?**

**A: Wilches:** Tail risk is a function of a deal's vintage and the opportunities a manager has to buy into the credit market as we move deeper into the cycle. Tail risk will vary depending on a manager's philosophy and risk appetite. The one potential unintended consequence of the past cycle and the recovery post-crisis is that it has emboldened some managers to take more risk than is appropriate.

**Verna:** TRS and market value triggers exacerbated the losses in the downturn. As fewer triggers are out-of-the-money now, there is less pressure on worst-case scenarios. This, in turn, opens up the possibility for managers to roll into new deals or refinance through a different facility with a portfolio that has a shorter remaining duration and is presumably less levered.



## Structural Changes in the Valuation and Modelling of Derivatives

By **Vincent Dahinden**, CEO, Solum Financial Limited

### 1. BACKGROUND

**Prior to the financial crisis, the pricing of derivatives products was generally straightforward and based upon Libor discounting. The significance of credit risk, funding and collateral was viewed as negligible (and the impact difficult to model) and thus these were ignored.**

The extreme market moves experienced during the global financial crisis exposed the inadequacies of certain assumptions commonly used in the pricing of derivatives, namely the Libor discounting standard and the commonplace omission of counterparty credit risk within derivatives pricing. As a result, the old-style framework for the fair pricing of derivatives has undergone a significant evolution.

There has been a market wide move to the discounting of collateralised derivatives using the relevant OIS curve and the inclusion of counterparty credit risk in derivatives pricing through the use of a credit value adjustment (CVA). In addition, fair value pricing is evolving and increasingly has started to incorporate other value adjustments or so-called xVAs to reflect for example, the costs of funding, capital and collateral.

The importance of counterparty credit risk has been acknowledged under reforms in both regulatory and accounting rules. As such, major regulatory (EMIR) and accounting (IFRS 13) changes have added further complexities to the derivatives valuation framework.

### 2. THE NEW ENVIRONMENT FOR DERIVATIVES PRICING

#### The Baseline

An obvious base case from which to start will be risk-free valuation. This is a valuation of a hypothetical “risk-free” derivative with no



associated counterparty risk, funding costs or any other components taken into account. Such a situation never exists in practice but nevertheless can serve as an initial starting point for valuation which needs to be further modified with the additional pricing components. The closest to this would be the example of a “perfectly” collateralised transaction. The closest to this would be the example of a perfectly collateralised transaction (i.e. a transaction under a symmetric two-way credit support agreement (CSA) with zero threshold and cash collateral paid continuously and in the currency of the transaction).

The evolution in derivatives pricing has introduced a number of new and non-trivial elements. Any deviation from the assumption of perfect collateralisation brings into play other derivative pricing considerations such as cost of funding, cost of capital and optionality within collateral agreements.

### **OIS Discounting**

The global financial crisis illustrated the credit risk embedded in Libor rates. This led market dealers to change the discount rate used for derivatives as it was clear that Libor was not a good proxy for the risk-free rate.

As such, OIS discounting has become the market-standard to discount derivatives covered by a perfect collateral agreement.

### **Counterparty Risk**

Counterparty risk is traditionally thought of as the credit risk between OTC derivatives counterparties.

To properly account for this risk, credit value adjustment (CVA) and debt value adjustment (DVA) must be incorporated.

Since the global financial crisis, counterparty-risk has become the key financial risk for banks. This is because:

- A large portion of the Basel III changes in capital requirement relate to counterparty credit-risk (CCR – default-risk) and CVA (marked to market credit-risk).
- IFRS 13 and FAS 157 require institutions reporting under these accounting standards to include the effect of counterparty credit risks (via CVA) and the institution’s own credit risk (via DVA) in its books and records.

### **Funding**

Banks have also moved to take into account funding charges (FVA) when pricing derivative transactions. This is because the requirement to post collateral can lead to a funding need.

FVA can be considered as the charge (FCA) and/or benefit (FBA) reflecting the impact of funding resulting from entering into uncollateralised derivatives with clients and hedging with collateralised derivatives in the inter-dealer market. The FCA (FBA) is similar to CVA (DVA) but uses the institutions own funding spread as opposed to the counterparty spread (own credit spread).

### **Capital Costs**

The increasing burden of capital charges being imposed on banks has led to the cost of capital being considered in derivatives pricing, calculated by reference to an institution’s required return on capital hurdle.

Another inevitable result of the new charges introduced by Basel III with respect to counterparty risk is to increase counterparty risk related risk weighted assets (RWAs) significantly. The impact depends heavily upon the modelling approach taken by banks which in turn depends upon the regulatory approvals in place.

The Current Exposure Method (CEM) and the Standardised Method (SM) (both to be replaced by the new SA-CCR) are more straight forward to implement but can result in crude results due to, for example the poor treatment of counterparty netting, or the incomplete treatment of collateral. As a result some institutions have embarked upon prolonged advanced modelling projects in order to obtain IMM (internal model method) approvals in an attempt to reduce RWA costs.

Under advanced IMM approaches, certain hedging strategies may be eligible for relief and therefore banks are attempting to manage RWAs through the implementation of appropriate hedging strategies.

### **The CSA and Collateral Optionality**

Collateral agreements aim to reduce counterparty risk in OTC derivatives. They are historically flexible and contain differences in Thresholds, Minimum Transfer Amounts (MTA)



and Valuation Date frequency. Additionally, they allow the posting of cash or a number of other eligible assets (such as high quality debt) and in different currencies. Additionally, they allow the posting of cash or a number of other eligible assets (such as high quality debt) and in different currencies. The ISDA Standard Credit Support Annex (SCSA) supports reducing embedded optionality in CSAs through standardisation.

Thresholds and MTA's as well as uncertainty associated with margin periods reintroduce counterparty risk and the flexibility in instrument and currency that can be posted introduces optionality.

To properly account for all of these, banks are now pricing derivatives transactions based on the specific details of each underlying CSA. Those collateral value adjustments are used to reflect specificities in the terms of the CSA which result in an economic impact to the fair valuation. This could include for example a benefit/cost due to cheapest-to-deliver optionality inherent in the CSA, arising from the ability to deliver multiple currencies and/or assets as eligible credit support

#### **EMIR and the Central Clearing Mandate for Standardised Derivatives**

There are various differences in the contours of the regulatory agenda in Europe (EMIR/ MiFID) vs. the US (Dodd-Frank Act and CFTC/SEC regulations) – most notably in terms of the respective timelines, but also with respect to scope, regulated entities and extent of the measures. However, the pillars of OTC derivatives regulatory reform are fairly comparable across jurisdictions and are broadly anchored to the major stated principles of i) increased transparency and ii) decreased interconnectedness of institutions trading in those markets.

In particular, all OTC derivatives contracts deemed to be standardised will have to be moved to exchanges or electronic trading platforms, and cleared through central counterparties. Moreover, for those transactions that are not centrally cleared, bilateral margin requirements and higher capital charges will be in order along with a swathe of measures designed to improve the risk management and transparency of such markets.

The mandatory clearing of all eligible OTC derivatives applies to Financial Counterparties (FC) and Non-financial Counterparties that are over a certain 'clearing threshold' (NFC+) and is expected to be in force towards the end of the year (where FCs are defined as, among others investment firms, credit institutions, insurance and reinsurance undertakings, pension funds, UCITS and alternative investment Funds. It has to be noted however that for some of the above entities compliance to the new regulation will be phased in).

In line with the G-20 mandated general principles, EMIR introduces three primary regulatory constraints on OTC derivatives for the financial institutions it regulates.

- Mandatory clearing of all eligible OTC derivatives, which applies to FCs and NFC+ only and will be in force from the end of 2014.
- Initial margin requirements and improved risk management metrics for those OTC derivatives that are not centrally cleared. These risk mitigation techniques includes measures applicable to FCs and NFC+ only (such as daily mark to market or the exchange of collateral and adequate capital to cover non-cleared transactions) and measures applicable to FCs and all NFCs (such as timely confirmation, portfolio reconciliation and compression, dispute resolution).
- Obligation to report all derivatives transactions to trade repositories, which applies to FCs, all NFCs and certain exempt entities.



### Margining Rules for Non-cleared Derivatives

While the move towards central clearing for a wide range of so-called standardised OTC derivatives has so far been the most visible change from regulatory initiatives and the one that has preoccupied financial institutions the most, a possibly even larger change looms in the non-cleared segments of derivatives markets, as regulators seek to align pricing, trading, valuation and risk management behaviour in exotic and non-cleared segments to that of standardised and centrally cleared derivatives products.

After a couple of consultation rounds, the Basel Committee (BCBS) and the International Organisation of Securities Commissions (IOSCO) has proposed a series of measures in its final policy paper published in September 2013, with respect to the margin requirements for non-centrally cleared derivatives. The key central measure introduced by the document is the introduction of two-way margin for all non-cleared derivatives (with the exception of a limited number of products, such as physically settled FX forwards and swaps, or the FX component in cross-currency swaps), including, like in the centrally cleared / CCP infrastructure model: i) variation margin (i.e. collateral as protection against the build-up of exposure to a counterparty) and ii) initial margin (i.e. initial overcollateralisation to cover for variation margin shortfalls in case the counterparty defaults).

These sweeping changes in the way financial institutions are expected to conduct their most sophisticated OTC derivatives businesses pose numerous issues.

- The consistency of the margining rules with other regulatory requirements is expected to be a key challenge. The combination of margining rules and the

liquidity coverage ratio for example is likely to compound the collateral pressure.

- The alignment of initial margin measurement between institutions with sometimes very different models and approaches may prove to be problematic. Given the fall-back option of relying on the fairly unattractive standardised formula (a percentage of total notional) is likely to be too punitive for many market participants, industry solutions will need to be found to harmonise internal models for IM purposes. Industry initiatives such as ISDA's Standard Initial Margin Model (SIMM) will be a first step in resolving this crucial issue.
- In the same vein, the industry and respective regulators will have to address the treatment of cross border discrepancies, whereby for instance intra-group internal models have to undergo different approval processes depending on the jurisdiction in which the trades or the business are taking place.
- The procyclicality of the new rules is another important issue; while transparency and prompt monetisation of collateral are useful tools upon the realisation of a credit event, it can be argued that the new requirements may increase collateral pressure ahead of such event (and therefore accelerate its occurrence).

### IFRS 13

The introduction of IFRS 13 is fundamentally affecting the way in which institutions accounting under IFRS need to approach the inclusion of fair-value adjustments into the risk-free value of a derivative.

In relation to counterparty risk, the following IFRS 13 aspects are important:

- IFRS 13 (paragraph 56): "The entity shall include the effect of the entity's net exposure to the credit risk of that counterparty or the counterparty's net exposure to the credit risk



of the entity in the fair value measurement when market participants would take into account any existing arrangements that mitigate credit risk exposure in the event of default”

- IFRS 13 (paragraph 42): “The fair value of a liability reflects the effect of non-performance risk. Non-performance risk includes, but may not be limited to, an entity’s own credit risk”

The above clearly seems to require both CVA and DVA adjustments to be made to the value of derivatives and that such adjustment should be reflected in the likely exit price. The concept of exit price in turn implies the use of market implied (risk-neutral) parameters (for example, the credit spread of a counterparty). If such parameters cannot be easily obtained, they must presumably be estimated via another reasonable method.

This debate surrounding the definition of exit price and the resulting implications for the parameterisation of probability of default (and loss given default, LGD) within such CVA/DVA calculations has been at the top of many financial institutions’ agenda ever since the introduction of IFRS 13.

Whilst the majority of the larger banks reporting under IFRS 13 (continued to) reflect CVA based upon market implied probabilities of default (driven largely by the desire to manage risk exposure using market instruments), the case for such use within smaller regional European banks was less clear. Many of the latter remained on historical parameters, receiving approval from their auditors in the context of market practice for a regionally defined peer group.

The rationale for these types of banks to favour CVA based upon historical probabilities of default was clear. The calculation of CVA based upon market implied probabilities of default would inevitably lead to increased P&L volatility in their books and records

which could only be managed through the implementation of complex systems infrastructure to enable the timely calculation of CVA/DVA and the associated greeks. In addition, typically such bank’s exposures would largely comprise counterparties whose name does not trade in the CDS market and for which the derivation of a market implied proxy is not trivial.

The use of a historically based calculation enabled such institutions to minimise the P&L volatility and avoid the need to embark upon protracted systems infrastructure projects which would be necessary to facilitate hedging of this volatility. However, the legitimacy of the use of historical parameters for the calculation of CVA is questionable.

The rationale for using market implied is arguably more compelling, as it would be in line with the existing market practice set by North American banks reporting under FAS 157 (which is typically based upon market implied probabilities of default) and already adopted by the largest European banks.

As a consequence even amongst smaller European banks there was a clear trend to consider a move to account for CVA/DVA based upon market implied probabilities of default.

A move to reporting CVA/DVA based upon market implied probabilities of default in financial accounts poses potentially significant issues for banks:

- the resulting CVA number (even net of DVA) will likely be higher;
- P&L volatility will be increased.

In addition, a number of practical challenges arise:

- a mapping methodology for unobservable counterparties must be devised which is both defensible and pragmatic. This typically represents the vast majority of the counterparty universe; and



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or visit [www.solum-financial.com](http://www.solum-financial.com)

- the management of P&L volatility requires appropriate hedging strategies (taking into account potentially conflicting risk management and regulatory capital objectives) and potentially model development/enhancement to enable the timely calculation of Greeks.

#### Other Components

The nature of OTC transactions is that each can be uniquely tailored and as such may contain novel features. For example, a derivatives contract may contain non-standard contractual termination events. Such terms will have a cost or benefit that can – and should – be priced.

### 3. A CHALLENGE FOR BOTH BANKS AND END-USERS

The incorporation of counterparty credit risk and other xVAs into derivatives pricing poses significant challenges for banks and other institutions. The calculation of CVA is one of the most computationally demanding efforts within a bank, requiring considerable investment in terms of costs, time and resources. From a theoretical perspective, the incorporation of all of the relevant xVAs into derivatives pricing in a coherent manner is non-trivial and raises valuation challenges (for example the inherent double counting between DVA and FBA).

In addition, the inherent inconsistency between the treatment of CVA under IFRS 13 (where for example DVA must be reflected) and Basel III (where DVA cannot be included) and the divergence in approaches between front office risk management and regulatory capital RWA management leads to difficulties in establishing a comprehensive approach to counterparty credit risk without creating competing incentives.

Derivatives end users on the other hand – from pension funds and insurance companies to energy firms – are faced with an increased lack of transparency in the market as banks have

slowly adjusted their pricing methodology on derivatives leaving end users sometimes unable to fully understand or compare prices, price-changes or P&L fluctuations until they have reflected these changes in their valuation methodology themselves. This is especially important for interest rate derivatives, cross currency swaps and commodity and energy hedges. These transactions are typically long dated and, in the case of cross currency swaps and commodity and energy hedges, can be relatively volatile. As such, the impact of these new pricing components may be relatively significant.

Lastly, the introduction of mandatory clearing for a wide range of derivatives products, and the associated rise of the central counterparty model as a main intermediary is a source of potential new risks – as well as new pricing techniques and risk management requirements – that market participants will need to assess and monitor. As both the range of standardised products and the clearing house product offering expand, the move towards central clearing will continue to gain traction, allowing multiple transactions with various counterparties to be consolidated into a single counterparty (allowing multi-lateral netting), with its associated margin, capital and operational relief. For more exotic, less liquid and bespoke products, the market will likely continue to operate on a non-cleared basis, as the risk management and operational treatment of such instruments do not match the standardisation requirements of the central clearing model.

Such drastic theoretical, accounting, regulatory and operational changes across the entire spectrum of derivatives products will have a large range of business consequences that will need to be addressed well ahead of final implementation deadlines, as all market practitioners (both financial institutions and their customers and end-users) adapt to a materially changed derivatives trading and risk management landscape.



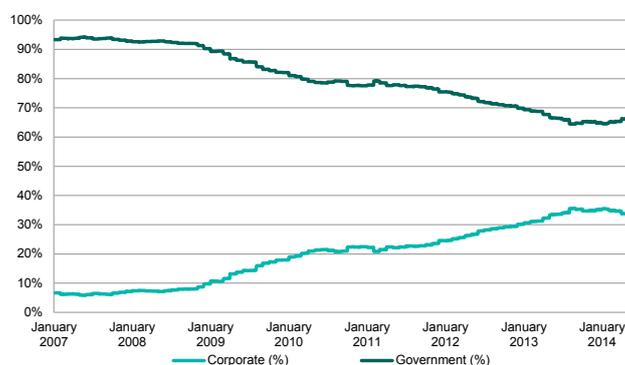
## The Rise of China's Corporate Bond Market

By **Michele Leung**, Associate Director,  
Fixed Income Indices

**The S&P China Corporate Bond Index currently represents 70% of the total local-currency-denominated corporate bond markets tracked by the S&P Pan Asia Corporate Bond Index. Its size easily makes it the largest corporate market among the 10 countries that comprise the regional index, followed by the S&P Korea Corporate Bond Index, which accounts for 15%.**

The size of the corporate bond market in China, as measured by the S&P China Corporate Bond Index, currently stands at CNY 7.58 trillion, representing an expansion by more than 14 times since December 2009. The corporate bond sector has also gained an increasing market share of the overall Chinese bond market; it rose from less than 10% to 33% over the period studied, as noted in Exhibit 1.

### EXHIBIT 1: CORPORATE VS. GOVERNMENT BOND MARKETS IN CHINA

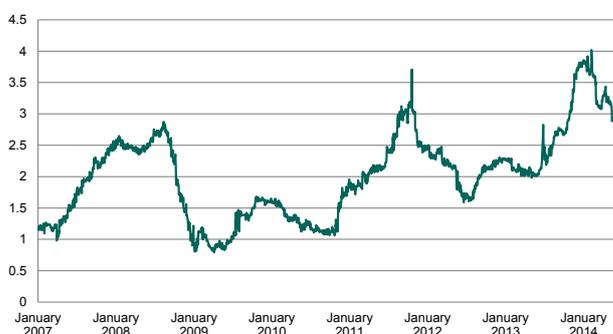


The total size of the corporate bond market in China, as tracked by the S&P China Corporate Bond Index, currently stands at CNY 7.58 trillion.

Source: S&P Dow Jones Indices. Data as of June 11, 2014. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. This chart may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The "Corporate (%)" represents the market cap of the S&P China Corporate Bond Index/S&P China Bond Index. The "Government (%)" represents the market cap of the S&P China Government Bond Index/S&P China Bond Index.

While the spread of the S&P China Corporate Bond Index over the S&P China Sovereign Bond Index was historically within the range of 1% to 3%, it widened in the past two years to nearly 4%, and it only came down in early 2014 after the risk of some corporate bond defaults was resolved.

### EXHIBIT 2: THE SPREAD OF THE S&P CHINA CORPORATE BOND INDEX OVER THE S&P CHINA SOVEREIGN BOND INDEX



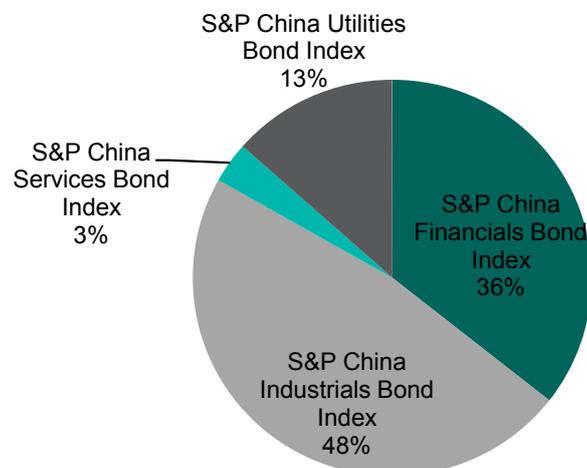
Over 90% of Chinese corporate bonds are issued by state-owned enterprises, whereas private corporate bonds only account for a small fraction of the market.

Source: S&P Dow Jones Indices. Data as of June 11, 2014. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. This chart may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In fact, over 90% of Chinese corporate bonds are issued by state-owned enterprises (SOE),<sup>1</sup> whereas private corporate bonds only account for a small fraction of the market. Within the corporate bond market, the industrial bond is the largest sector (see Exhibit 3). Represented by the S&P China Industrials Bond Index, it is also the fastest-growing segment and has expanded by over 24 times in the period studied. The major issuers of these bonds are China Railway and China National Petroleum Corp.

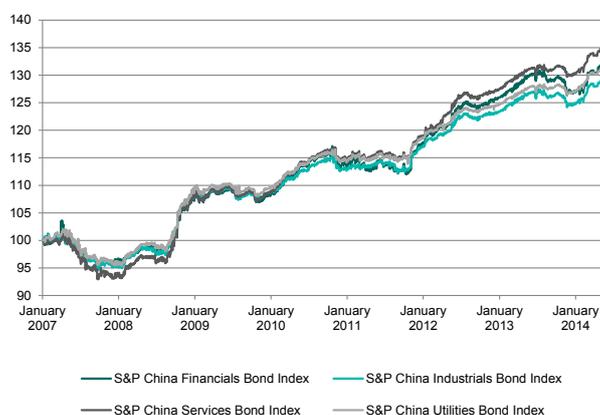
### EXHIBIT 3: SECTOR BREAKDOWN OF THE S&P CHINA CORPORATE BOND INDEX

Source: S&P Dow Jones Indices. Data as of June 11, 2014. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. This chart may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.



In terms of total return performance, the S&P China Corporate Bond Index has risen 5.7% YTD and 32% since the index's first value date on Dec. 29, 2006. Among all the sector-level indices, the S&P China Services Bond Index is the outperformer, growing 36% over the same period.

### EXHIBIT 4: TOTAL RETURN PERFORMANCE



Source: S&P Dow Jones Indices. Data as of June 11, 2014. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. This chart may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

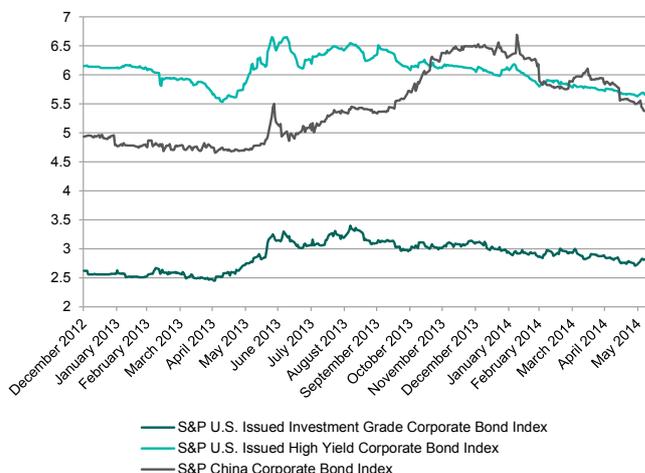
As of June 11, 2014, the modified duration of the S&P China Corporate Bond Index is 3.46, with a weighted yield-to-maturity of 5.38%. Among all sector-level indices, the S&P China Financials Bond Index has both the highest yield-to-maturity and modified duration, which are 5.74% and 4.43, respectively.

<sup>1</sup>Bank of America Merrill Lynch, More on China's on-shore corporate bond market, Asia Credit Strategy, March 28, 2014



Exhibit 5 compares the yields of the S&P China Corporate Bond Index with the S&P U.S. Issued Investment Grade Corporate Bond Index and the S&P U.S. Issued High Yield Corporate Bond Index. As a reference, the S&P U.S. Issued Investment Grade Corporate Bond Index and S&P U.S. Issued High Yield Corporate Bond Index have modified durations of 6.61 and 4.92, respectively.

#### EXHIBIT 5: YIELD-TO-MATURITY COMPARISON FOR THE S&P CHINA CORPORATE BOND INDEX



Source: S&P Dow Jones Indices. Data as of June 11, 2014. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. This chart may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

As China continues to implement new policies to strengthen its economy and improve governance, the growth in the corporate bond market is expected to remain solid. The S&P China Corporate Bond Index seeks to provide global investors with the key market characteristics of the rapidly expanding corporate bond sector, while also improving transparency in the local-currency bond market.

#### PERFORMANCE DISCLOSURES

The S&P Pan Asia Bond Index, the S&P China Corporate Bond Index, the S&P China Financials Bond Index, the S&P China Industrials Bond Index, the S&P China Services Bond Index, the S&P China Utilities Bond Index, the S&P China Sovereign Bond Index, and the S&P Korea Corporate Bond Index (the "Index") were launched on March 12, 2014. All information presented prior to the launch date is back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. Complete index methodology details are available at [www.spdji.com](http://www.spdji.com). It is not possible to invest directly in an index.

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Another limitation of using back-tested information is that the back-tested calculation is generally prepared with the benefit of hindsight. Back-tested information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities, fixed income, or commodities markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

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or visit [www.spdji.com](http://www.spdji.com)

on the investment plus accrued interest (or US \$1,650), the net return would be 8.35% (or US \$8,350) for the year. Over a three year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US \$5,375, and a cumulative net return of 27.2% (or US \$27,200).

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## Fuelling Fund Management: The Power of Independent, Automated, Multi-Vendor Price Validation

**Tim Dennis**, Managing Director,  
Asset Arena Pricing Services

### PRICING IN THE FAST LANE: A DAUNTING INTRADAY CHALLENGE

**For asset managers and third-party administrators (TPAs), the daily valuation of securities can represent a daunting task. As a basis for multiple net asset value (NAV) calculations, TPAs and fund managers have a window of under two hours to price tens of thousands of instruments across multiple asset classes for hundreds of funds.**

In Europe, and now increasingly in the US, the pressure is on to complete this process not just once a day, but throughout the day. Multiple valuation points are standard for European firms, with some pricing on the hour and up to 15 times daily.

In a live, fast-moving trading market, where prices change constantly, multiple intraday valuations can place major demands on a financial institution's resources and operations. As the fuel of those operations, and effective fund management, there is an urgent need for a more efficient approach to pricing.

#### **Risks and costs for the pricing process**

As Europe's asset managers and TPAs look to expand their customer base and achieve growth, the need to carry out multiple intraday valuations in tighter time frames creates risk for the pricing process. This risk only increases when firms rely on manual input and spreadsheets to manage their pricing data.

What is more, many asset managers and TPAs rely on just one source of data to price instruments. With no back-up sources to validate prices, this approach not only increases the risk of inaccurate valuations but also of no pricing updates at all, should a data vendor's system fail for any significant length of time.

Corporate actions can add another layer of complexity to the pricing process, and their impact on prices must be closely monitored and reported on. Again, purchasing just one feed for corporate actions data makes this impact hard to validate, increasing the risk of errors.

All the while, the investment world is itself becoming more complex. To differentiate themselves in a highly competitive market, traditional, “long-only” asset management firms are increasingly adopting hedge-fund-style strategies and trading alternative over-the-counter (OTC) instruments. Although regulation now decrees that most standard OTC products must be cleared by central counterparties, a large number of exotic instruments are still not traded at an exchange. Electronic pricing data is therefore not available on these often illiquid products. To value them, firms instead rely to a far greater degree on human calculations and input – running a greater risk of human error.

Beyond introducing significant risk and potential for error, a largely manual approach to pricing is costly for asset managers and TPAs. Typically firms have responded to growing pressures on pricing processes by hiring more staff. For organizations looking to achieve scale, this will prove an unsustainable solution as intraday valuations and NAV calculations become more common and onerous.

### TAKING A WRONG TURN: THE IMPACT OF INACCURATE PRICING

In the first instance, inaccurate prices will inevitably lead to inaccurate NAV calculations. As well as having a negative impact on anyone transacting with the fund, this can potentially dilute the fund itself or reduce its value for remaining shareholders.

Incorrect valuations can also have a knock-on effect on performance presentations and, if they are based on performance, the calculation of fees.

Perhaps most importantly, a fund’s reputation can suffer. Recent years have seen a number of high-profile court cases and news stories related to the incorrect valuation of instruments. Whether undervaluing by mistake, or fixing prices by design, institutions are more and

more likely to misprice securities when manual processes are involved: spreadsheets can be malleable; numbers may be dropped; human errors could creep in.

### THE ROAD TO COMPLIANCE

In the wake of well-publicized incidents of mispricing, where portfolio managers have had a little too much control over the prices of certain instruments, regulators around the world are paying new attention to valuation practices.

Although no specific regulatory guidelines on valuation have been issued as yet by, for example, the US Securities and Exchange Commission or the European Securities and Markets Authority, the need for checks and balances across pricing processes is growing. This is particularly the case when no current market value is available. With funds having to use a certain amount of discretion to determine fair value, rigorous controls must be in place to underpin their judgments.

***“The need to carry out multiple intraday valuations in tighter time frames creates risk for the pricing process.”***

### STEERING THE WAY FORWARD

Now that oversight is the watchword of valuation processes, the role of the chief compliance officer (CCO) is gaining importance. As the eyes and ears of the board in terms of compliance issues, CCOs are driving a new emphasis on internal valuation control – and the previously undervalued pricing function as a whole.

As a result, a cultural shift is taking place. For oversight and due diligence, asset managers are generally increasing their awareness of, and proactive involvement in, the details of the pricing process.

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### Policies and procedures

Ultimately, the new, more rigorous approach to pricing is leading funds to more clearly define policies and procedures for the valuation of instruments. Making sure these mandates are both created and are carried out is becoming the cornerstone of robust, compliant pricing.

An internal pricing mandate could be as simple as always using a primary data source feed and a secondary pricing feed to compare it with, and – if these don't match – a named third source to validate one or the other. For non-standard OTC instruments, with no electronic feeds to help price them, the procedure may not be as straightforward; the main objective, for compliance and control, is to have a procedure in place to start with.

### FULL SPEED AHEAD BUT IN CONTROL: NEW WAYS TO DRIVE DOWN COSTS AND RISK

Intent on retaining control over their mandates, while reducing the costs and risks of in-house pricing, asset managers and TPAs are increasingly looking to outsource pricing validation processes to external service providers. An outsourced model will adhere to the firm's own policies and procedures for pricing and corporate actions, thereby keeping ultimate control of the function in-house. At the same time, it can introduce a range of new benefits for the outsourcing firm.

### Automation

Automation is key to the pricing services provider, instantly reducing the risk of human error and significantly speeding up the pricing process. The validation component of calculating an NAV can take up to 90 minutes; an automated solution, hosted on the provider's own powerful infrastructure, can scrub and validate prices in 15 minutes.

It will compare feeds as dictated by a firm's mandate, and automatically generate easily digestible reports on the results.

High levels of automation can even be applied, not only to validating prices and corporate actions for traditional instruments, but also to the core processes of pricing illiquid OTC products. Working with the customer's brokers, the provider will apply tolerance tests and other checks to the prices provided, using artificial intelligence to transfer details from faxes or emails into the automated system. Any manual data input along the way, for example of a price given over the phone, will be subject to a four-eyes approval processes. Here, the data is collected and entered independently by two different pricing services team members.

### Independent validation and audit trails

In itself, an outsourced pricing service is an automatic guarantee of independently validated, and therefore highly trustworthy, prices: critical for peace of mind in the new age of compliance. For OTC valuations in particular, it also automates the generation of an audit trail – demonstrating that pricing policies and procedures have been followed, and any inaccuracies are not the fault of the asset manager or TPA concerned.

### Economies of scale

When pricing is carried out in-house, increased demands on valuation processes inevitably result in higher staff and infrastructure costs. A large pricing services provider may value hundreds of thousands of instruments on a daily basis and, by automating price validation for many customers, can offer unrivalled economies of scale as well as scalable infrastructure.

For further information please contact [am.solutions@sungard.com](mailto:am.solutions@sungard.com)  
or visit [www.sungard.com/assetarenapricingservices](http://www.sungard.com/assetarenapricingservices)

### Focusing on strengths

As well as helping reduce the cost of additional resources, an outsourced pricing service will ultimately help get more value from existing staff. By taking on the most time-consuming yet least skilled aspect of NAV calculations, the service provider allows in-house teams to concentrate on the part of the process where they can add critical value, which is in an oversight capacity.

By adopting an automated price validation process, asset managers and TPAs are better poised to accommodate a broader range of flexible investment solutions, inclusive of larger volumes of more complex instruments, to meet their clients' demands. Ultimately, the focus is on retaining existing clients and winning new business.

### CONCLUSION: POWER EFFECTIVE FUND MANAGEMENT WITH EFFICIENT PRICING

Price validation is rarely a core competency for asset managers and TPAs, nor should it become one. In the front office, fund managers' talents lie in stock picking, fund allocation and marketing; in the back office, the focus should be on managing complex discrepancies in pricing data.

That said, pricing validation is also a critical part of fund management activity, not least when it comes to achieving compliance and building a reliable reputation. If fund managers are fast, expensive cars, with the sleek brand identities and gleaming chassis they need to market themselves to investors, then pricing data is their fuel. Every vehicle, however sophisticated, needs good fuel to perform well and go far. Without accurate, reliable, independently validated prices, fund managers cannot operate at the peak of their powers.

### ABOUT SUNGARD'S ASSET ARENA PRICING SERVICES

SunGard's Asset Arena Pricing Services collects, reconciles and validates vendor, broker and counterparty pricing data. Fully automated processes ensure that the required data is consistently and accurately extracted from a full range of report formats. Through its corporate actions service, Asset Arena Pricing Services covers an extensive range of corporate actions and dividends across all world markets. Reports alert asset managers and third-party fund administrators to new corporate action announcements as well as confirmations of validation status. Delivered via a customized user interface, Asset Arena Pricing Services is hosted by SunGard on a Software as a Service (SaaS) basis.



## Benefits From ISAE 3402 (Type II) Engagement

**Stefan Shoylev**, CFA, Senior Financial Analyst,  
Value&Risk Valuation Services GmbH

**Financial institutions like asset managers, insurance companies, commercial banks and custodians, which use external valuation services, take an array of complementary operational risks. Most of those risks stem from the fact that valuation by a third party can make an institution or its division critically dependent on a chain of production steps that are out of their immediate control. This may include special issues like development, choice and quality of the valuation models or calculation methods, but also common ones like timeliness and reliability of delivery, informational and IT-security, or compliance with contractual and law provisions.**

The risks associated with third-party valuation are also subject of control by the financial regulatory authorities. All developed jurisdictions generally prevent financial institutions from disclaiming their own liability for services provided to them by third parties. In Europe, for instance, the Alternative Investment Fund Managers Directive (AIFMD) and its supplementing Delegated Regulation (so-called “Level 2 measures”) provide that the delegation to third parties must not prevent the effectiveness of supervision by the AIFM. Furthermore, the AIFM must ensure that the delegate properly supervises the performance of the delegated functions and adequately manages the risks associated with the delegation .

We at Value&Risk recognize the operational-risk concerns of our customers. Moreover, we recognize that these concerns are identical with our own. Back in 2010 we aimed to design a robust and efficient quality control system covering all stages of our operational chain. Our natural next step was to let this system undergo a rigorous verification in accordance with an acknowledged global standard that would provide our customers, their auditors and the regulatory bodies with the credentials they needed.

We chose the regular audit in compliance with ISAE 3402 (then SAS 70) Type II.

This paper briefly describes that standard and the implementation of a compliant control system from the perspective of the valuation service organization. It discusses general principles, but also some practical solutions, challenges and benefits, drawn from our experience.

### ISAE 3402

International Standard on Assurance Engagements No. 3402 (ISAE 3402), Assurance Reports on Controls at a Service Organization, was issued (eff. 15.06.2011) by the International Auditing and Assurance Standards Board (IAASB), which is part of the International Federation of Accountants (IFAC). Like its predecessor SAS 70, the standard defines a set of principles an auditor must employ in assessing the internal controls of a service organization.

Prescribing auditors how to assess internal controls, rather than organizations how to design them, the standard is flexible in a sense that it can be implemented to the whole range of processes and procedures that may constitute operational risk. For a valuation service this usually includes - but is not limited to - all IT and manual systems, by which valuation data is initiated, recorded, processed, corrected and transferred. Various specific controls are typically related to:

**Input Customer Data:** customer's authorization, instrument identification;

**Input Market Data:** completeness, consistency and timeliness of the raw market data;

**Internal Data Processing:** correctness of the setups, appropriateness of the models used;

**Output Data:** completeness, correctness and timely delivery of customer reports.

Further controls may concern IT and information security, disaster recovery and business continuity, etc.

### REPORT TYPES

According to ISAE 3402 the auditor's reports can be classified as either Type I or Type II depending on their scope. In both Type I and Type II reports the auditor evaluates:

**a)** whether the assertions of the service organization fairly present its control system as designed and implemented at the time of the audit, and

**b)** whether the controls related to the control objectives stated by the service organization are suitably designed.

Additionally, in Type II report the auditor evaluates whether the controls related to the control objectives operated effectively throughout the audited period. In including a detailed testing of the effectiveness of the service organization's controls the Auditor's Report Type II is meant to provide reasonable assurance that controls functioned properly and the control objectives were achieved during the specified period.

### CONTROL DESIGN AND IMPLEMENTATION

A suitably designed control catalogue means one, which provides reasonable guarantee that the working steps to which it refers would generate outcomes that meet certain specified criteria (control objectives). For example, if a valuation service desires to assure timely and correct delivery to its customers (control objective) it may place an appropriate check (control) that verifies the timeliness and correctness of the delivery procedure (working step).

It might sound simple, but designing and implementing in practice a good functioning control catalogue can be a challenging task. There is no ultimate formula for how to do that and every organization should adapt the general principles to its business priorities, process workflow and corporate culture. As far as tighter controls cost more resources and increase rigidity, the organizations always face some tradeoff between quality, cost and flexibility.



For us at Value&Risk quality represents the highest priority. The company's business is to provide premium services and quality is what we cannot afford to compromise. Maximum flexibility towards customers' needs, widest range of covered asset classes and fast reaction to market events are other indispensable pillars of our philosophy. Given these guidelines set by our business model we have established an extensive control catalogue that covers: model development, evaluation process, IT and information security, risks related to external parties, incident management and business continuity.

The control catalogue applies to existing processes and procedures, but indirectly it also concerns the future ones. New procedures are only developed and introduced in combination with corresponding suitable controls. This approach makes development more formal and time-consuming but pays off with additional stability of the adopted procedures and higher quality of their output.

Let us take evaluation of financial instruments - the central process of our service. It consists usually of two stages: a set-up stage, which is a one-time operation chain and periodic (typically daily) valuation, which is a recurring operation chain. Every significant working step at both stages is equipped with an appropriate control designed to serve some specified control objective.

The controls are placed at two levels. At the calculation-tool level the focus of controls lies on the valuation procedures (correctness and completeness of the static and market data, appropriateness of the models used, correctness of the performed calculations, etc.). At the customer-portfolio level the focus of controls lies on the data communication with the individual customer (authorization,

compliance with the SLA, correctness and completeness of incoming/outgoing data, etc.). The importance of the second level corresponds to the opportunity we grant our customers to negotiate highly individualized services.

The logic of the evaluation process can be demonstrated by the following example. It relates to the valuation of a German Promissory Note (Schuldscheindarlehen or simply Schuldschein) - a debt-instrument, in whose pricing Value&Risk is a market leader. The Schuldschein is not publicly tradable and can be evaluated only by means of a model. Being a private deal, it is negotiable and may have various customized features only the contract parties are aware of. That is why the setup of a Schuldschein into the valuation system includes analytically extracting data from the original terms and conditions and provides a good illustration of a workflow, which consists of both manual and automated procedures. The basic working steps of the evaluation, as well as the corresponding chains of controls and control objectives can be summarized as follows:

<b>A. SET UP</b>			
<b>No</b>	<b>Working steps</b>	<b>controls</b>	<b>control objectives</b>
<b>1</b>	Reception of customer's request (automated)	Authorization of data sender (automated/ manual)	To perform only authorized customer data communication
<b>2</b>	Reception of term sheet (automated)	Completeness of the data (manual)	To assure completeness and correctness of the relevant data set
<b>3</b>	Term sheet analysis: choice of valuation model/ tool, if needed - creation of new tool (manual)	Compliance with the SLA and the legal framework; appropriateness of the model/tool used (manual)	To assure compliance with SLA and legal requirements, as well as appropriateness of the model used
<b>4</b>	Term sheet analysis: setup in the valuation tool (manual)	Completeness and correctness of static data (manual/four-eye principle)	To assure completeness and correctness of the relevant input data set
<b>5</b>	Term sheet analysis: setup in the customer's plausibility/ reporting tool (manual)	Completeness and correctness of static data (manual/four-eye principle)	To assure completeness and correctness of the relevant input data set
<b>B. DAILY VALUATION</b>			
<b>No</b>	<b>Working steps</b>	<b>controls</b>	<b>control objectives</b>
<b>1</b>	Reception/processing of raw market data (automated)	Completeness/correctness of raw market data (automated/ manual)	To assure completeness and correctness of the relevant input data set
<b>2</b>	Calculation of daily prices (automated)	Completeness/consistency of calculation output data: calculation-tool level (automated/manual)	To assure completeness, correctness and consistency of the internal output data
<b>3</b>	Transfer of daily prices into customer's plausibility/ reporting tool (automated)	Completeness/consistency of calculation output data: customer-portfolio level (manual/four-eye principle)	To assure completeness, correctness and consistency of the internal output data
<b>4</b>	Report creation (automated)	Completeness/correctness of reporting data (manual/ four-eye principle)	To assure completeness, correctness and consistency of the internal output data
<b>5</b>	Report delivery (automated/ manual)	Timely and correctly delivery (automated/ manual)	To assure timeliness, completeness and correctness of the outgoing data; To perform only authorized customer data communication



Since this table is meant to serve as only an example, it depicts the general scheme of controls associated with the evaluation. More detailed description of the working steps depends on the type of the customer, the SLA and the specific features of the Schuldschein. Moreover, the Schuldschein is just one instrument of the asset-universe Value&Risk provides valuations for. The valuation processes of other assets may have different paths of working steps and controls. For example, the setups of more standardized instruments, like options or IRS, can be automated and therefore streamlined substantially.

Nevertheless, the table demonstrates one important point - all controls include at least in part manual procedures. Even in when automated, control functions are always assigned to a specific person, who is responsible for surveying the control results and documenting them. Personal assignment and documentation of controls are fundamental principles of our control system that ensure accountability and transparency, and enable the effectiveness of the auditing process.

### AUDITING PROCESS

Since the audit in accordance with ISAE 3402 (Type II) is retrospective, it takes place after the expiration of the audited period. In our experience, the auditing process comprises as minimum the following steps:

**1) Control description:** The service organization provides the auditor with a written description of its workflow, operational risks it believes it faces, control objectives it pursues and controls it has placed in order to meet the stated objectives.

**2) Assessment of design of the control structure:** In interaction with the service organization the auditor prepares analysis of the described risks, the relevance of the formulated control objectives and the suitability of the controls placed. The goal of the analysis is to determine whether the control objectives properly cover genuine risks and controls are designed to effectively achieve their objectives. In cases of gaps, falsely defined control objectives, misplaced or redundant controls the auditor may recommend corrective measures or suggest improvements in the effectiveness of the control structure.

**3) Testing of controls (only for ISAE 3402 Type II):** Based on an appropriate random sample of internal documents (daily records, checklists, reports, etc.) from the tested period, as well as direct observations on the current controlling process, the auditor tries to determine whether the asserted controls have been properly performed in everyday operations. The following simple example demonstrates the procedure. The figure below represents an anonymized excerpt of our files-delivery checklist. The checklist is designed to document the performance of control named "Timely and correctly delivery of the outgoing data to the authorized customer's SFTP-account and/or email address". According to the checklist, on 09.12.2013 the customer XXX-Bank should have received on its SFTP-account its portfolio of OTC-options not later than 8:00 a.m., in txt-format. Additionally, the customer should have received an email, which informs him that the txt-file has been uploaded.

Customer/ Portfolio (Mo, 09.12.2013)	Output Data			
	Delivery Until		Delivery Format	
	Sftp (Timestamp)	E-mail (Timestamp)	Sftp (Signature)	E-mail (Signature)
XXX-Bank (OTC-Options)	8:00 am	8:00 am	txt	info

The timestamps in the first two blank boxes (under the heading “Delivery Until”) along with the signatures in the next two boxes (under the heading “Delivery Format”) should allow the auditor to identify the operator, who has performed the action, and to crosscheck the time and the format of delivery in the SFTP-log-file and the service mailbox. If the auditor does not detect any omissions or discrepancies in his sample he can reasonably conclude that the above control has been properly performed and its objectives have been achieved in the specified period.

**4) Evaluation and report:** As a last step of the auditing process the auditor issues a service auditor’s report, in which he states whether he has obtained reasonable assurance that:

- a) the presentation of the service organization’s controls is fair;
- b) the design of these controls is suitable to achieve the defined control objectives;
- c) the controls were properly performed and operated effectively with respect to the control objectives throughout the audited period (only for Type II report)

## CONCLUSION

For a valuation service organization, a successful ISAE 3402 (Type 2) engagement is a costly undertaking. It means rigorous examination of all significant aspects of the organization’s workflow and, along with considerable financial cost, demands commitment and persistence from the whole working team, from the top management to the single employee.

The benefits to the user organization are straightforward. It obtains an in-depth audit that effectively communicates information about how the service organization identifies its operational risks, designs its internal controls and, in case of Type II report, achieves its control objectives. In this way the user organization saves additional costs for performing its own audit procedures at the third-party service location. It manages economically and reliably the operational risks and meets easier and cost-efficiently the regulatory requirements associated with the delegation to an external provider.

The service organization in its turn obtains an independent evaluation of the suitability and the effectiveness (in case of Type II report) of its internal control system. The evaluation process brings opportunities for improvement of that system and builds a climate that increases accountability and promotes employee awareness.



Although costly itself, ISAE 3402 audit saves further costs for performing separate audits for multiple individual customers. Additionally, it treats all customers equally in giving them and their auditors access to the same set of information.

Looking back at four years of continuous ISAE 3402 engagement and three Auditor's Reports Type II (so far all of them with an unqualified opinion), we at Value & Risk consider our invested resources in terms of time, cost and effort by far more than offset by the benefits in terms of increased service quality, new business opportunities and recognition by our customers and their auditors. We see our ISAE 3402 (Type II) engagement as a milestone of our commitment to transparency, integrity and highest professional and quality standards.

For further information please contact [info@valuerisk.com](mailto:info@valuerisk.com)  
or visit [www.valuerisk.com](http://www.valuerisk.com)

Interest in “Control Reports” under ISAE-3402 has increased dramatically in recent years although a “Control Report” is not likely to be favourite reading for most people.

This growing interest is related both to the break-up of the value chain and the associated increase in outsourcing. In outsourcing relationships, service providers like to submit a Control Report evidencing the efficiency and effectiveness of their control system to their customers. And for customers, Control Reports provide an efficient tool for obtaining insight into the control structures of their service provider.

Control Reports were originally developed for the exchange of information between auditors in the context of annual financial statement audits. That explains their partly very technical language, but it also entails the benefit that these reports are compiled with the same diligence as annual account audit reports.

Control Reports usually present deficiencies quantitatively along with a comment by the service provider. The customers of a service organisation can therefore integrate the report results directly in their own control system, while the commentary permits customers to perform an initial evaluation of the defects concerned.

Communication using ISAE-3402 reports also works so well because these reports are highly standardised. To arrive at a clear and comprehensive assessment,

the ISAE-3402 auditor analyses control criteria like completeness, correctness etc. in detail.

What has really given ISAE-3402 reports gold standard quality, however, is that they are accepted increasingly by regulatory authorities as an appropriate control instrument in outsourcing control.

Control Reports can also improve the organisation of a service provider substantially if both the management and employees are prepared to examine themselves and their performance critically in order to improve the quality of their service.

What impressed us about Value & Risk was that the company was not only prepared, but truly determined to establish a robust control system as the foundation for continuous improvement of its service quality.

At Value & Risk, the analytical background of the service is reflected in ongoing analysis and optimisation of the control system.

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Mr Schliemann is Certified Accountant, Member of GIPS Executive Committee and Managing Director of FFA Frankfurt Finance Audit GmbH – Value&Risk’s auditing company under ISAE-3402.

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- |   |                               |                                  |
|---|-------------------------------|----------------------------------|
| <b>122</b> Augeos                       | <b>148</b> Finalyse           | <b>173</b> Quantifi              |
| <b>124</b> AVS-Valuation                | <b>150</b> Fitch Solutions    | <b>174</b> Quaternion            |
| <b>125</b> Axiom Valuation              | <b>152</b> GFI                | <b>176</b> Scanrate              |
| <b>126</b> BDO                          | <b>153</b> Grant Thornton     | <b>178</b> SCI                   |
| <b>128</b> BGC Partners                 | <b>154</b> ICAP               | <b>180</b> Solum Financial       |
| <b>129</b> Bloomberg                    | <b>155</b> Interactive Data   | <b>182</b> S&P Dow Jones Indices |
| <b>130</b> Cbonds                       | <b>156</b> Intex              | <b>184</b> StatPro               |
| <b>132</b> Chatham Financial            | <b>158</b> KPMG               | <b>185</b> SS&C GlobeOp          |
| <b>133</b> Credit Benchmark             | <b>160</b> Lewtan             | <b>186</b> SunGard               |
| <b>134</b> Derivative Partners Research | <b>161</b> Market Axess       | <b>188</b> Superderivatives      |
| <b>136</b> Deloitte                     | <b>162</b> Markit             | <b>190</b> Thomson Reuters       |
| <b>138</b> DeriveXperts                 | <b>163</b> Moodys             | <b>192</b> Tullett Prebon        |
| <b>140</b> DerivSource                  | <b>164</b> MTS                | <b>193</b> Tradition             |
| <b>142</b> EDG                          | <b>166</b> Numerix            | <b>194</b> Value & Risk          |
| <b>143</b> EuroABS                      | <b>168</b> Prism Valuation    | <b>196</b> Voltaire Advisors     |
| <b>144</b> European Data Warehouse      | <b>170</b> Prytania Solutions |                                  |
| <b>146</b> EY                           | <b>172</b> PWC                |                                  |
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# VENDOR DIRECTORY

**Our objective in creating this Directory of service providers involved with Valuation Risk was to present, in one easily accessible publication, as complete and representative a list of vendors in this space as possible. A number of years ago, this was relatively easy, since there were only a small number of large players to take into account. Now things are very different!**

Over recent years there has been an explosion of new firms starting up in all parts of the industry, and in our estimation there are now over 150 companies operating in sectors which can justifiably be said to be related to valuation risk. In this context we are pleased that we have managed to include over 1/3rd of this total in our Handbook first time around, and have high hopes that the publication will become even more inclusive as it develops over time.

We believe that the business of valuation in its broadest definition breaks down into five main sub-sectors:

#### **Pricing & Valuations**

This is the direct provision of pricing and valuations data to end-users. These can be a variety of different price types (trade, broker, composite, evaluated, ...) in a wide range of asset classes (fixed income, securitized products, derivatives, real estate, ...), but the underlying purpose is to supply a price (or range of prices) for a financial instrument which can be used by the consumer to meet their valuation obligations.

#### **Models & Analytics**

There are a number of firms who do not provide pricing, but rather the analytical means to produce it. This is a highly specialist and technical field, populated by mathematicians and 'rocket scientist' quants, often refugees from the major investment banks and/or academia.

#### **Data & Inputs**

The very best model is only as good as the data which fuels it! Often neglected, but absolutely critical to the valuation process, is the underlying data used to populate and calibrate pricing models. This includes yield curves, credit estimates and spreads, prepayment speeds, probabilities of default, terms and conditions data, and much more.

#### **Derived Products**

Valuation is done for a reason – not just for the intrinsic delight it provides! That reason may be external client/regulatory reporting or internal trading and risk management, but there is a fundamental purpose to the periodic production of a price. Some of these downstream uses have applications to valuation risk, such as index production and analytics and the creation and management of risk measures.

#### **Advisory**

Here we are on home turf! In addition to the major firms providing legal and audit/assurance services, there are a large number of smaller, specialist companies (such as ours) supplying other vendors and/or valuations end-users with advisory services.

The vendors in this Directory are presented in alphabetical, rather than category, order since in many cases, they provide service offerings in more than one of the categories identified above. We hope that the standardisation of the listing format will allow the reader to more easily identify exactly what each firm provides.

**Augeos is a technology and management consulting firm, specialising in developing tailored services and software solutions for the Finance Sector.**

Augeos's approach consists in designing highly targeted solutions:

- from raw market data supply on the trend of the international markets to their selection and interpretation
- from software development to help the Back Office in pricing of financial instruments,
- from assisting executive officers in managing risk assessment and monitoring and, in a broader sense, to specialized consultancy.

In the existing market conditions, financial intermediaries are required to abide to the constant evolution of banking legal framework.

Augeos, a prestigious name in the industry, brings particularly valuable contribution in the right direction: its dedicated solutions adjust rapidly to the varying scenarios of reference and provide an immediate competitive advantage.

**Technology and services for the fair value price management of illiquid bonds.**

Clients and supervising authorities require a careful attention on the monitoring process of the financial instruments, in particular following aspects outlined below:

- Reference Data
- Classification
- Market Data retrieval

For many administered financial instruments and for regulators new requirements, depending on their classification, it is now important to rely on a "Fair Value" price to be associated with the one written into the Balance Sheet.

It has become strategically more important to have the whole calculation process of the fair value of the financial instruments successfully managed.

In cases where it is decided to outsource the process of evaluating the Fair Value or having a price benchmark to make comparisons with internal procedures, Augeos offers the automatic prices evaluation service **Augeos Pricing Service - APS**.

It covers on average 70%-80% of the Italian Banks' portfolios at an affordable cost. It guarantees also the availability of detailed single instrument price documentation for audit purposes.

We proceed with the bond **theoretical pricing valuation** using appropriate pricing models for the each "building block" of the bond. Each *basic component* with its consolidated cash flows is evaluated using the method of discounted cash flows, through a discounted rate curves consistent with the related rating.

Options are evaluated according to the most appropriate market models. For each security, we deliver a report inclusive of key evidence used in describing the "fair value" of all its components.

It is important not only to have a manual that describes the pricing models but also to demonstrate the working process and market data adopted to generate the fair value.

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## AUGEOS PRICING SERVICE. A POINT OF REFERENCE IN THE GALAXY OF THE ILLIQUID BONDS.

Augeos Pricing Service is an independent and accurate service to evaluate OTC bonds.

### KEY BENEFITS.

#### COMPETENCE.

Augeos team has more than 20 years of experience in providing pricing services.

#### REFERENCE AND MARKET DATA.

Thanks to VDF Plus, our service based on Six Financial Valor Data Feed, our reference data are fully structured and updated near-real time.

Augeos also guarantees an accurate check of the quality of reference data using term sheets.

Interest rates, fixing prices, zero curves and volatility grids are key elements provided to feed valuation models.

#### MODELS.

We use proprietary and market-standard models to provide our daily price valuation service. Our models are precise and renowned by years of experience and among our long term customers.

The service guarantees the broad global coverage of portfolios with highly specializing competencies on Italian OTC bonds.

We provide theoretical prices for bonds ranging from vanilla to complex illiquid instruments.

We have been successfully delivering prices to a number of clients trusting us in all Italian banks for more than 15 years.

We also put particular efforts both on careful automatic integration of reference data and on our proprietary algorithms to classify

instruments.

In addition, we implemented a reporting price check to provide a better service result validation and calibration with multiple price sources.

#### CERTIFIABLE AND AUDITABLE VALUATIONS.

Calculation and logs are stored for audit trails anytime.

#### REALIZE MORE.

Check details on:

[www.augeos.it/EN/Services/APS](http://www.augeos.it/EN/Services/APS)

**Augeos**

Services and technology to create value



**AVS-Valuation GmbH (AVS), Frankfurt am Main is recognized as an external valuation company with a strong focus on the evaluation of complex and illiquid financial instruments such as ABS, CLO, CDO, OTC-Derivatives and other tailor made instruments.**

AVS is independently operating and part of the owner-managed MainFirst Group. The valuations are neutral, independent, transparent and reliable. As a key principle valuations are unbiased, based on data analyses carried out internally, and on own models and market assessments.

#### **AVS Clients - Top 3 valuation provider by most custodians banks**

Custodian Banks, Investmentbanks, Insurances, KAG's, KVG's, Asset Manager, Institutional Investors, Pension Funds, Funds, Wealth Management, Consultant, Auditors

#### **Valuation Requirements**

- AIFM & UCITS Directives
- Basel III, Solvency II, Regulator
- Financial Statements
- Regional Valuation Guidelines
- European Market Infrastructure Regulation
- European Long Term Investmentfunds
- Risk Management
- Scenario analysis & stress testing
- Market Conformity, Security Lending
- Collateral Management
- Reporting, Monitoring
- Derived trading information

#### **Valuation Portfolio**

- Bonds, Loans, Structured Credit (MBS, ABS, CDO, CLO, Bonds, Loans, SSD)
- Interest Rate Derivatives (FRN, Caps, Callable, Swaps, CMS, Accrual)
- Equity-Linked Derivatives (Convertibles, Options, Warrants)
- FX-Linked Derivatives (Dual Currency, Quanto, FX Forward)

#### **Services**

- Valuations
- Specialities
  - CDO/CLO Equity Tranches
  - Combo Notes
  - Infrastructure instruments
  - Real estate instruments
  - Mittelstandskredite (SME loans)
  - Asset covered loans
- Project management / coordination
- Market conformity check
- Mark to Model check
- Monitoring & Reporting
- Risk Analysis
- Advisory

#### **AVS - IDW PS 951 approved**

AVS is IDW PS 951 approved (German equivalent of SAS 70 / ISAE 3402) and aims to provide services on the highest possible standards.

**Heinz Hofstaetter**  
Managing Director

**Dr. Rainer Eichwede**  
Managing Director

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**w:** www.avs-valuation.com





**Axiom Valuation provides a comprehensive range of expert valuation services for private businesses, illiquid securities, fixed income portfolios, intangible and tangible assets, and other hard-to-value assets. We value thinly traded public companies and divisions of public companies for a variety of purposes.**

We offer a unique alternative investment return authentication service (AIRAS) for institutional investors in hedge funds and private equity funds. Since 2001, Axiom Valuation has conducted valuation assignments for clients throughout North America, Europe, and Asia from its headquarters in the greater Boston, Massachusetts area. In the increasingly complex world of valuation, we provide ANSWERS YOU CAN TRUST, and UNDERSTANDING BEYOND THE NUMBERS.

#### **Fair Value Services for Fixed Income Portfolios**

Axiom Valuation is a leading provider of recurring fair value reviews of fixed income portfolios held by hedge funds, Business Development Corporations (BDCs), and Collateralized Loan Obligations (CLOs). Properly fair valuing illiquid fixed-income instruments requires a unique combination of experience in the professional fixed-income market, and powerful analytics that incorporate all of the factors that enter the fixed-income pricing equation.

We have developed a powerful, scalable, and cost-effective platform that enables our staff to deliver accurate and fully-documented fair

value review reports to our clients to meet their demanding schedules for financial reporting. Our process has been vetted by the top audit firms, and has been found to yield results that meet established fair value guidelines at price points well below our competitors.

#### **Fair Value for Other Illiquid Securities and Assets**

Institutions investing in illiquid financial securities are required to document information used to fair value financial securities on their balance sheets. Although fair value is not a new concept and has been used by market participants, the adoption of Topic 820 (formerly FAS 157) has codified the steps to properly fair value financial securities in order to meet more stringent audit standards. Topic 820 (formerly FAS 157) made independent valuation a necessity for any entity with financial reporting requirements. We have developed a series of state-of-the-art models to value complex, illiquid financial securities. While fair value is an exchange price concept, in cases where pricing is infrequent and idiosyncratic, these models help determine the fair value range and whether the price is consistent with other observable market factors.

**Stanley Feldman**  
Chairman

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**There's so much more to valuations than number crunching. The real challenge is arriving at a valuation that is fair. This involves a fine interplay of business acumen, legal expertise and technical knowledge, and is as much an art as a science.**

You might need an independent valuation of a business for any number of reasons – such as for accounting standards or for compliance, litigation, commercial or tax purposes.

BDO's Valuations team is one of the largest in the UK, and includes experts who are published authors in the field. Our client base comprises FTSE 100 companies, governments, lawyers and regulators, and covers a wide range of sectors including Pharmaceutical, Financial Services, Natural Resources, Power & Utilities (including Water, Oil & Gas and Renewables), Real Estate, Manufacturing, Technology and Telecommunications.

We have particular expertise in specialist areas such as valuations of unquoted companies, intellectual property and other intangible assets, unincorporated businesses and associated liabilities. We act as experts in relation to disputed transactions, assessment of loss, share expropriation, and Section 994 claims. We also provide expert valuations for international arbitration, matrimonial disputes and insolvency related litigation.

Our market position means we can offer true impartiality not only throughout the UK but virtually anywhere in the world. Our UK firm is a member of BDO International, the fifth largest global accountancy network with over 1,250 offices in 144 countries. This means we can provide the same standards of service and comparable multi-disciplinary teams no matter where in the world you need us to be.

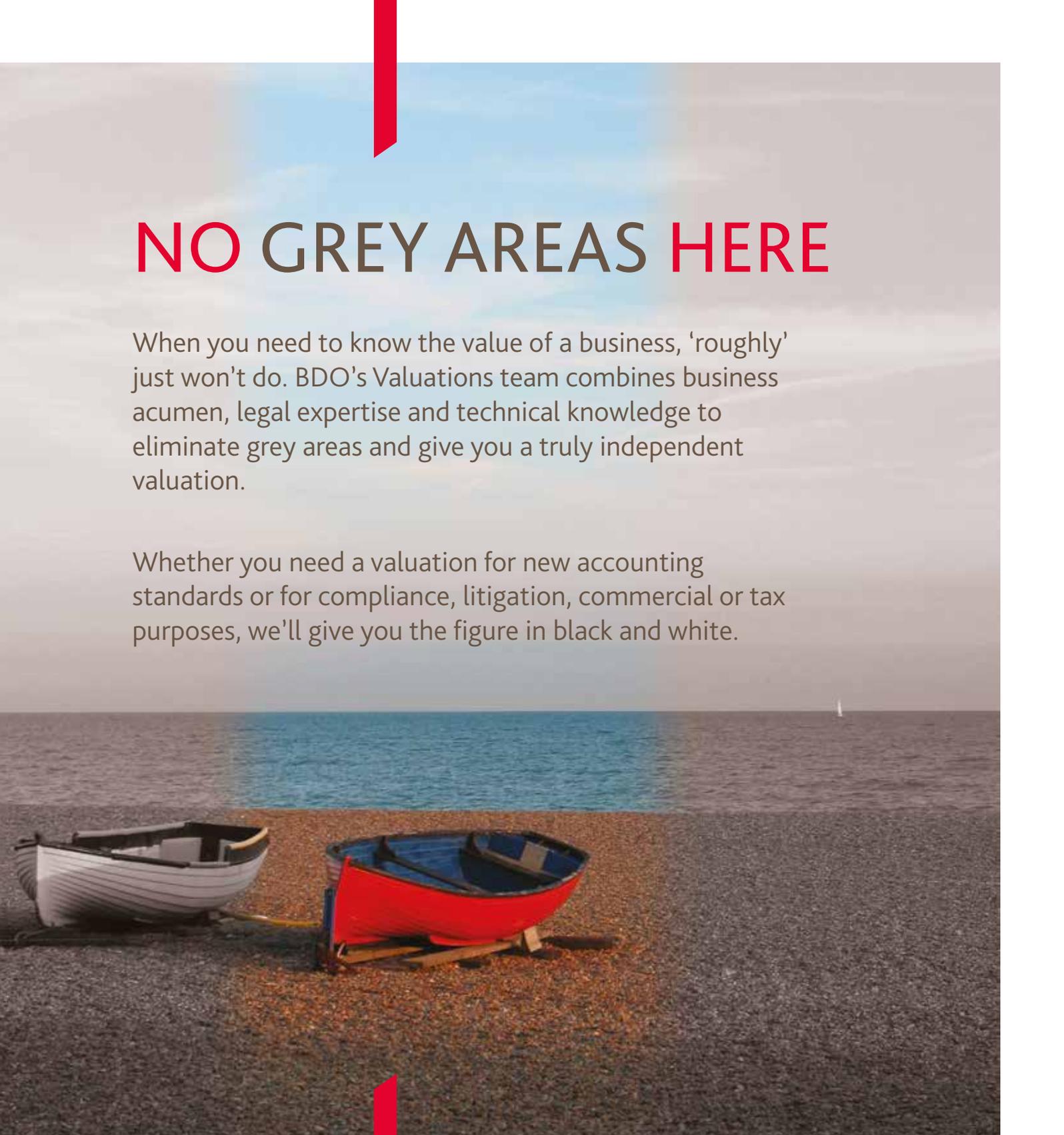
And it should go without saying that, as a major firm, we can also provide you with all the audit, tax and advisory expertise that your business needs to thrive, both nationally and internationally. Just as we are committed to delivering expert valuations, we also believe in delivering great value. It's all part of our exceptional client service.

**David Mitchell**  
National Head of Valuations

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# NO GREY AREAS HERE

When you need to know the value of a business, 'roughly' just won't do. BDO's Valuations team combines business acumen, legal expertise and technical knowledge to eliminate grey areas and give you a truly independent valuation.

Whether you need a valuation for new accounting standards or for compliance, litigation, commercial or tax purposes, we'll give you the figure in black and white.

For more information please contact:

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BDO LLP is authorised and regulated by the Financial Conduct Authority to conduct investment business.





**voice + electronic brokerage**

**BGC Partners, Inc. is a leading global brokerage company servicing the financial and real estate markets. BGC conducts approximately \$180 trillion annually in financial transactions for customers, including the world's largest banks, broker-dealers, investment banks, trading firms, hedge funds and investment firms. BGC Market Data is the exclusive provider of market data sourced from BGC Partners' broking activities.**

### Coverage

BGC Market Data's products are aggregated directly from BGC Partners' broking desks globally and include pricing coverage of:

- Fixed Income
- Interest Rate Derivatives
- Foreign Exchange and Options
- Money Markets
- Inflation
- Credit Default Swaps
- Other Structured Products

### Sourced Straight from the Desks

In today's environment of ever increasing regulatory pressure, with the growing need to ensure all market data is both accurate and verifiable, BGC Market Data is able to provide an unrivaled view of OTC data sourced directly from BGC Partners' voice and electronic broking, pricing, and analytic systems. We do not create prices or data for assets we do not provide broking services for, so you are guaranteed true market prices aggregated from our broking desks around the world.

### Unparalleled Flexibility

BGC Market Data is able to deliver the data in the ways best suited for your enterprise needs, directly over BGC's unified electronic trading platform, via our distribution vendor partners, and over the internet. Whether your valuations require real-time updates, intra-day or end-of-day snapshots, or access to historical archives, BGC Market Data will have a solution that can be tailored to your purpose.

### Breadth and Reliability

BGC's "direct-from-the-desk" model, combined with the breadth of coverage, ensures that clients as well as third-party valuation providers, have the necessary and accurate information required to confidently power their applications including:

- Risk Evaluation and Management
- Portfolio Management
- Asset Evaluations
- Programmatic Trading
- Algorithmic Strategy Testing

For more information, including details of our packaging, pricing and distribution options, please contact us at [bgcmarketdata@bgcmarketdata.com](mailto:bgcmarketdata@bgcmarketdata.com).

### BGC MARKET DATA

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# Bloomberg

**Drive enterprise workflows with credible, transparent prices across a broad spectrum of financial instruments. Bloomberg connects your firm with third-party sources, including exchanges, TRACE and dealer quotes, as well as market consensus prices for liquid corporate and government bonds.**

Meaningful transparency is critical. Regulations require more detailed disclosures and stricter risk measurement. That's why we deliver accurate pricing for mutual funds, money managers, hedge funds, internal pricing groups, auditors and regulators, whether your priority is quality, cost, transparency or coverage.

## **Bloomberg Valuation Service (BVAL)**

Out of the millions of securities that exist, most are thinly traded and difficult to price. Traditionally, a few broker quotes were sufficient to justify value. Bloomberg understands the need to increase rigor and transparency when establishing fair and independent asset evaluations. The Bloomberg Valuation Service (BVAL) draws on contributed market data from thousands of sources. These broad observations, together with innovative analytics, terms and high-quality data, produce objective third-party price valuations for fixed-income asset classes and derivative securities.

BVAL is the evaluated pricing service from Bloomberg, a leader in quality data and analytics. BVAL's benefits go beyond traditional asset evaluation services with objective, independent evaluation capabilities for both traditional and hard-to-price assets.

## **Coverage includes:**

### • **BVAL Fixed Income**

- Government, supranational, agency and corporate (GSAC) bonds
- Municipal bonds
- Mortgage bonds

### • **BVAL Derivatives**

- OTC derivatives
- Structured notes

Most important, BVAL delivers extensive value across the enterprise. BVAL not only provides rigorous, transparent and defensible pricing. It helps you identify, measure, monitor and manage valuation uncertainties. You know Bloomberg for high-quality data, cutting-edge technology and outstanding 24/7 service. These three elements combine to make BVAL the clear choice for evaluated pricing.

## **Real Pricing from Real Industry Experts**

BVAL was developed by a team of seasoned industry experts with hundreds of years of collective experience in trading, fund management, compliance and risk management, and pricing. Our team has worked on the client side and for other pricing services, so they know firsthand how regulatory changes, volatility and other factors affect your ability to evaluate positions effectively.

## **Bloomberg LP**

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**Cbonds is the leading source of information on fixed income markets of Russia and the CIS covering other Emerging and Developed Markets. For over 14 years Cbonds has been providing market professionals with such information as bond database, quotes, indices, market news, comments and research.**

Cbonds is an independent data vendor not affiliated with securities market players and other news agencies. That's why we maintain objective and unbiased attitude when providing comprehensive informational coverage of fixed income markets.

Informational resource CBONDS was established in June 2000 and initially was devoted to the Russian corporate bond market. "Cbonds.ru" Ltd was registered in June 2001. Then the site coverage was widened to the Russian debt market in general, afterwards it was expanded to CIS countries and global markets. Cbonds.ru Ltd is an independent, non-affiliated information provider, keeping an objective and unprejudiced position when providing data. The monthly website audience amounts to more than 100,000 unique visitors from 200 countries, whose activity is connected with the fixed income market. The bulk of the visitors come from Russia, Italy, Ukraine, Poland, USA and UK.

Within the framework of our activities in the field of bond market information support we work for establishing partner relations with major market participants - investment banks, issuers, trading floors, regulatory bodies. This, in turn, gives us prompt access to the information right from the market participants' hands.

### **Cbonds Services**

#### Market news

#### Bond issues database

- Simple bond search
- Advanced bond search
- Government bond auctions
- Defaults and restructuring
- Bond calendar
- Credit ratings

#### Bond quotes

- Stock exchange, OTC quotes
- Market participants' quotes
- Bond comparing

#### Bond calculator

#### Indices

- Cbonds indices
- Fixed income statistics
- Market participants' indices
- Consensus

#### Research

#### League Tables

- Bookrunner league table
- League table builder

#### Portfolio Management

### **Cbonds Conferences**

We have been arranging professional financial market conferences since 2003. Every year the company successfully holds more than 25 events in Russia, Ukraine, Kazakhstan, and other countries. Cbonds conferences presuppose an intense agenda, a wide range of participants, exciting informal activities. The majority of Cbonds conferences are held annually.

## **Konstantin Lysenko**

Head of Russia & CEE Fixed Income Group

### **Cbonds**

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# Advanced search for domestic and international bonds from across the world

<http://cbonds.com/emissions/>

Bond Search Advanced Bond Search Government Bond Auctions

Issuer: Issuer # RN ISIN

SPV: Start typing the name

Region: [Select region](#)  
Africa  Asia (excl. Japan)  CIS   
Developed Markets (excl. Europe)   
Eastern Europe  Selected: 8 from 8

Country: [Select country](#)  
Albania  Algeria  Andorra   
Angola  Argentina  Selected: 168 from 168

Market segment:  
 corporate  
 municipal  
 sovereign

Industry: [Select industry](#)  
Agriculture  Banks   
Chemical and petrochemical industry   
Communication  Selected: 21 from 21

Issue amount (m):  
0 7548502

Issue type:  
[Select issue type](#)  
Domestic bonds  International bonds

Issue kind:  
[Select issue kind](#)

Issue status:  
[Select issue status](#)  
approved by issuer  being placed   
cancelled  early redeemed   
exchanged  Selected: 11 from 11

Currency:  
[Select currency](#)  
USD  EUR  CHF  GBP  JPY   
Selected: 66 from 66

Listing:  
[Select trading floor](#)  
Moscow Exchange  RTS  SPICEX   
OTC Market  Selected: 80 from 80

Coupon type:  
 Fixed rate  
 Floating rate

Coupon rate:  
0% 96%

Zero-coupon bonds only

Agent: Start typing the name

Placement date: [calendar] - [calendar]

Placement date: [calendar] - [calendar]  
 Including reopenings

Interest commencement date: [calendar] - [calendar]

Put/call date: [calendar] - [calendar]

Maturity date: [calendar] - [calendar]  
 Including put/call at this time

Search only for:  
 Amortising  Perpetual  
 Securitization  Subordinated  
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 Structured products  Foreign bonds  
 CDO  Retail bonds  
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**Chatham Financial is an advisory services and technology solutions firm specializing in the debt and derivatives markets. We serve the capital markets investment and risk management needs of clients across a wide spectrum of industries from our offices worldwide.**

#### **Tailored Solutions for Client Needs**

Founded in 1991, Chatham is an independent market leader with a global team of capital markets experts, risk management advisors, CPAs, lawyers, quantitative analysts and technology developers serving more than 1,200 clients globally. Our practitioners provide best-in-class solutions for interest rate, FX, and commodity hedging, hedge accounting, and derivatives regulatory compliance.

We also offer an advanced SaaS platform, ChathamDirect, giving clients direct access to the same the tools leveraged by our in-house practitioners. Our platform supports multiple asset classes with tools for quantitative analysis, sophisticated scenario modeling, accounting workflows, reporting, and valuations.

#### **Leaders Helping to Shape Valuation Standards**

As an independent valuations provider, Chatham is at the forefront of cutting edge valuation topics, including CVA, DVA, FVA and OIS discounting. Our experts are thought leaders in the markets and have long been contributors to the global valuation standards-setting process through our work with the FASB, the IASB, and the International Valuation Standards Council.

#### **Market Tested with Proven Results**

Using proprietary, market-tested models developed by our in-house quantitative experts, we execute more than \$2 billion daily of derivative notional on behalf of our clients. These models are subjected to rigorous SSAE 16 examinations annually, assuring clients that we employ validated methodologies and maintain reliable controls.

To learn more about Chatham Financial and our services, please visit us at **[www.chathamfinancial.com](http://www.chathamfinancial.com)**.

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**Credit Benchmark is an innovative provider of credit risk data and analytics. We pool credit risk estimates from the world's biggest banks and financial institutions - global, regional and national - to create consensus credit views.**

Credit Benchmark operates a contributed data model, focused on gathering credit risk information from the world's major global banks.

Contributed data models, which aggregate data from multiple market participants, have long created value in financial services. As the model has been proven, contributed data models gathering more confidential datasets, showing results on an anonymised basis, have developed. In securities lending, for example, Data Explorers succeeded in demonstrating the value of industry-sourced benchmarking data to securities lenders and beneficial owners, enabling the company to gather highly market sensitive data, such as open lending positions and margins.

We currently focus on credit risk estimates produced by banks using the Internal Ratings-Based Approach ("IRB"). The Basel framework for banking capital has resulted in many global and national banks adopting IRB (either the foundation or advanced approach) to calculating regulatory capital.

Under IRB, banks employ highly qualified credit risk professionals to assess the creditworthiness of the entities with which they do business, generating many thousands of robust entity-level ratings.

Credit Benchmark's contributed data model unlocks the value of this powerful resource, allowing banks to view their own estimates in the context of a robust industry consensus. We maximise data quality through rigorous data validation and entity mapping techniques. We protect the security and anonymity of individual contributors through industry-leading secure hosting, data processing and data transmission.

Credit Benchmark currently calculates consensus credit risk data analytics for probability of default (PD) and loss given default (LGD) at the entity level in the following areas:

- **Sovereigns**
- **Corporates**
- **Banks**
- **Non-bank financials**  
(Private Equity, Mutual Funds, Hedge Funds)

Our data is highly flexible, allowing users to view single entities or to create portfolios.

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Head of Business Development

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## Have your products independently evaluated...

**Within the context of greater need for transparency and ever increasing requirements of regulatory agencies, steady growth in demand for services related to independent valuation exists in many institutions.**

In recent years, the market for Structured Products has been continuously active despite the Euro- and Credit Crisis. This applies to the numbers of products and the turnover levels, as well as the complexity and variety of traded Securitized Derivatives.

For more than 15 years, Swiss based Derivative Partners have been building a wide expertise in the area of financial derivatives and have established themselves as a leading consultant and information provider with regard to analyzing, evaluating and reporting complex payout profiles. By entering into strategic partnerships Derivative Partners has internationally expanded its Risk Management- and Valuation Services.

Extensive investment banking experience enables Derivative Partners to offer sound advice and high-quality services.

### Independence

Independence is the foundation of our services. The valuation of portfolios consisting of complex products builds on an independent base of master data and market data which is fed into a comprehensive proprietary valuation library containing state-of-the-art pricing models.

### Uniformity

To obtain a consistent portfolio view, the uniform application of valuation models across the corresponding asset classes is of high importance. Not only does it contribute to more stability, it also counteracts the distortion of cumulative and interdependent portfolio data.

### Transparency

Communication of master data, market data, model parameters and methodology is the key to building up trust in our services. Therefore our helpdesk constantly provides timely explanation to questions and challenges of any depth regarding our services.

### Delivery

Standard valuation services are designed to run fast and stable on our scalable framework and allow us to cost effectively meet our clients' needs.

In addition, the processing and presentation of valuation results can be tailored to detail: this ranges from providing pure pricing figures to comprehensive product reports including diverse key figures and ratings.

Furthermore, we offer tailor made pre- and post trade analysis and advice to deliver greater product understanding for our clients.

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 Managing Director

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# INDEPENDENT VALUATION

[www.derivativepartners.com](http://www.derivativepartners.com)

- » **Independence** of data warehousing and state of the art valuation methods
- » **Uniformity** of valuation processes
- » **Transparency** through explanation of valuation parameters
- » **Delivery** using comprehensive product reports and analysis tailored to clients' requirements

## ASSET CLASSES AND PAYOFFS:

**Equities / Indices:** Futures, Options, Spreads, Multi-Asset Tracker, Discounts / Reverse Convertibles, Multi Asset (Quanto / Callable) Barrier Reverse Convertibles, Multi Asset (Quanto) Conditional Coupon Autocallables, Asians, Cliquets, Convertible Bonds, Total Return Swaps, Volatility Swaps, Accu- / Decumulators, etc.

**FX:** Forwards, FX Swaps, Options, Butterflies, Risk Reversals, Digitals, (Double) Barriers, (Double) Touches, Target Redemption Notes, Knockout- Forward Strips, Accu- / Decumulators, etc.

**Precious Metals / Commodity Indices:** Trackers, Futures, Options, Total Return Swaps, Spreads and many other nonlinear OTC derivatives

**Interest Rates:** Forwards, Futures, Swaps, Bonds, Caps, Floors, Swaptions

**Credit:** Corporate Bonds, Credit Linked Notes



**We help our clients address some of their most challenging valuation issues, ranging from strategic, transactional and operational decisions through to regulatory compliance and monitoring.**

**By combining our specialist valuation skills with our commercial and industry expertise, our work provides deep insights that stand out through the impact we have on the reputation and success of our clients. We pride ourselves on our ability to listen to our clients, understand their needs and help them develop bespoke solutions to complex valuation issues.**

### ABOUT US

Valuation is often a controversial and complex subject. It requires in-depth understanding of the market, the asset in question, the company and its competitors, financial and non-financial information, as well as factors such as the legal and regulatory environment. Valuation advice needs the right blend of analysis, experience and professional judgment.

Our specialist valuation team advises on all aspects of valuing companies, income generating assets, listed and unlisted securities, derivatives, structured credit, asset backed securities, intellectual property and intangible assets. In addition we offer the largest and most comprehensive real estate valuation capability of any of the major business advisory practices.

We are able to support the provision of rigorous fair value assessments for clients by coordinating efficient, consistent and controlled valuation capability with technology and resources across our firm to deliver a high quality service.

We offer a commercial perspective that is supported by technical rigour and the insights and experience gained from performing numerous major assignments in the UK and internationally every year.

Deloitte capitalises on its vast valuation experience gained from assurance work and quantitative modelling and analytics skills from bespoke restructuring and transaction assignments. We also utilise the knowledge from market leading pricing advisory engagements across Europe.

The UK Valuation group is a key member of Deloitte's global valuation practice. This provides access to a team of over 1,500 dedicated valuation professionals in all major geographic markets and jurisdictions.

### WHAT DO WE OFFER?

- **Portfolio valuations**
- **Financial instruments and structured products**
- **M&A and investment analysis**
- **Reorganisation, turnaround and recapitalisation**
- **Litigation, expert determination and disputes**
- **Intellectual property and intangible assets**
- **Real estate and tangible assets**
- **Fiscal Valuations**

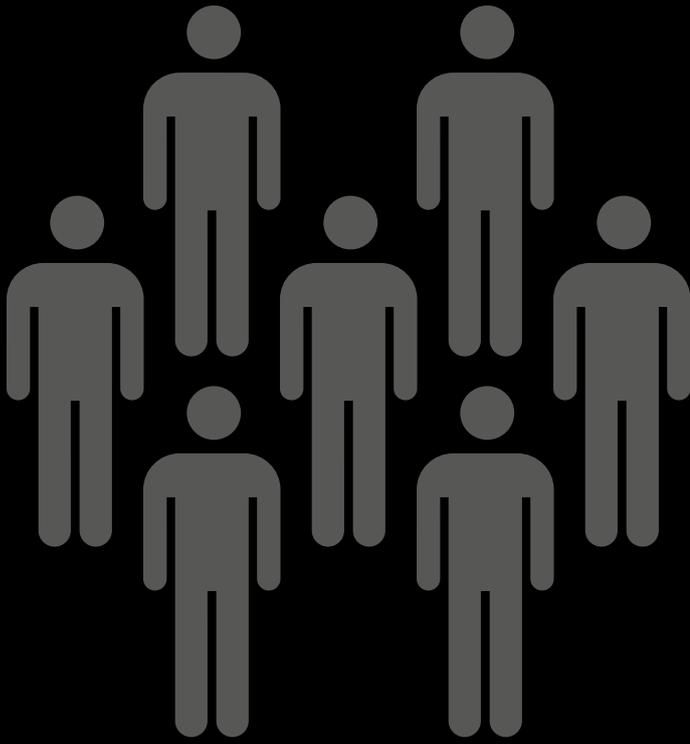
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## Standing out from the crowd

Deloitte is unafraid to challenge established conventions to achieve better results. It is not simply number crunching. Deloitte's Valuation team combines a wide range of expertise in highly effective ways to form robust opinions – standing out through the impact we have on the reputation and success of our clients.



## **Independent Valuation and Price Verification service for OTC and COMPLEX products**

**DeriveXperts is a European specialist provider of fair valuation services for financial instruments with a global market coverage across all asset classes.**

DeriveXperts has the capacity to select and filter appropriate market inputs even in the most volatile and illiquid environments.

### **Our services cover and provide you with the following:**

- Accurate and relevant valuations
- Complex products
- Price verification
- Regulatory compliance
- Transparency
- Reliability and efficiency
- Dedicated support
- Competitive cost
- Tailored solutions

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Head of Client Relations

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**w:** www.derivexperts.com



## Our values

**DeriveXperts'** development strategy is based on four strong values:

- **Reactivity** – with a flexible approach, DeriveXperts always manages to adapt to specific client requirements in a very timely and consistent manner
- **Commitment on quality** – the quality of our services and the support offered is superior and constant, therefore our clients stay with us for a long term
- **Continuous innovation** – we have a think forward approach and constantly focus on improving services to best suit our clients' needs
- **Cutting edge technology** – in order to provide accurate valuation, DeriveXperts uses the most reliable technology, best tested for this industry

## What our clients say

*"The justifications coming along with DeriveXperts' valuations, allow us to be more efficient in identifying the risks and in discussions we have with counterparties."*

**Pascale Chatelain**

Head of Compliance and Risk  
Management  
VEGA Investment Managers

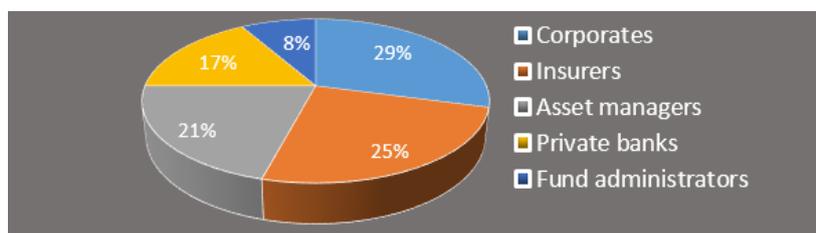
*"Independent valuation on structured products allows us to verify prices provided by the issuers / calculation agents and to be more selective in our eligibility criteria."*

**Florent Carmeille**

Head of Financial Control  
AG2R - La Mondiale

## Our clients

**DeriveXperts** is in constant expansion on its client's portfolio. Here is the current segmentation.



Follow us on LinkedIn and Twitter:



DeriveXperts



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For more information, please contact **David Baranes** by email  
(david.baranes@derivexperts.com) or telephone at +44 (0) 20 8618 0055

# DERIVSOURCE

## DerivSource.com - the source for clear thinkers in the evolving derivatives world

DerivSource is an independent information source and online community for derivatives professionals. We provide trend analysis, peer commentary and various educational resources via our articles, podcasts and interactive webinars. Register for FREE today to join the conversation.

### About Us

DerivSource launched in early 2008 in the backdrop of an impending financial crisis with the sole aim of providing independent and journalist-led information to derivatives professionals working in an opaque industry. The focus of DerivSource quickly shifted to cover the rapid transformation of the derivatives market as a result of the financial crisis and introduction of new regulation including Dodd-Frank and EMIR in addition to day-to-day trends in derivatives processing, risk and technology.

### Our community now & in the future

Today, as a leading online information source, the DerivSource community has members globally who rely on our independent trend analysis, peer commentary and variety of educational resources including interactive webinars and live events to stay informed in this fast paced market. Our members represent a wide geographical and professional demographic from buy-side and sell-side financial institutions, pension funds, regional banks, asset servicers, law firms, consultancy firms and software vendors.

Moving ahead, DerivSource remains dedicated to its growing community of derivatives professionals and operates as a valuable resource and information portal for our readers. We will continue to facilitate open discussions and debates amongst our community members with the aim of educating one another and solving problems together.

### Join DerivSource

Join the community today by registering to up to **free** our weekly and monthly e-newsletter to keep up with industry news and trends. <http://derivsource.com/user/register>

### Our Services

- Opinion & Industry Analysis
- Peer Commentary
- Weekly News Roundups
- Podcasts & Events
- Educational Briefings & Webinars
- Free informational newsletters

## Julia Schieffer Founder & Editor-in-Chief

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part of the vwd group

**According to our clients' needs, we provide tailor-made quantitative analyses for investment products and complex securities, incorporating latest findings from capital markets research. EDG's solutions include product and risk assessments as well as the calculation of indicators and sensitivities (Greeks). Special focus lies on the valuation of structured and / or illiquid products as well as complex derivatives.**

**As part of the vwd group, a market data and technology provider, we are able to offer comprehensive outsourcing solutions, e.g. data back-ends.**

**Fair Value Calculation:** Independent calculation of "fair values" using state-of-the-art models in line with regulatory requirements for all asset classes. EDG's focus lies on illiquid (OTC) and complex products such as OTC derivatives (Total Return Swaps, Exotic Options, Asians, Rainbows etc.).

**Market Conformity Checks:** Assessment of trades for all product structures and asset classes. Service ranges from conceptual as well as operational support. Trade prices are compared to market prices, benchmarks as well as evaluated prices (fair value).

**Client specific figures:** Calculation of parameters and product figures (Greeks, volatilities, barrier hit or pay-off probabilities etc.) according to our clients' individual requirements.

In addition, we supply appropriate models and techniques for valuation purposes such as issuer specific yield curves or counterparty risks.

**Risk Classification:** Calculation of various product (risk) figures ((C)VaR, volatility, SRRI (UCITs KID) etc.) including marginal risks (e.g. default risk) for all structures and asset classes (stocks, funds, bonds, structured products etc.). Risk calculations are provided on a single instrument and portfolio level.

**Product Assessment:** Quantitative analysis of financial products based on key figures for costs, liquidity, default and counterparty risks etc. Key figures are available on a single as well as on an aggregated level.

**Studies/Expert Opinions/Consulting:** Leveraging EDG's expertise and knowledge, studies and further consulting services are provided. This service includes research studies, expert opinions as well as regulatory topics. Studies are based on empirical evidence and theoretical background. In addition, education services are provided by our affiliated company EDA/the vwd academy.

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# EuroABS Promoting Transparency in the Capital Markets

**EuroABS Limited is a fully independent company 100% owned by its management team of ex-market professionals. The EuroABS business was founded in 1999 by its CEO Ben Bates. The EuroABS website was launched in July 2000.**

## **EuroABS Provides the Capital Markets with:**

- Regulatory Reporting
- Pricing And Valuation
- Issuance Documentation And Reporting Database

## **EuroABS Provides Services For:**

- Investors
- Issuers
- Investment Banks
- Law Firms
- Ratings Agencies
- Regulators
- Other Professionals

## **Regulatory Reporting**

Issuers of structured finance bonds need to be aware of and understand the myriad of regulations from various jurisdictions.

All of these have significant implications for the structured finance/ABS and RMBS markets. In terms of transparency and information disclosure requirements, we at EuroABS are the market leading service provider for issuers. We can help you to understand and comply with your regulatory requirements and help to make sure your customers and investors get what they need to comply with theirs.

We can provide you with the services and tools to make the disclosure and transparency process painless. All you need to do is provide us with your transaction documentation and data.

We'll build your Cash Flow Model (or Liabilities Model as required by the Bank of England) and Host everything securely on an industry standard platform for presentation to those eligible to see it.

We can also help you produce your reports and data on a consultancy basis. We've been through the process many times with issuers; from deal origination to regulatory acceptance and granting of central bank eligibility.

## **Pricing & Valuation**

The EuroABS Portfolio Mark to Market Service (E- PMMS). EuroABS provides pricing and valuation services to genuine investor and issuer clients of our investment bank valuation contributors. Our service covers the:

- European ABS Bond Market
- CDO/CLO Markets
- Corporate Bond Market

E-PMMS provides contributed prices from all the major broker dealers in these markets. Users receive unrivalled source transparency, data quality, context and assumption information, raising the bar for illiquid asset valuation data services.

## **EuroABS European ABS Documentation and Reporting Database (EADReD)**

EADReD provides a disclosure and transparency service for all structured, ABS and secured credit asset classes (ABS, RMBS, CMBS, CDOs, Covered Bonds, etc.).

Compiled over a 14 year period our database has comprehensive data coverage of the above issuance dating from 1st January 1995.

EADReD is provided free of charge to all market participants.

**Ben Bates**  
Chief Executive Officer

**EuroABS Limited**  
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**Restoring confidence through transparency**

**European DataWarehouse (ED) is the first centralised and independent platform for collecting, validating and providing detailed, standardised, asset class specific loan level data (LLD) for European asset-backed securities (ABS) transactions. Developed, owned and operated by the market, and endorsed by the Eurosystem, ED aims to increase transparency and restore confidence in the ABS market. Close to 800 RMBS, CMBS, SME, Auto, Consumer Finance and Leasing ABS deals with over 30 million loans across various European jurisdictions are currently stored in ED.**

By increasing the transparency, availability and quality of the information of the underlying assets, and by ensuring a regular update of this information, market participants have a sound basis upon which to build valuation, risk and surveillance models. ED, as a centralised repository for European ABS data, facilitates the use of loan level data for drill down or benchmark analysis for institutional investors,

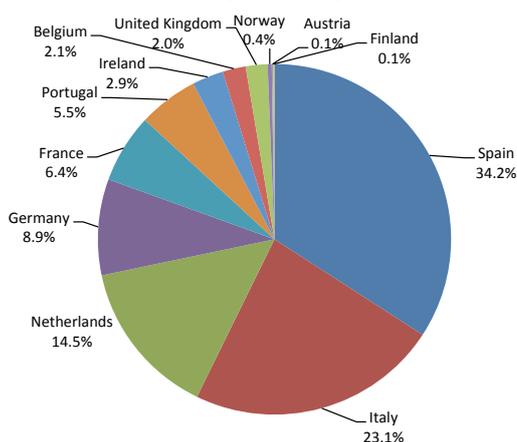
investment banks, data vendors and analytical providers, rating agencies, due diligence providers and consultants.

At the ED operational core lies the database system called Edwin. Edwin offers a standard interface to upload and validate LLD data in compliance with the specific European Central Bank ABS reporting templates. At the same time, ED monitors timeliness and of the uploaded data and performs specific consistency checks on the quality of the information uploaded.

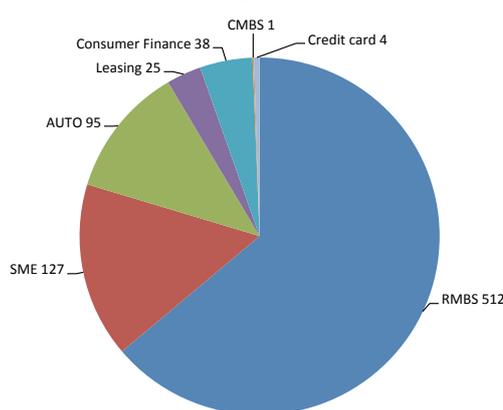
Through Edwin, users can review deal information at a glance, check the ECB scoring and view and download the deal history of a specific transaction. Edwin also offers multiple formats to download the information in XML, Excel or CSV formats.

ED also offers EDplus, a user application that facilitates the download of the information into a local database with an easy connectivity, automatic synchronization of new loan level data submissions and simple filtering options to improve performance.

**ABS Distribution by Country of Assets**



**ABS Distribution by Asset Class**



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# Restoring confidence through transparency

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Website: <http://www.eurodw.eu>



**In Transaction Advisory Services our 8,700 global professionals deliver tailored advice attuned to your needs – helping you drive competitive advantage and increased shareholder returns through improved decision-making, through services that include:**

- Lead Advisory
- Restructuring
- Operational Transaction Services
- Transaction Support
- Strategy
- Transaction Tax
- Valuation & Business Modeling

#### **Valuation**

The need for transparent and robust valuations to support corporate transactions and to meet regulatory and accounting requirements has increased. But justifying the value of assets and liabilities has grown more complex and critical for most businesses. Our experienced professionals bring excellence in accounting, taxation, and financial due diligence to provide you with valuation advice for a multitude of purposes.

#### **Modelling**

Building an effective business model, whether it's to evaluate a transaction, a new market opportunity or for other strategic purposes, is a complex and difficult task.

Our business modelling professionals can help you carry out the model review, model support and model-build activities you need to make key decisions and improve your strategic outcomes.

#### **Economic Advisory**

Economic Advisory uses the fundamental principles of economics to address client needs in the areas of policy, regulation and commercial decision making. We draw on the breadth of EY's capabilities and global reach, and underpin our work with rigorous, evidence-based quantitative analysis and deep sector expertise. Visit our webpage to find out more.

#### **Peter Galka**

Partner, Transaction Advisory Services

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## Finalyse Valuation Services

**Finalyse is a European consultancy supporting the financial services industry and corporates with tailored solutions for its Risk Management, Valuation and Risk-Reward Optimization (Performance) needs. With a clear focus on and around Risk Management, Finalyse combines the following expertise: Valuation, Regulatory Compliance (Basel II & III, Solvency II, EMIR, UCITS V, AIFMD, etc.), Quantitative & Financial Modelling, Data Processing & Warehousing and Business Intelligence.**

In response to the legal requirements for the financial services industry and corporates to have impartial expert valuation of complex derivative and structured products, Finalyse Valuation Services were launched to offer a transparent and independent valuation and risk management service to help you comply with all these new regulatory requirements.

- Best-practice valuation of derivatives and structured products of any complexity
- Tailor-made and cost-effective
- Periodic reporting of values and sensitivities
- Competitive prices
- Outsourced service
- Certification ISAE3402 (SAS70)
- Fully transparent and auditable
- Full documented reporting available
- Fast reaction time to any request from clients
- Full support/reconciliation with counterparty prices
- EMIR Reporting

**Finalyse is following a 4-Pillar process:**

- **Market Data Handling:** Integrated Service, Flexible and Adaptable Data Feed, Market Data Quality Check
- **Pricing:** Tailor Customer's Specific Needs, Easy to Use Pricing System, Open Pricing System Architecture
- **Reporting:** Granular Reporting, Customized Reporting, Integration with Risk Management Systems, Full Position History and Audit Trail
- **Reconciliation:** Challenging Counterparties, Gap Analysis, Acceptance Test, "4 Eyes Principle" Application, Accurate and Realistic Pay-Off



For more information scan the QR code or visit [www.finalyse.com/fvs](http://www.finalyse.com/fvs)

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# Finalyse Valuation Services

Finalyse valuation service is tailor made to client needs. During the whole process, close interaction, proximity and full transparency guarantee that customers' needs are fully met. Prices from counterparties are analysed and compared on an ongoing basis in order to prevent and resolve pricing differences. When differences with counterparty's prices arise, Finalyse's team of financial experts with hands-on experience in quantitative analysis executes several controls with the aim of explaining them fully. Finalyse does not only provide prices but full analysis reports, stress tests, greeks, margin calculation and value at risk.

**OTC**      **REPORTING**      **STRUCTURED PRODUCTS**  
**COLLATERAL**      **DERIVATIVES**      **STRESS TESTING**  
**AIFMD**      **COUNTERPARTY RISK**      **EMIR**



**CONTACT INFORMATION**  
 For more information about Finalyse Valuation services, please contact our dedicated FVS team.  
 Tel : **+(352) 260 927**  
[fps-info@finalyse.com](mailto:fps-info@finalyse.com)

# Fitch Solutions

**As a result of regulatory changes and volatility in the capital markets, financial institutions are increasingly being asked to provide more transparency into how valuations originate as well as fair and objective market-based valuations of their assets. To help financial institutions meet these demands and promote financial stability, Fitch Solutions offers a variety of pricing data, credit risk indicators and analytical platforms.**

## Fitch Pricing Services

Premium quality CDS pricing data based on data sourced from Contributor Tier 1 banks and subjected to a stringent cleaning process. Coverage includes:

- CDS Pricing: daily consensus pricing on 3,000 global reference entities covering corporate, sovereign and loan CDS.
- CDS Liquidity Scores: identifies the liquidity of each asset and its percentile ranking across the CDS universe.
- ABCDS Pricing: monthly consensus pricing on 2,500 asset backed credit default swaps including credit cards, automobiles, RMBS, and CMBS.
- CDS Benchmarking: A benchmarking tool to support pricing of illiquid names using average CDS values calculated by rating, sector and region for the full-term structure across each currency, seniority and restructuring.
- CDS Indices: A set of independent and purely data-driven corporate and sovereign indices that provides market participants with objective, transparent and unique data to more easily identify credit derivative trends and conduct market analysis over time.

- CDS Derived Bid Offers: Based on spread level, liquidity ranking and region, Derived Bid Offers provide valuable information on names outside the frequently traded CDS universe.

## Benefits of Fitch CDS Pricing Services

- Fitch Pricing Services are differentiated through its data cleaning expertise and extensive history.
- Data is cleaned in probability and spread space and without blending different currency and restructuring automatically.
- Provision of full curves rather than individual points on the curve.
- Data results do not curve fit automatically thereby improving the accuracy of modelling and valuations; curve fitting in volatile market conditions can produce inaccurate results.
- Coverage covers the full CDS universe with market leading historical data to 1999.
- Provides a benchmarking service for highly illiquid names.
- Offers consensus aggregated means and standard deviations.
- Immediate access to Fitch product specialists for price challenges.

## Data Availability

- Identifier fields, such as client identifier, Fitch ticker and RED code; other entity descriptive fields, such as entity name, seniority, currency and restructuring.
- Data descriptive fields, such as data type (mid spreads, upfronts, running spreads, etc).
- Consensus mean and standard deviation
- Liquidity Indicator

**Catherine Downhill**  
Global Business Manager

### Fitch Solutions

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# Premium CDS Pricing Intelligence

At Fitch Solutions, we're always enhancing our offerings to ensure financial professionals have a wide variety of pricing data, credit risk indicators and analytical platforms for valuations, as well as regulatory, accounting and risk management purposes.

That's why **Fitch Pricing Services** delivers premium CDS pricing data, liquidity insights, bid offer spreads and benchmarks for illiquid entities to give you a better understanding of risk within the CDS market. With robust global coverage of pricing data across all industries, indices and sectors, Fitch Pricing Services enables you to conduct valuations and meet regulatory requirements knowing you have the most comprehensive, timely and accurate pricing intelligence.

**Fitch**Solutions

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**As an independent intermediary, GFI is uniquely positioned to provide the capital markets with specific suites of data. GFI Market Data refers to actual market prices and trade information, reflecting real market sentiment not just indications gleaned through consensus pricing. GFI Market Data's product suite includes CDS, bonds, FX options, equities, interest rates and energy and commodities data. GFI Market Data is licensed through Fenics Software Limited, a GFI Group Inc. company.**

If you're a risk manager, credit officer, fund manager, analyst or other financial market participant, you want data that will give you a winning edge.

- **Manage Risk**  
Real prices and actual transactions provide a reliable window into changing market perceptions - critical tools for measuring and mitigating risk.
- **Independent Pricing**  
Our pricing shows real values from actual trades, not aggregated or averaged. This sets our data apart for both pricing and modeling of market developments.
- **Pinpoint Valuations**  
Understanding the underlying market is everything. Our data helps you know when prices are within acceptable pricing tolerances - and, when they're not.
- **Trade Smarter**  
With streaming real market prices, GFI data allows you to calibrate and create accurate projections in order to maximize the potential of your trading strategies.
- **Manage Portfolios**  
Regulatory requirements demand independent information. Our data gives you the price points you need to revalue portfolios with ease.

### Credit

GFI Market Data offers one of the most comprehensive credit default swaps data sets on the market and bond data that delivers deep insights into the market.

Recognized as a leading wholesale broker in credit derivatives, GFI offers data that is widely considered an indicator of credit trends and equity markets.

### FX Options

GFI Market Data gives risk managers at banks, hedge funds, corporations and institutions the price points they need to accurately revalue FX option portfolios - all in one convenient service.

Why GFI Market Data for FX Options Revaluation? Implied volatility surfaces for up to 140 currency pairs and the confidence that comes with GFI ForexMatch®, named Best FX Options Trading Platform by Profit & Loss for three years running.

### Interest Rate Options

GFI is recognised as a major participant in IRO markets globally, with a particular strength in Asian currencies. GFI Market Data covers ATM and skew for cap/floors and swaptions for multiple maturity term pillars. GFI provides complete transparency whereas many brokers and vendors provide spread values.

### Energy

GFI is a leading broker in a large number of European power markets and gas hubs, a leading broker of freight and one of the very few suppliers of wet freight data.

GFI Market Data offers actual bids, offers and trades for European power, European gas, coal and freight.

## Diego Cruz

### Data Sales

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**The Valuations team has wide experience in valuations of companies, intangible assets and financial instruments. We serve enterprises of all types and sizes, covering a wide range of industries.**

### **Complex Asset Valuations and Advisory Services 'CAVAS'**

Grant Thornton's CAVAS team has broad valuation, transactional and risk management experience in complex distressed, alternative and illiquid assets. Our team is dedicated to solving any complex valuation challenges in the industry, bringing a unique perspective to the valuation process.

We provide advice and solutions for acquisitions, disposals, mergers and restructuring proposals; taxation purposes; valuation of items such as trademarks, brand names, know-how, customer lists, patents and licences; dispute resolution; and regulatory and accounting matters.

### **The Grant Thornton CAVAS team can help you achieve:**

- greater pricing accuracy and the highest levels of transparency for your entire portfolio valuation, including risk metrics
- the highest levels of transparency enabling you to comply with the Alternative Investment Fund Management Directive (AIFMD) and the Dodd – Frank Wall Street Reform and Consumer Protection Act

- sophisticated compensation arrangements for your company executives and assistance in determining fair market value for financial reporting (eg Share-based Payments under IFRS 2) or tax planning purposes
- fair value measurements for Level Three assets under IFRS 13 (or FAS 157/ASC Topic 820 under US GAAP) and understanding how these assets will affect your balance sheet as well as better assessment of credit risk in fair value measurement (CVA, DVA, FVA)
- effective risk management frameworks (eg value-at-risk, counterparty risk) and developing stress testing methodologies and procedures
- independent and consistent valuation marks for bespoke structures in energy markets, such as embedded optionality in supply contracts or investments in real assets
- efficient integration of evolving regulation and accountancy frameworks, eg Basel III, EMIR, Solvency II, IFRS IAS 39, IAS 37 and national GAAP rules
- efficient hedging strategies for your significant risk exposures

We use a variety of methodologies and models that reflect best practice in the market. Our team utilise a wide range of quality market data including interest rate, credit and inflation curves, implied volatility skews and implied correlation data for an unlimited range of assets.

**Dr James Dimech-DeBono**  
Partner, Head of CAVAS

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**ICAP Information Services (IIS) empowers you to make trading decisions with authoritative and independent over-the-counter (OTC) market information from ICAP, a leading markets operator and provider of post-trade risk mitigation and information services.**

We provide data services across all key asset classes and offer innovative solutions for real-time, end-of-day and historical products.

Our data is the intelligence behind algorithmic trading, research models, risk and compliance applications and portfolio pricing and management. We are a key source of mark-to-market data for the industry. With \$1.3 trillion of average daily volume traded by ICAP being fed into our data products, IIS delivers 96,000 instruments generating almost 30 million updates per day.

ICAP's high-quality benchmark pricing information can be tailored to the specific requirements of your organisation and has many potential applications. As the leading provider of OTC market information, IIS is at the forefront of delivering independent data solutions to financial market participants.

IIS provides efficient, comprehensive and flexible data solutions to meet all your market data needs.

Whether you are looking to strengthen your risk management processes, support algorithmic trading strategies, evaluate portfolios or meet regulatory requirements, IIS has the right package for you.

Offering real time, end-of-day and historical data sourced from ICAP, a leading markets operator and provider of post trade risk mitigation and information services, IIS delivers the information you want; when and how you need it.

#### **Real Time**

IIS real-time data provides market insight to organisations that need to apply high quality, transactional data to a wide range of business activities.

#### **End Of Day**

ICAP EOD packages are sourced from ICAP's global daily trading activity and include complete order book and active trade data from both the BrokerTec platform and unique certified data from the GovPX service.

#### **Historical**

Our historical data packages include ICAP closing and intraday data as well as electronic US Treasury trading activity on the BrokerTec platform and electronic spot FX trading activity on ICAP's award winning EBS platform.

#### **ICAP**

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**Interactive Data Corporation is a trusted leader in financial information. Thousands of financial institutions and active traders, as well as hundreds of software and service providers, subscribe to our fixed income evaluations, reference data, real-time market data, trading infrastructure services, fixed income analytics, desktop solutions and web-based solutions. Interactive Data's offerings support clients around the world with mission-critical functions, including portfolio valuation, regulatory compliance, risk management, electronic trading and wealth management.**

Backed by more than 40 years of experience, Interactive Data is a proven industry leader in evaluated pricing, setting the standard for coverage, quality and reliable delivery. Thousands of financial institutions worldwide, ranging from central banks to large investment banks, subscribe to Interactive Data's evaluations.

Interactive Data has teams of evaluators operating in the U.S., U.K., Germany, Hong Kong and Australia. Evaluators maintain and develop market contacts on both the buy and sell-side. The Company's independent evaluations represent its good faith opinion as to what a buyer in the marketplace would pay for a security (typically in an institutional round lot position) in a current sale. In addition to bid-side evaluations, Interactive Data also offers mid/mean and ask-side evaluations.

Interactive Data delivers daily evaluations representing approximately 135 countries and 450 different currencies for approximately 2.7 million financial instruments

#### **Corporate Bonds**

- Investment Grade Issues
- Approximately 46,000 corporate debt issues, including debentures, fixed and floating rate notes, private placements and Eurobonds
- Approximately 35,000 long-term U.S. CDs
- High-Yield Issues

- Approximately 45,000 high yield debt issues
- Emerging Market Issues
- Approximately 3,000 emerging market debt issues

#### **Governments & Agencies**

- Approximately 21,000 government and agency debt issues, including treasuries, agency/GSEs, sovereigns, and government debt securities
- Approximately 800 North American preferred and 10,000 convertible bonds

#### **Securitized Debt Issues**

- More than 1,000,000 U.S. agency pass-through issues (FHLMC, FNMA, GNMA, and SBA pools)
- More than 200,000 U.S. agency and non-agency collateralized mortgage obligations, approximately 17,000 asset-backed securities, and 11,000 commercial mortgage-backed securities
- Approximately 3,000 European asset-backed and mortgage-backed securities
- Approximately 2,300 covered bonds

#### **U.S. Municipal Securities**

- Approximately 1.1 million active U.S. municipal bonds, including investment grade, high yield, derivatives, single and multi-family housing, and taxable municipals (BAB, Student Loan, Public Improvement)

#### **U.S. Money Market Securities**

- Approximately 140,000 corporate money market issues, including bankers' acceptances, CDs, commercial paper, discount notes, and repurchase agreements
- Approximately 2,500 non-U.S. money market issues, including commercial paper, CDs, and asset-backed commercial paper
- Approximately 50,000 municipal money market issues, including tax-exempt commercial paper, taxable commercial paper, variable rate demand notes, municipal notes, short term bonds, and annual and semi-annual put bonds.

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**Intex Solutions, Inc. is the world's leading provider of structured fixed-income cashflow models and related analytical software. Our clients include many hundreds of the world's best known financial institutions including most major investment banks, regional broker dealers, issuers and investment managers. Intex was founded in 1985, and remains an independent, privately-held company with headquarters near Boston, Massachusetts. Intex also supports its many international clients with staff and representatives in London and Tokyo.**

Intex provides the industry's most complete library of RMBS, ABS, CMBS, CDO, CLO and Covered Bond deal models, created and maintained for accurate cashflow projections and price/yield analytics. Intex supports deals issued in North America, Europe, Australia, Japan and other regions of the globe. Since 1990, Intex has modeled nearly every public deal and numerous privately issued deals, and creates ongoing updates for each deal each month or quarter using investor reports and, when available, loan- or asset-level information obtained directly from trustees, servicers and issuers. Intex's products help foster new deal issuance, increase the liquidity of the secondary marketplace, and improve deal surveillance and transparency.

Intex's software solutions include INTEXcalc™, an end-user application offering unprecedented transparency, ease of use, and speed, the INTEX Application Programming Interfaces (APIs), namely the INTEX C Subroutines™ for developers seeking to build proprietary applications in C/C++ and the INTEX Wrapper™ API for developers seeking to build proprietary applications written in higher level programming languages such as VB, VBA, .NET and C#, and INTEX DealMaker™ for investment banks and others who need to structure new deals. All Intex software applications have at their core the ability to calculate future principal and interest cashflows based on user-specified stress scenarios applied to interest, prepayment, default, recovery and delinquency rates as well as other more deal-specific assumptions. Intex's cashflow projection tools have also been integrated into many specialized third-party applications targeted to specific vertical markets and industry segments.

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# INTEXcalc™

## *The Next Generation of Cashflow Analytics*

For over 20 years, the global securitization market has trusted Intex for its complete and accurate cashflow models and analytical tools. Worldwide, Intex covers RMBS, ABS, CMBS, CDO/CLO, Covered Bonds and many Emerging ABS Sectors. **INTEXcalc**, designed for speed, ease of use and deal transparency, enables users to analyze single securities, portfolios and bid lists quickly and with fine granularity and control.

- Analyze multiple deals simultaneously. Quickly analyze and price position lists
- Utilize a single interface anywhere — run cashflows locally or via the web
- Review and compare historical loan-level performance data
- Integrate past performance data with stress forecasts
- Augment loan-level data with user-defined fields

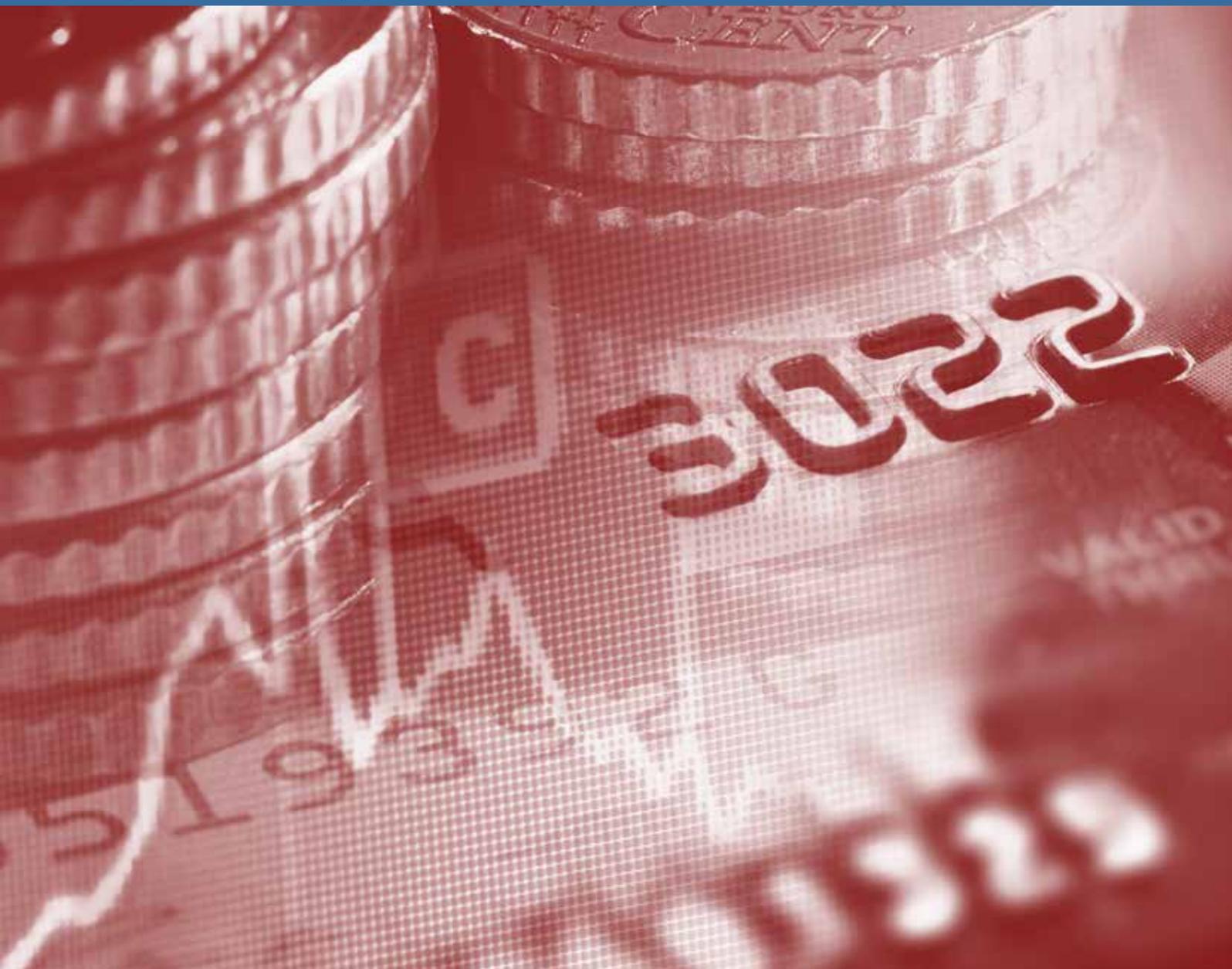
The logo for INTEX, featuring the word "INTEX" in a bold, white, sans-serif font with a red outline, set against a dark red rectangular background.

[www.intex.com](http://www.intex.com)



*Used by leading investors, issuers and arranging banks worldwide for the most accurate cashflows.*

*Available in Local and Web Versions*





*cutting through complexity*

**KPMG's Valuation Services practice is part of KPMG's global network of member firms with more than 1,200 dedicated valuation professionals in nearly 50 countries. Our global network allows us to mobilize international teams, who have a sense of regional market conditions and can consider local issues such as taxes and market regulations, in a timely manner.**

Our Valuation Services teams have extensive experience in providing valuation services in relation to transactions, reorganizations, disputes, litigations, financial reporting, restructurings and funds.

We also work closely with KPMG's Joint Ventures teams, especially around market entry, JV set-up and exit planning and implementation.

#### How KPMG can help

We assist member firms' clients with the following:

- **Independent board advice** – to help determine the right price to pay or accept for a business
- **Investment and transactional advice** – to analyze investment opportunities, sometimes as an integral part of the due diligence exercise.
- **Fairness opinions** – advice on the fairness of the price and terms of a transaction, as required by regulatory authorities, in public takeover bids, demergers, squeeze-outs and related party transactions
- **Accounting support** – determining the value of identifiable acquired intangible assets such as trademarks, brands, technology, and customer relationships, and tangible assets such as machinery, equipment, and real estate as well as impairment reviews

- Finance support – in relation to equity raising of debt financing
- **Internal reorganization support** – identify and support arm's length value analysis for internal planning purposes
- **Funds** – the valuation of illiquid assets, debt securities, derivatives, liabilities and asset retirement obligations within a fund/investment
- **Restructuring** – valuation advice and disposal options review in connection with an Independent Business Review ('IBR') and independent valuation options for the benefit of an administrator (or similarly acting party)
- **Venture capital and holding company support** – establishing the value of unquoted investment portfolios can help venture capitalists and holding companies in their strategic investment decisions
- **Litigation support** – supporting litigation or arbitration, particularly expert witness and adjudication work in valuation disputes

KPMG is a global network of professional firms providing Audit, Tax and Advisory services. We operate in 155 countries and have more than 155,000 people working in member firms around the world. The independent member firms of the KPMG network are affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. Each KPMG firm is a legally distinct and separate entity and describes itself as such.

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cutting through complexity

# Do you need to know what **your business assets are worth?**

Companies seek valuations for corporate governance or regulatory reasons, or because management wants to better understand value so it can make optimal decisions. In these instances, a company is often at a critical juncture – it may be planning an acquisition, resolving a shareholder or joint venture dispute, or seeking to reduce the gap between intrinsic and market value. At such a strategic time, it makes sense to seek the services of an experienced commercial valuations team.

KPMG's Valuation Services teams have the technical skills and practical deal experience to provide objective, independent advice. KPMG member firms' professionals recognize that a valuation is not a simple numbers exercise. Our approach is to focus management's attention on many of the key transactional or strategic issues that can help generate shareholder value.

## For more information please contact:

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## **Unsurpassed Transparency, Risk Assessment, and Valuation**

### **Serving the Entire Structured Finance Market**

### **Data - Surveillance - Regulation - Reporting Compliance - Predictive Analytics - Big Data Solutions**

Lewtan offers a wide range of data, software, and analytics solutions to the global asset-securitization industry. Lewtan provides risk assessment and valuation while facilitating greater transparency, better decision-making, and greater access to capital in the global financial services markets. Lewtan's flagship products for the securitization platform, ABSNet and the ABS System, unite the data flow between the hundreds of issuers and investors that Lewtan serves. More than 300 institutions worldwide rely on Lewtan's intelligence and surveillance solutions, and the company has twice been named Global Technology Provider of the Year by the International Securitisation Report.

ABSNet provides a unified platform for the structured finance community that brings together all of the players in need of data and analytics content via the various delivery methods needed to automate the process for assessing, structuring, monitoring and transacting business. ABSNet is the most comprehensive data and analytics platform for structured finance professionals to automate and assist in the credit surveillance, analytics, valuation and reporting of a portfolio of asset-backed and mortgage-backed instruments.

The ABS System is the proven and time-tested solution for issuers and servicers looking for

a best-in-class infrastructure to support their structured finance program. The ABS System automates and provides a platform for all aspects of Issuers' and Servicers' structured finance related requirements including pooling, collateral processing, cash management, investor reporting, accounting, surveillance, regulation and ensuring transparency in the market. The ABS System employs Lewtan's quarter-century plus of experience and has been used in issuances all across the world.

Lewtan is also proud to be the leader in innovative technologies surrounding the world of Big Data. Lewtan's machine learning artificial intelligence technique, IntelliSolve, is being used in exciting ways in the structured finance industry, signifying how Big Data and machine learning is truly the next frontier. IntelliSolve finds highly predictive signals, hidden within the vast data sources of loan/lending data and uncovers complex persistent patterns that are predictive of future outcomes. It has been used to predict liquidations, severities, delinquencies and prepayments in mortgage/loan data and can be applied to a wide variety of business problems. IntelliSolve can consume "any" data for analytics.

Lewtan holds a unique position as the only organization serving all aspects of the global structured finance market.

**Over \$500 billion in ABS investor reports**

**Over 200,000 bonds covering 20,000+ deals tracked**

**Over 25 different asset classes on Lewtan platforms**

**Customers in 17 countries and growing**

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**MarketAxess and Trax data solutions offer unique insight into the global fixed income marketplace. MarketAxess BondTicker™ is the industry's leading bond price information tool both in the U.S. and in Europe, offering market participants access to the most comprehensive fixed income market data. Trax data services provide European capital market participants with robust pricing, volume and reference data alongside its industry leading post-trade matching and regulatory reporting services – Trax processes approximately 65% of all fixed income transactions reported to the Financial Conduct Authority.**

#### **MarketAxess BondTicker™**

BondTicker™ is our web-based data service that combines Financial Industry Regulatory Authority (FINRA) data from the U.S. and European pricing data from Trax with MarketAxess tools to provide professional market participants with the most comprehensive set of pricing information available today. The data includes actual execution prices, as well as MarketAxess estimated spread-to-Treasuries and asset swap spreads, for trades disseminated by FINRA. BondTicker also includes actual execution prices and depth of market for unique trades executed on the MarketAxess trading system in both TRACE and non-TRACE disseminated bonds which are not available through any other source. European BondTicker includes end-of-day pricing data covering Euro, Sterling, USD and a range of non-core currency denominated debt, allowing users to source pricing information on a broad universe of bonds, including illiquid instruments.

#### **Trax**

In February 2013 MarketAxess completed its acquisition of Xtrakter Ltd., a leading provider of regulatory transaction reporting, financial market data and trade matching services to the European securities markets. In May 2014 Xtrakter rebranded to Trax, consolidating the firm's suite of data and post-trade solutions under a single brand. Trax provides capital market firms with information to assist them in conducting net asset valuations, mark-to-market calculations, fixed-income portfolio mapping, liquidity and volume modeling, as well as reference data population updates. It also provides a wide range of pricing data for approximately 53,000 international securities and internationally traded government bonds, as well as securities reference data for over 300,000 government bonds, corporate bonds, medium-term notes and private derivative issues.

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**Markit provides independent and transparent valuation services. We offer independent valuations for OTC derivatives, private equity investments, structured notes and cash products, as well as a web-based platform for aggregating internal, counterparty and independent marks.**

### Markit Portfolio Valuations

Markit Portfolio Valuations has been serving the buy-side since 2005 and provides cross-asset coverage for a wide range of vanilla and exotic instruments across credit, commodity, interest rate, inflation, FX and equity derivatives, bonds, loans, structured securities, illiquid debt and private equity holdings.

Customers choose our valuation and risk analysis services for the accuracy, consistency, timeliness and transparency of our valuation methodology and results delivery, the comprehensive coverage we provide through a single interface, as well as our expert and responsive support across all regions.

Customers such as hedge funds, asset managers, fund administrators and auditors typically use Markit Portfolio Valuations directly, or to provide value-added services to their clients, covering a number of requirements. These include Net Asset Value (NAV) calculations, Collateral/margin verification and dispute resolution, independent price verification or internal benchmarking, stress testing and scenario analysis for risk management and regulatory compliance as well as hedge accounting and financial reporting.

We deliver cost-effective solutions for portfolios of any size and composition and can offer reliable same day turnaround to meet customer needs.

### Flexible delivery

Markit provides a secure, standardised and aggregated view of client OTC derivative and cash positions across multiple counterparties on a single electronic platform called Markit Valuations Manager.

The service simplifies the collection of counterparty position data and valuations to deliver greater operational efficiency. Instead of visiting multiple dealer sites and normalising numerous file formats, clients access and download their daily positions directly on the Markit website or via API. Markit has agreed a single, standard set of fields with bank counterparties and acts as the delivery channel for more timely, complete and consistent counterparty valuation data.

Markit Valuations Manager also provides a co-branded solution for sell-side participants looking to streamline the delivery of their OTC and cash valuations directly to their own client base, supporting regulatory requirements for the daily distribution of OTC derivative marks.

### Markit Totem

Markit Totem is a comprehensive service providing consensus market prices to major OTC derivative market-makers. It covers a broad range of asset classes and enables market-makers to independently check their book valuations.

Data integrity is ensured through the application of rigorous controls to ensure consensus prices are true reflections of the market. Close collaboration is maintained with contributing banks to ensure that valuations data, regulatory and audit requirements are met for book valuations and day one P&L.

### Markit

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# MOODY'S ANALYTICS

## Moody's Analytics: Structured Analytics & Valuation : Valuation & Advisory Services

In today's complex and uncertain market environment, managing risk is more important than ever. Investors, board members and regulatory bodies are demanding increased reporting and independent, third-party advice. Moody's Analytics Valuation & Advisory Services offers a host of tools and solutions allowing you to better analyze, evaluate and manage risk in your portfolio, and help you satisfy reporting requirements for investors and regulators. We retain an independent third-party view that is not influenced by any proprietary market positions; we are not a market maker and do not have a trading platform.

### Our Valuation and Advisory Services team offers:

- Portfolio risk assessment such as assisting you with stress testing efforts, incorporating Moody's Analytics macroeconomic forecasts
- Established criteria and thresholds to identify portfolio-specific risks
- Risk-related performance statistics such as VaR, OAS, DV01, etc.
- Asset class-specific benchmarking of portfolio to broader market
- Return attribution and performance comparisons using client trade information
- Custom portfolio-specific commentary
- Custom internal CFO / Board of Directors report

- Custom external (public) reporting for firm investors or interested parties

Moody's Analytics provides expert valuations and advice using proprietary data and models.

- 1. Methodology:** Create methodology for analyzing structured finance securities, including ABS, RMBS, CMBS, CDOs and other exotic transactions.
- 2. Valuations Process:** Building Advisory framework consistent with our methodology which incorporates high quality data, macroeconomic forecasts, credit models and cash flow tools.
- 3. Quality Assurance:** Performance quality assurance on pricing estimates with careful examination of credit worthiness, capital structure nuances and counter party risk.
- 4. Valuation & Advisory Package:** Deliver Advisory package to clients, provide commentary regarding macroeconomic and performance trends, and help prepare documents for auditors as well as board members and investors.

Moody's Analytics, a unit of Moody's Corporation, helps capital markets and credit risk management professionals worldwide respond to an evolving marketplace with confidence. The company offers unique tools and best practices for measuring and managing risk through expertise and experience in credit analysis, economic research and financial risk management.

## Justin Revelle

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MTS is one of Europe's leading electronic fixed income trading markets, with over 500 unique counterparties and average daily volumes exceeding EUR 100 billion. MTS offers a comprehensive and trusted market data service, empowering fixed income market participants to set best practice for price discovery, verification and validation.

#### WHY CHOOSE MTS DATA?

- **MTS Real-Time Data -**

Real-Time executable prices and every trade direct from the MTS interdealer Cash markets

#### Delivery Methods:

- Direct from MTS
- via the leading market data vendors

- **MTS Historical Data:** Time Series Data - One of the richest sources of historical pricing and trade data back to April 2003

- **MTS Historical Data:** Tick-by-Tick data - As quoted, as traded information across the MTS interdealer cash markets. Full price, order and trade data back to June 2011

MTS Historical Data is used extensively by central banks, market participants and the academic community to produce leading research, to formulate trading ideas and strategies, for daily reporting and risk management processes and to power analysis into liquidity, pricing trends and spread evolution.

[Contact us for a free sample.](#)

MTS Data delivers an unparalleled source of pre- and post-trade transparency across 18 of the MTS Cash interdealer government bond markets with over 100 participants trading more than 1,000 bonds, all generating around 30,000,000 executable prices per day.

As Europe's premier facilitator for electronic fixed income trading, MTS's Real-Time data is complimented with a variety of historical value-added products going back to 2003.

- **MTS Live -**

Real-Time un-aggregated pre-trade data offering a complete and un-netted order book with every visible price and order for the most liquid bonds traded on the MTS Cash markets

- **Co-location -**

The ultimate option in terms of low-latency connectivity allowing users to host their own servers within the primary data centre of MTS

- **MTS Raw Data -**

MTS Real-Time Data in the native format of the MTS platform giving the ultimate flexibility in data delivery and processing

- **MTS Reference Prices -**

Benchmark price fixings calculated exclusively each day by MTS. History available back to 2007

- **MTS Reference Data -**

Benchmark reference data for all bonds traded on the MTS platform

[Find out more about MTS Data by speaking to our expert team.](#)

**Christine Sheeka**  
Data Product Manager

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## MTS Markets

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# MTS Data

Real-time tradable  
prices for European  
fixed income.

- Executable prices on over 1,100 government bonds across 18 countries, sourced from MTS, Europe's premier facilitator for electronic fixed income trading
- Trade-by-trade information reported in real-time
- Daily end-of-day and tick-by-tick data
- Historical data back to 2003

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Find out more about MTS Data by speaking to our expert team.

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Website: [mtsmarkets.com](http://mtsmarkets.com)





**Numerix CrossAsset is a solution for the integration and delivery of a holistic approach to Model Risk Management and Model Validation.**

With the highly flexible, fully transparent analytics architecture of Numerix CrossAsset clients can conduct rigorous model analysis to independently validate pricing and risk sensitivity outputs, as well as make comparisons between different models to analyse how the outputs vary under different assumptions. At its core is access to over 100 market standard models and methods for all major asset classes and the Numerix hybrid model framework for pricing multi-asset basket trades.

Numerix supports implementation and performance testing, validation and model risk quantification. Numerix model validation tests provide the necessary standardized tests to confirm model accuracy and performance confirming both mathematical and financial correctness of Numerix models. With Numerix, tests for the performance of the models' hedges can be run, either on Numerix models or on a customer's proprietary models. Numerix is flexible enough to accept bespoke models or other libraries upon which to run the automated model validation tools, providing a consistent approach to model validation regardless their origin.

The Numerix model validation implementation tests check the mathematical identities that option pricing functions must satisfy. These identities provide a very sharp test that allows almost no scope for false positives or negatives. It can be automated to test thousands of cases, instead of just a few. In addition, the well-established Numerix CrossAsset Library can be leveraged as a benchmarking tool.

The Numerix model validation financial correctness tests check how realistic the model's dynamics are. The Calibration Error Test and Calibration Stability Test check the fit of a model's volatility surface to real volatility surfaces encountered in market data. The Hedge Performance Test measures the performance of the model's hedge to see how much risk the hedge removes, and provides drill-downs to isolate the causes of hedging errors.

Founded in 1996, Numerix derivative analytics solutions and services support pricing, valuation and risk management for capital markets and asset liability management. Numerix has more than 700 clients, including firms in asset management, banking, brokerage, insurance, and corporate treasury and operates with more than 80 partners around the world.

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Models



Consistent Valuations

Risk

## The best trading decisions require the best analytics.

Driven by regulators and internal pressure to avoid losses due to poor modeling, today's institutions are seeking to better quantify their model risk.

Numerix CrossAsset delivers a holistic approach for Model Risk Management and Model Validation.

Ensure your models have been implemented properly and perform as expected. Understand model behavior and limitations under extreme market scenarios. Know your models are providing effective hedges, given all market conditions.

Numerix software for testing mathematical and financial correctness of models—in addition to Numerix Model Validation Services—are working together to help today's financial institutions reduce operational risk and external valuation costs, while meeting evolving regulatory requirements.

Learn why the world's leading financial institutions select Numerix Model Validation. Visit <http://nx.numerix.com/Derivative-Pricing-Model-Validation.html>.





**Prism Valuation offers accurate and comprehensive independent valuation services to financial institutions to aid in regulatory compliance and improve understanding of risk.**

Regulators and audit firms are heightening their oversight of valuations. Firms trading and investing in OTC derivatives and structured products are under increasing pressure to ensure that their processes comply with evolving regulatory requirements (Dodd-Frank, Basel 3, MiFID 2, EMIR, AIFMD) and in addition satisfy investor and risk management demands. Given the complex nature and the changing liquidity of many of these instruments, obtaining reliable valuations which satisfy all stakeholders is a challenge.

#### **Experience matters when providing quality valuation services**

The extensive Front Office heritage of our core group of experienced people (all former traders and quants) gives us the critical market insight to appreciate the intricacies of even the most complex Structured Product or the illiquid OTC derivative. The strong academic credentials of all of our people—most with PhD's or Master's Degrees in Science, Math or Engineering—allow us to utilize the most sophisticated modelling techniques used by market participants. We have extensive experience delivering quality valuations reliably with full transparency and support to a global client base.

#### **Independent and reliable data**

The foundation of any valuation is independent market data. We obtain market data directly from reliable and unbiased sources including more than 50 Exchanges world-wide.

#### **Accurate and market-benchmarked models**

Our computational framework uses the market tested and benchmarked financial software developed by Numerix.

#### **We have full coverage: Vanilla to complex, all currencies, all underlyings**

Our flexible infrastructure allows us to handle most flavours of complex derivatives or assets and we are always adding new structures and market data to our capabilities.

#### **Clients the world over trust Prism Valuation**

Prism Valuation has over 100 end-user clients globally, subscribing to valuation and other services. Portfolio valuations are delivered monthly, weekly or daily as client requirements dictate. Valuations are delivered in various time windows including NY funds timeframe. Our client list includes Custodial Banks, Insurance, Asset managers, Pension Fund Managers, Mutual Fund Managers, Banks, National and Multi-National Development Banks and other government agencies, Law Firms and more.

**Keldon Drudge**  
CEO

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# Why are people using Prism Valuation? You do the math.

Prism Valuation provides a consistent, accurate valuation and risk analysis service for OTC Derivatives and Structured Product assets. We offer a cost-effective way to add full transparency to your valuation process.



1

## Reliability and Experience

- Long established: Providing valuation and risk analysis services since 2006.
- Front office experienced people with wide knowledge of valuing deals from the vanilla to the complex.
- Track record of serving a significant, blue-chip global client base with diverse requirements.



2

## Independence and Objectivity

- Not associated with any bank or dealer, so no conflicts of interest.
- Market data sourced directly from independent inter-dealer brokers, global exchanges and major market data vendors.
- Industry proven models and analytics based on Numerix.



3

## Transparency and Support

- Complete transparency into valuation model methodologies, calibration processes, inputs and assumptions fully available to clients.
- Comprehensive valuation support and challenge process, any issues are investigated and resolved quickly.
- Full risk analysis of deal valuations available including all cashflows, day over day attribution, market data, sensitivities and scenario analysis.



4

## Coverage and Flexibility

- Wide coverage of derivatives and securities, from the most vanilla to the most complex, full spectrum of underlyings.
- Multiple market data snap times in line with major market closes or bespoke snaps as required by clients.
- Flexible data transfer of deal terms (client system files, Prism templates, confirms), and flexible result file format options



5

## Increased Efficiency and Cost Savings

- Access to OPTIC, Prism Valuation's web portal, allowing on demand revaluations, challenges, deal booking analysis tools and valuation support.
- Instantly comply with regulator, auditor, or investor demands for valuation transparency and risk analysis.
- Track portfolio composition, changes, trade modifications, and other relevant KPIs using advanced custom filter tools.

FIXED INCOME | INFLATION | FX | EQUITY | COMMODITY | CREDIT | CUSTOM INDICES



**Prytania Solutions' experience and unique technology allows flexible, bespoke valuations across the entire spectrum of secured credit.**

**Prytania Solutions offer valuation and risk advisory services across a wide range of asset classes, including ABS, CMBS, RMBS, CLOs, and CDOs, both cash and synthetic.**

Prytania Solutions has sought to develop a reputation as an expert institution for defensible, transparent and fully independent valuations in the secured debt market, with a particular expertise across the broad spectrum of securitisation asset classes.

Combining deep market knowledge with an ability to utilise technology in a way that allows us to quickly deliver highly tailored pricing solutions to our clients, Prytania Solutions has evolved its valuation services to address today's changing regulatory and market environment.

#### **More than just a price**

By adopting the mantra that in today's financial marketplace an independent valuation needs to provide "more than a price", Prytania Solutions offers a range of valuation services that break out the constituent components of each price in order to allow the user to understand fully how a security or asset's valuation was arrived at.

In particular, our pricing services offer transparency on any or all of the following:

- Input credit assumptions used: default and delinquency projections, prepayment rates and loss severity vectors
- Risk Score composition – which variables drive a particular market or asset class?
- Market observables used and whether these were direct or indirect
- Detailed cashflow model projections

#### **Valuations can range from quick prices, through to detailed cashflow models and reports**

Our proprietary pricing platform has been designed to be highly responsive to users' exact valuation requirements.

Our valuation reporting service can range from an automated price only to a fully customized reporting, designed to satisfy any relevant regulatory or accounting requirement.

So whether you are in need of a daily price feed in order to mark a trader's book, or you require an independent valuation report in order to satisfy fair value accounting best practice, then come and talk to us about your requirement.

### **Garry McDougall**

Solutions Marketing

#### **Prytania Solutions**

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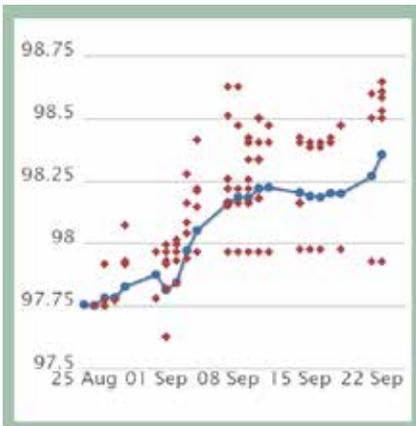
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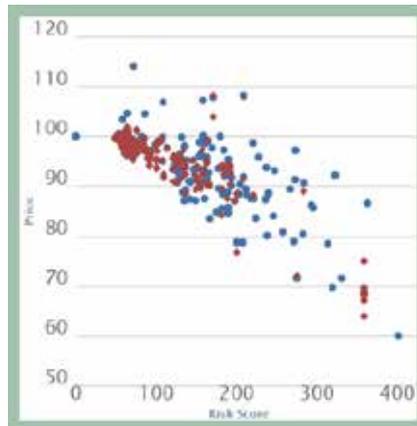


# Secured credit valuations. More than just a price.

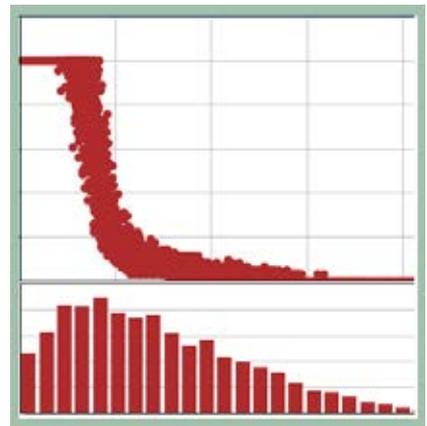
[prytaniagroup.com/solutions](http://prytaniagroup.com/solutions)



**Bond history and observations**  
Look back at the bond's history and the direct observations that have contributed to its valuation.



**Whole asset class**  
See how your bond is performing relative to the whole asset class. Valuations are influenced by other similar assets with observable prices in the market.



**Loan-level stochastic analysis**  
The loan-level capability of Prytania's cashflow engine allows stochastic analysis to be run, presenting a full loss distribution of each tranche.

// All secured credit // RMBS // CMBS // ABS // CLO // CDO // Synthetic //



# pwc

**PwC is founded on a culture of partnership with a strong commercial focus. This is reflected in our vision:**

**“One firm - a powerhouse of a commercial enterprise that does the right thing for our clients, our people and our communities.”**

**Our goal is to build the iconic professional services firm, always front of mind, because we aim to be the best. We set the standard and we drive the agenda for our profession.**

### Our global network

- 180,529 people
- 158 countries
- 776 locations

PwC helps organisations and individuals create the value they're looking for.

### Valuations

We help our clients understand what their business, shares or assets are worth in the context of transactions, financial reporting, disputes, tax or group restructure purposes.

Our experienced and dedicated valuation specialists and industry experts can assist in understanding the value of an asset or business and what is really driving that value. Our ability to offer independent valuation advice which looks at both the commercial and technical aspects of an M&A transaction, dispute or group restructure can often provide new insights or fulfil an important corporate governance role.

### Deal related valuations

In our view improved economic fundamentals have now caught up with the share market. Volatility is low currently but may increase, as we saw from the sharp correction in May after the Fed's hinted at QE tapering in 2014. Any increased volatility would further complicate the process of making investment decisions. The key is to focus on the longer term investment case and understand whether the growth story underpinning any investment plan our clients have to make is sustainable and credible.

The concept of value impacts all stages of a deal and our experts have considerable experience at helping our clients during all stages of the deal cycle.

### Non-deal related valuations

Assessing the risks and returns of potential deal or capital expenditure in the current economic climate is essential. In our view, as less available debt capital is likely to limit investment decision making, resulting in value creating investments being deferred, any investment plans should be supported by a robust decision making process and analysis.

We currently sponsor the ICAEW Valuation Group.

**Nick Rea**  
Partner

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**Quantifi delivers cross-asset trading, front-to-back operations, position management, market, credit, counterparty and liquidity risk management, margining, and regulatory reporting, all on a single integrated real-time platform. As well as supporting all regulatory and industry practices, Quantifi applies the latest technology innovations to provide new levels of usability, flexibility, and ease of integration. This translates into dramatically lower time to market, lower total cost of ownership and significant improvements in operational efficiency.**

#### A Leader in Analytics

Quantifi has an established reputation as the market leader in analytics. Quantifi provides valuations based on industry best-practices, and a flexible framework for model parameterisation and selection that is audited and permissioned. Key features include:

- Broad cross-asset coverage (fixed income, rates, FX, credit, equities and commodities)
- Fast OIS discounting support
- Simple and automated calibration
- Support for illiquid markets and exotic instruments, including structured and hybrid products
- Multiple market data feeds with rule based selection
- Integrated multi-core and grid support for high performance and scalability

#### Market Validated Models

Incorporating industry best-practice, Quantifi's comprehensive suite of market validated models provide timely, accurate and independent valuation for even the most

complex OTC products. Built on the latest technology and incorporating advanced numerical methods, Quantifi delivers groundbreaking performance and scalability for even the most complex OTC portfolios.

#### Simplified Data Management

Quantifi provides a suite of tools and applications to manage, navigate and mine data. A simple ETL framework can be used for managing real-time and batch inbound and outbound data feeds and comes with pre-integrated feeds for popular data providers.

#### Leveraging New Technology

Quantifi is a front-runner in financial technology with early adoption of key technologies that give our clients advantages in terms of speed, scalability, and usability. This includes being the first commercial native .NET analytics library and the first financial solution provider to support the Intel TBB multi-core API. Quantifi's open, service-oriented architecture (SOA), can be implemented using multi-core or grid computing, or through the cloud. This is part of Quantifi's overall strategy for reducing the total cost of ownership for users and making the solution open and flexible.

#### About Quantifi

Quantifi is a specialist provider of analytics, trading and risk management solutions. Founded in 2002, Quantifi has over 140 clients across 16 countries including 5 of the 6 largest global banks, 2 of the 3 largest asset managers, leading hedge funds, pension funds, insurers, brokers, clearing members, corporates and other financial institutions.

**Roland Jordan**  
Head of EMEA Sales, Quantifi

#### Quantifi

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**Quaternion Risk Management Ltd was founded by three senior banking professionals with extensive capital markets experience. Our head office is in Dublin; demand for Quaternion solutions has led to the formation of UK and German subsidiaries.**

Our clients encompass investment banks, the capital markets arms of universal banks, state-sponsored financial institutions, insurance companies and asset managers. To date we have worked with such clients in Germany, UK, Switzerland, Ireland and the Middle East.

Quaternion solutions range from senior advice to concrete implementation of bespoke or our proprietary software, with a focus on the quantitative aspects of the risk management, trading and finance functions.

#### **Consulting Services**

- Quantitative analysis for derivatives and other highly structured products
- Pricing and risk system implementation, design, training

#### **Validation Services**

- Independent pricing and risk model validation and review
- Valuation of complex asset and derivative portfolios
- Review of in-house quantitative development
- Independent stress testing and back testing

#### **Quaternion Risk Engine**

The QRE provides pricing and risk analytics for a wide range of vanilla and structured products spanning all asset classes. We can reconcile models used for trading with those for regulatory purposes.

- Core pricing library in C++ based on the open source library QuantLib, optimised for performance and extended by Quaternion to cover further products and efficient pricing methods
- Integration module
- Core risk engine providing scenario generation (risk-neutral and real-world), repeated portfolio valuation under scenarios through time using parallelization techniques for optimal usage of multi-core and multi-CPU environments
- Configurable analytics components (parametric, historical and MC VaR, ETL, PFE, MC CVA/DVA/KVA/FVA/KVA with netting, liquidity ...) as post-processors of the valuation cube data
- Support for Basel III, UCITS, IFRS 13, CRD IV....

#### **Some of the Major Business Requirements Supported by Quaternion**

- Integration of Front Office, Middle Office, Treasury, Risk and regulatory systems – workflow, processes, models
- Regulatory and Audit compliance: IMM, Basel, CRD IV, UCITS (reporting on fair value of derivatives), IFRS13 (market and credit risk analytics – CVA/FVA/XVA, PFE)
- IM/VM calculation for centrally/non-centrally cleared trades
- P & L attribution
- Liquidity reporting
- Derivative pricing – managing OIS pricing and forward discount curves
- PD modelling

**Caroline Tonkin**  
Director of Sales & Marketing

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Quaternion Risk Management Ltd is a capital markets consulting practice specialising in the provision of advice and the implementation of complex projects for senior management in the trading, risk and finance functions. We deliver an outstanding service to our clients based on extensive management and execution experience in the industry in times of growth and times of stress. This experience covers the detailed challenges of organisation, processes, systems, software and modelling for the capital markets business.

Our projects range from the design and implementation of new pricing models and software, often in response to regulatory demands, to the reorganisation of processes, systems and information arising from business restructuring.

Our partners involve themselves deeply in each of our projects to ensure the efficient delivery of practical solutions on time and on budget.

Our clients choose us because we provide conceptual knowledge combined with cost effective practical solutions to risk problems.



## **Quaternion Risk Management Ltd**

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# SCANRATE

Scanrate provides insights, knowhow and software solutions for the Danish mortgage bond market.

**The Danish mortgage bond market is one of the oldest, largest and most robust fixed income markets in the world. It has survived several occasions of economic and political turmoil, including the latest global financial crisis, with no disruptions to issuance activity or market confidence.**

## Background

For more than twenty-five years, Scanrate has developed the benchmarks models used to assess risk and returns on Danish MBS.

Scanrate was first to introduce an MBS modelling framework based on lattice models and backward induction. Prepayment models are behavioral models taking borrower composition and historical prepayment practices into account. The models are widely used by large investors and market makers in the Danish market.

## Offerings

### Software libraries

Software offerings include the advanced fixed income library RIO with a range of proprietary models for calculating risk and return, scenario analysis and performance attribution. The library has an intuitive Microsoft Excel interface and full support for Microsoft.Net.

### Prepayment modelling service

Quarterly prepayment modelling service based on updated data from the mortgage credit institutions. Keep up with Danish MBS market by reading the quarterly report.

### ASP solutions

Scanrate provides complete ASP solutions with daily updates to data and models done by an experienced team of analysts.

### Fair value service

Scanrate provides a fair value pricing service for Danish bonds. The service is used for collateral management and capital requirement reporting by a large number of Danish banks.

### Risk reporting services

Scanrate offers custom designed valuation services for portfolio managers with interest in Danish MBS. As an example, we deliver daily risk reports on Danish MBS upon closing of the Copenhagen Stock Exchange.

### Data services

Scanrate is a distributor of Danish bond market data. Scanrate holds one of the most complete historical databases on Danish MBS activity.

### Integration services to third party systems

Scanrate has broad experience in building interfaces to third party portfolio management systems.

### Clients

Clients include major commercial banks, global data vendors, pension funds and central banks.

### Consultancy

As a leading independent bond market expert, Scanrate is frequently employed as a consultant on product development and new legislation.

## Svend Jakobsen

Partner

### Scanrate Financial Systems A/S

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**w:** www.scanrate.dk



# DATA. FISH. KNOWLEDGE.

Fresh is always better.





**SCI is an independent media company that started in 2006 with the aim of bringing readers an independent and impartial perspective on the global securitisation markets. SCI covers all aspects of securitization and its constituent asset classes - ABS, CDOs, CLOs, CMBS and RMBS - through a powerful combination of News, Market Data and Events.**

#### News

SCI's daily news service tackles the most relevant stories affecting investors, from regulation, new issues and risk management to secondary trading, pipeline deals and loan defaults, all through its in-house editorial team.

#### Market Data

SCI's data package includes: SCI PriceABS - a daily secondary market colour and price service covering the US & European markets (for more see next paragraph.) We also offer comprehensive coverage of deals in the pre-issuance pipeline; a primary issuance database of deals and their structures; details of events impacting loans securitised in CMBS; information on CLO manager changes; and industry job moves. Each data feed is available to subscribers in both online and downloadable formats.

#### SCI PriceABS

SCI PriceABS is a daily secondary market price service using direct market observations of pre- and post-auction price talk and covers/

traded prices for all securitised products across the US & Europe: ABS, CDO, CLO, CMBS and RMBS. Trade colour and prices are fed to clients online, in excel and via API in a standard, uniform format to integrate into your desktop systems.

SCI PriceABS data is also available via several third party evaluation and cashflow platforms to provide an efficient means of data integration and analysis. Our partners include platforms such as INTExcalc, Moody's Analytics and ThomsonReuters LPC.

#### PriceABS tackles several key problems:

1. Provides access to trade information you don't currently receive
2. Offers new depth to pricing processes and reduces the reliance on single-dealer quotes
3. Offers cloud-based access to irretrievable trade data tied up in email archives
4. Offers search by a variety of parameters: deal identifier; asset class; trade type; and date range.

#### Events

SCI hosts well-established seminars in London and New York that have individually tailored programmes covering the most important and relevant current issues to participants, through panel discussions with leading market figures and audience-driven Q&As. We also organise online webinars on all aspects of trading, pricing and risk management.

**John Owen Waller**  
Managing Director

#### Structured Credit Investor

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**w:** www.structuredcreditinvestor.com



# PriceABS

Colour and Clarity

ABS RMBS CMBS CLO CDO

## Front Office Color; Back office Pricing

Name	CUSIP	ISIN	Size	Price received	Decimal price	Price type	Deal type
ACE 06-SL3 A1	004423AA7		5221000	Hteens	18	TALK	RMBS
ADAGI III-X A1B		XS0262820805	10000000	88	88	CVR	CLO
ALBA 2007-1 B		XS0301706288	2200000	63.03	63.03	CVR	RMBS
ALBA 2007-1 B		XS0301706288	2200000	LM60s	63.5	TALK	RMBS
ALESC 9X A1	G0158WAA0		5000000	M60s	65	TALK	CDO
ARESE 2007-1X A3		XS0292443677	30500000	94.06	94.06	CVR	CLO
ARKLE 2010-1X 2A		XS050654152	4943000	100.36	100.36	CVR	RMBS
ARKLE 2010-2A 2A		US041239CG72	9750000	103.3	103.3	CVR	RMBS
ATTN 2006-2A A3B	049733A57		5000000	Lsingles	2	TALK	CDO
AVOCA III-X B		XS0223410142	2000000	85.25	85.25	CVR	CLO
BACCT 2006-A14 A14	05522RAP3		100000000	100.01	100.01	CVR	ABS
BACM 2006-3 A4	059500AD0		1,300,000	110.00	110.00	CVR	CMBS
BALTA 2006-3 22A1	07386HL33		13598000	MH40s	47	TALK	RMBS
BCAP 2009-RR14 1A2	05532LAB5		16857000	H40s	48	TALK	RMBS
BLONN 2006-1 D		XS0279764335	4,100,000	MH70s	77.00	TALK	CMBS
BOYNE 1X C1		XS0235642971	4500000	H70s	78	CVR	CLO
BSCMS 2005-T20 H	07387BBH5		12,650,000	msingles	5	TALK	CMBS
CBCL 10A B	12497PAB5		15000000	LM70s	73.5	TALK	CDO
CD 2007-CD5 A4	12514AAE1		2,000,000	84.00	84.00	CVR	CMBS
CIFC 2007-1X B1L		USG2189PAG12	4000000	80.25	80.25	TALK	CLO
CRTS 2006-A 1	125093BV5		6500000	LM90s	93.5	TALK	CDO
CWALT 2006-43CB 1A6	02149FAF1		39444000	MH70s	77	TALK	RMBS
EMFNL 2008-2 D		XS0382371440	11000000	M20s	25	TALK	RMBS
FOSSM 2010-2X A1		XS0513923614	4935000	100.57	100.57	CVR	RMBS
GALE 2007-3X D		USG3144YAK58	2000000	H70s	78	TALK	CLO
GALXY 2011-11X D		USG2600QAE55	2000000	L90s	92	TALK	CLO
GALXY 2011-11X D		USG2600QAE55	2000000	M90s	95	TALK	CLO
GHM 2007-1 BA		XS0288628224	1720000	56.52	56.52	CVR	RMBS
GMFM 2011-1A 2A1		US38406CAT09	16550000	102.33	102.33	CVR	RMBS
GRND 1 C		XS0260142988	10,000,000	94a	94.00	TALK	CMBS
MANSD 2007-1X M2		XS0293460381	4375000	L60s	62	CVR	RMBS
MANSD 2007-2X M2		XS0333311693	1000000	61.45	61.45	CVR	RMBS
MMCAPS 18 A1	G6179RAA3		5000000	LM60s	63.5	TALK	CDO
NCSLT 2004-1 B1	63543PAS5		7000000	LM40s	43.5	TALK	ABS
OPERA GER 2 E		XS0278492706	500,000	70a	70.00	TALK	CMBS
PRETSL 22 A1	74042MAA4		27623125	64h	64	CVR	CDO
PROVT 2007-1 D		XS0283674819	1500000	20.7	20.7	CVR	CDO
RL1 INC 2003-5	45804RAA1		1500000	M70s	75	TALK	ABS
RLOC 2007-1X C1A		XS0300474789	3408000	56.65	56.65	CVR	RMBS
RMAC 2004-NS3X M2		XS0200803962	31000	L60s	62	CVR	RMBS
RMI 2006-3	45804CAA4		1500000	H40s	48	TALK	ABS
SMPER 2006-1 D		XS0274875052	1,650,000	H60s	68.00	TALK	CMBS
SMPER 2006-1 D		XS0274875052	1,650,000	M70s	75.00	TALK	CMBS
STCLO 2006-4X C1		USG8514FAE19	2000000	87.13	87.13	CVR	CLO
TMAN 4 A		XS0263096389	5,000,000	94-95a	94.00	TALK	CMBS
TMAN 4 A		XS0263096389	5,000,000	92.75	92.75	CVR	CMBS
UROPA 2007-1 M1B		XS0311811193	1405000	50.75	50.75	CVR	RMBS
UROPA 2007-1 M1B		XS0311811193	1405000	H50s	58	TALK	RMBS
WINDM X-X A		XS0293895271	5,000,000	DNT		CVR	CMBS
WINDM X-X A		XS0293895271	5,000,000	89a	89.00	TALK	CMBS
WINDR 2005-2X C		USG9699FAD80	1000000	81.11	81.11	CVR	CLO

### Front Office, Sales, Trading & Portfolio Management

Increased colour, coverage and depth for each trade

### Valuation, Audit, Risk

Additional independent price verification to complement evaluated pricing sources

Level 1 & 2 pricing data required by regulators to satisfy valuations and audit

Comes with full access to SCI news and data

- 10s of 1000s of prices archived
- 1000s of new prices added each week
- Licences tailored to your needs

For a 5-day free trial

Email [info@structuredcreditinvestor.com](mailto:info@structuredcreditinvestor.com)

[www.structuredcreditinvestor.com](http://www.structuredcreditinvestor.com)



**Solum Financial Limited is a financial consultancy firm which offers specialised advice in all areas of capital markets. The Solum team consists of detail-oriented experts who have held senior managerial positions at leading global banks and are highly experienced in the areas of trading, structuring, risk management, quantitative analysis, modelling and control functions.**

### Why Solum?

Solum brings to its clients independent and conflict free advice in specialist areas where the expertise is typically concentrated in the largest and most sophisticated financial institutions.

With an average of 14 years' experience at top tier financial institutions, Solum consultants offer clients solutions across a wide range of risk management, quantitative modelling and regulatory issues.

### Solum Track Record Summary

Over the last 5 years Solum executed mandates with a total nominal value in excess of £1.2 trillion. Solum's clients include large international banks, global law firms, supranational entities, government agencies, liquidators, corporations and buy-side investors. Executed mandates include complex derivatives portfolio valuations and wind down strategies, trading book auctions, advising on counterparty credit risk, model validations and derivatives pricing methodology. Solum also acts as a technical expert (including acting as an expert witness) in a large number of dispute resolution cases.

The number of repeat assignments that Solum receives highlights the quality and consistency of Solum's advice.

### Solum Expertise

Solum provides advice and solutions for the entire spectrum of risk management,

quantitative modelling and regulatory issues, including:

- Model validation and trading book audit across products and asset classes
- Risk management methodologies (e.g. VaR, expected shortfall, exposure calculations)
- Quantitative modelling
  - multi-curve discounting framework
  - value adjustments (xVA) and initial margin calculation
  - complex derivatives pricing
- Impact analysis of EMIR regulation
- Regulatory and accounting compliance (e.g. IFRS13, Basel III)
- Portfolio de-risking and capital management
  - RWA management
  - wind-down and portfolio auctions
  - governance of non-core units
- Trading desk set-up and hedging strategies (e.g. xVA )
- Dispute and litigation
  - close-out calculations and forensic analysis (market best practice)
  - analysis of transaction documentation and commercial rationale

### Solum Approach

The Solum partners are directly involved in the day-to-day interaction with the client and are directly responsible for the project delivery.

In addition to the partner in charge, a typical project team would consist of senior consultants with more than 10 years' practical experience gained in the financial industry.

The Solum deal team works closely with the client's team in order to deliver tangible solutions that can be implemented in a timely manner and correspond to the best market practices.

**Vincent Dahinden**  
Chief Executive Officer

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### Example Advisory Mandates

European Bank: Advised a European bank on potential risk reduction strategies for a €50 billion complex derivatives portfolio and subsequently executed the portfolio auction.

European Government Agency: Engaged by a European government agency to perform a portfolio valuation and an assessment of the potential exit strategies ahead of the transfer of an entire derivatives trading business.

European Bank: Provided a comprehensive review and recommendations relating to CVA and CCR covering front office, IFRS accounting, systems, vendor review and full CVA/DVA/FVA benchmark calculations.

US Bank: Consulted on validating calculation methodology and conducted benchmarking analysis of results produced by internally developed model for exposure and xVA calculations.

US Bank: Conducted comparative analysis of external vendor solutions for CVA and provided recommendations on systems architecture and integration related issues.

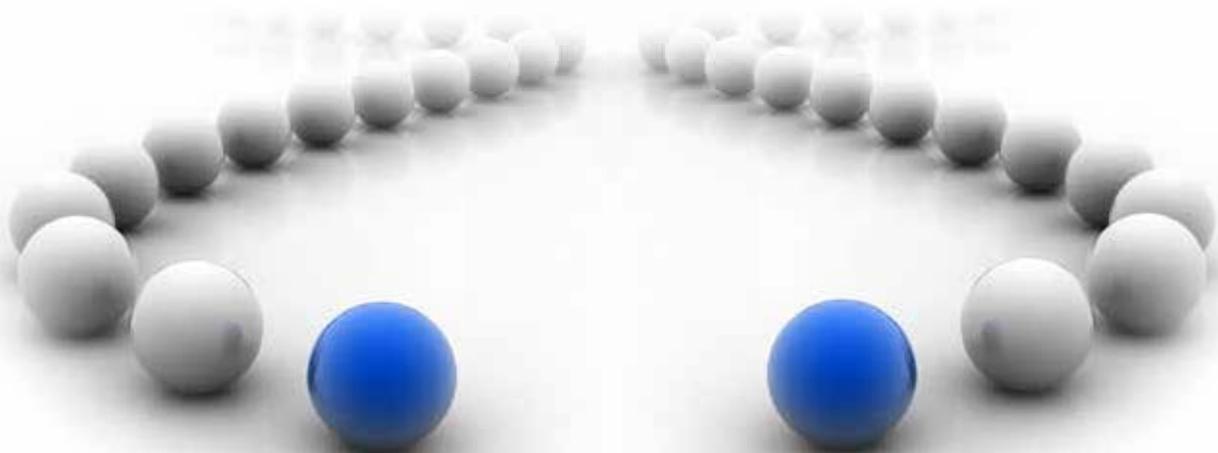
### Example of litigation mandates and expert work related to valuation

Illiquid Asset Valuation: Provided expert assistance in relation to the pricing of illiquid fixed income securities and independent price verification for margin calculation purposes.

Structured Credit: Performed a risk assessment and forensic pricing of CSO tranches and advised in relation to the effect that certain restructuring proposals would have had on realised losses.

Fund Derivatives: Provided alternative methods to value equity CPPI gap risk in order to assess the loss in relation to the early termination of a principal protection agreement.

Corporate Derivatives: Provided analysis in relation to pricing, suitability and marketing process in respect of interest rate derivatives entered into between a non-financial entity and a bank.





## S&P DOW JONES INDICES

**S&P Dow Jones Indices LLC, a part of McGraw Hill Financial, is the world's largest, global resource for index-based concepts, data and research. Home to iconic financial market indicators, such as the S&P 500® and the Dow Jones Industrial Average™, S&P Dow Jones Indices LLC has over 115 years of experience constructing innovative and transparent solutions that fulfill the needs of investors.**

More assets are invested in products based upon our indices than any other provider in the world. With over 1,000,000 indices covering a wide range of asset classes across the globe, S&P Dow Jones Indices LLC defines the way investors measure and trade the markets.

As the world's largest resource for index-based innovation, data and research our mission is to bring independent, transparent and cost effective solutions to the global investment community. S&P Dow Jones Indices is at the forefront of index change and innovation. Our goal is to continue to anticipate and respond to how our clients see global investment opportunities.

In addition to our index family we also provide the following services:

### Professional Resources

CE-accredited research, education and timely market commentary tailored to your investment profile.

### Custom Indices

Through our independently calculated solutions, clients can create custom indices to meet their specific investment criteria. Whether creating a slice of one of our existing indices or a white label version, we construct, maintain and disseminate custom indices for investors, exchanges and ETF providers around the world.

### SPICE®

Taking index analysis and research to the next level, SPICE® provides subscribers with access to timely, comprehensive data, corporate action alerts and developments that affect index composition and weighting.

### Data & Index Licensing

Our indices are licensed to financial institutions around the world as the basis for a wide range of financial instruments. We also offer index data subscriptions across asset classes for clients who require consistent measures of market performance and need underlying data on component securities.

### S&P Dow Jones Indices LLC

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**S&P DOW JONES  
INDICES**

McGraw Hill Financial

# indexology

## Illuminating

As financial markets evolve, S&P Dow Jones Indices delivers expertise, ideas and education so you can imagine new views and capture market energy.

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## StatPro Pricing Services

**StatPro is a provider of asset valuation and portfolio analytics services for the global investment community. Set up in 1994, StatPro Group has operations in Europe, North America, South Africa, Asia and Australia and approximately 450 clients in 36 countries around the world. Our clients include asset managers, custodians, pension plans, banks, data vendors, insurance brokers and some of the world's largest investment managers.**

Recognized as a top provider of evaluated Fixed Income prices, StatPro supplies its customers with independent end-of-day and intra-day valuations across multiple asset classes. Covering an ever increasing number of securities from major and emerging markets around the globe, clients to StatPro Pricing service have access to:

- **Fixed Income Valuations**  
85,000 actively priced securities in 35 currencies
- **Equity feeds**  
Prices for all listed securities from 168 exchanges / 100 countries
- **Index Data**  
Major Equity and Fixed Income indices available at the Total and Constituent levels.
- **Reference Data**  
Over 250 Security Master fields for both Equity and Fixed Income securities
- **FX rates**  
Spot and Forward Rate available for 85 currencies

- **Corporate actions**

Over 30 events for both Equity and Fixed Income securities

- **StatPro Data Direct**

Web-based platform allowing access to all our prices

### Flexibility and Reliability

StatPro's clients enjoy a flexible and robust service, deciding when and how to receive the data they need:

- File layouts and content can be built around clients requirements for a fast and easy implementation
- Data is available at multiple times throughout the day, with a maximum of 30 minutes after snap times
- Over 99.70% of our data feeds are delivered on time
- Completion of the SSAE 16 Type II audit and ISO 2701 compliant

### Customer Service

Subscribers to StatPro Pricing service are entitled to personalized customer service. Clients are given direct access to one of our customer services representatives, who have access to pricing analysts.

**Steven Poher**  
Data Sales Manager

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**SS&C Technologies, Inc. is a leading provider of software solutions and services for the international investment community. Investment managers, broker/dealers, sponsors, and custodians around the world use SS&C's mission-critical and decision support systems. SS&C brings together experts in investments, providing superior client service from its headquarters in Windsor, CT and subsidiaries in Canada, United States, Australia and Europe.**

SS&C GlobeOp is a global leader in providing independent financial asset valuation solutions to hedge funds, fund of funds, pension funds, banks, custodians and other buy-side institutions. SS&C GlobeOp delivers valuation services across a comprehensive spectrum of financial products using proven valuation methodologies, independent sources, consistently applied processes and advanced technologies.

With increased regulatory and institutional investor focus on transparency and independence, SS&C GlobeOp's Valuation Services assures all stakeholders – investment managers, investors, administrators and auditors – about the integrity of the valuation process.

#### **SS&C GlobeOp Valuation Services include:**

##### **Asset Valuation**

- Comprehensive, systematic pricing of exchange-traded and OTC, securities and derivatives

- Independently-sourced rates and prices
- Market-standard valuation models
- Advanced straight-through-processing (STP) technologies

##### **Asset Price Verification**

- Validation and verification of third-party valuations, e.g., custodians, banks, self-administered asset managers, other administrators
- Rigorous valuation processes using multiple price sources and tolerance checks to support compliance with fair market valuation standards (FAS 157 / ASC Topic 820)
- Analysis of vendor/broker pricing methodologies and sources

##### **Comprehensive Valuation Solutions**

- Single source for valuation services
- Consistent, verifiable valuation processes across all assets
- Powerful support for investor due diligence processes
- Documented and tested processes (SAS 70 Type II) to support client internal and external audits
- Tailored services to support client-specific valuation policies with independent, consistent processes and timely reporting.

#### **SS&C GlobeOp**

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**SunGard's Asset Arena Pricing Services Providing customers with full validated pricing services, validated corporate actions, and broker and counterparty price collection services has never been more critical. By not only collecting data but also subjecting it to rigorous quality analysis and improvement, SunGard's Asset Arena Pricing Services helps its customers to enhance accuracy, timeliness and service while reducing staffing costs.**

SunGard's Asset Arena Pricing Services collects data from customers' contracted data vendors and subjects it to a rigorous validation and exceptions resolution process. Delivering over 700,000 prices and automating over 11,000 manual prices daily via its hosted infrastructure, this solution enables clients to focus on true exceptions and oversight, allowing them to maximize resources and reduce IT spend.

Through its corporate actions service, Asset Arena Pricing Services covers an extensive range of corporate actions and dividends across all world markets. Reports alert customers to new corporate action announcements as well as confirmations of validation status.

#### **Asset Arena Pricing Services helps asset managers to:**

- Improve operational efficiencies -- Through automation, multi-vendor validation, vendor management and custom solutions Asset Arena Pricing Services increases efficiencies in fund administration and NAV production processes
- Reduce risk – Our client interface offers transparency of the pricing process and total control via customized oversight using the client's rules and tolerances. All information is centralized allowing for an efficient audit process and significantly reducing financial, operational and reputational risk

- Reduce costs – Through centralization, automation and streamlining of internal processes resources can be reallocate to more valuable functions.
- Meet Service Level Agreements – timely, accurate data collection is a key component of the valuation control process
- Adhere and comply to regulations – prompt and reliable validated price reports enable you to meet regulatory reporting requirements

#### **Asset Arena Pricing Services provides asset managers with:**

- Multi-sourced pricing and corporate actions service that use customer defined data vendors
- Fully validated corporate actions on a schedule of two reports daily
- Data validated to a schedule of your choosing, including daily, weekly or monthly closing price reports
- Tailored pricing files sent in a format to suit your in-house systems
- Exception reports and audit trails provided as required
- Data that has been subjected to rigorous validation checks, including movement tolerances, stale pricing checks, missing data and checks to other sources
- Multi-stage validation procedures tailored to individual customer demand
- Tailored reports on data and validation outcomes
- Flexible data file formats for seamless delivery to any accounting, client or third-party system

**Tim Dennis**  
Managing Director

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## Accuracy. Consistency. Transparency. Speed.

Does your pricing valuation process have it all?

### SunGard's Asset Arena Pricing Services can help.

For asset managers and third-party administrators, the daily valuation of traded securities can represent a daunting task within a short window of time. And for achieving compliance and building a reliable reputation, an independent, automated, multi-vendor price validation process is a must.

SunGard's Asset Arena Pricing Services collects, reconciles and validates data from multiple pricing vendors, brokers and counterparties. Fully automated processes ensure that the required data is consistently and accurately extracted from a full range of report formats. Delivered via a customized user interface, Asset Arena Pricing Services is hosted by SunGard on a cost-effective, Software as a Service (SaaS) basis.

**SunGard's Asset Arena Pricing Services is the cornerstone of robust, compliant pricing.**



For more information, please visit:  
[www.sungard.com/assetarenapricingservices](http://www.sungard.com/assetarenapricingservices)



Contact us  
[am.sungard@sungard.com](mailto:am.sungard@sungard.com)

**SuperDerivatives is the global leader in cloud based market data, derivatives trading technology and analytics. The company has renowned expertise across all asset classes and has pioneered multi-asset product structuring and pre-trade analysis systems to support the world's derivatives traders. The market has voted SuperDerivatives the “Best Derivatives Data Provider” for the last three years.**

eValueX is the most comprehensive independent portfolio valuation service with practically unlimited coverage of assets and derivative products. Powered by SuperDerivatives award winning market data and our extremely accurate analytics, eValueX has its own dedicated quantitative analysis team that can price and then automate any bespoke complex structures in the portfolio, including rare highly bespoke structures.

eValueX provides end of day valuation any hour of the day using snapshots of real time data. The accuracy of eValueX stems from both the high quality of market data and the SuperDerivatives pricing models that truly reflect the interbank market prices.

- Comprehensive, independent and market-reflective revaluation solution for entire portfolios.
- Unparalleled coverage across asset classes, trade types and data cut times.
- Super-accurate pricing based on our award winning market data and best in class analytics.

- Provides accurate risk-sensitivity metrics (Greeks).
- Streamlined, efficient and fully automated.
- Dedicated technical and product support, 24 hours a day.

eValueX utilises the SuperDerivatives cloud and grid computing to calculate huge portfolios in an extremely short period of time. It is highly scalable, able to rapidly ramp up and down according to client requirements.

eValueX provides investors with the highest levels of transparency and enables them to comply with accounting, auditing and regulatory requirements and standards such as FAS 133, FAS 157, IAS 39, IFRS, MiFID, Best Execution and SAS 70.

eValueX is supported by a price auditor tool that will allow a valuation analyst to quickly understand how the value of a transaction was obtained by visualising all of the market data components. This can be used to check the value of any trade at any time against current fair market valuations.

The eValueX quantitative analyst team have years of experience valuing the most complex or exotic transactions, highly structured trades and illiquid assets. Working from term sheets, the team will recreate any structure, test for performance under various conditions and automate its valuation.

#### SuperDerivatives

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# THOMSON REUTERS™

**Thomson Reuters DataScope Evaluated Pricing Service offers an independent, accurate, and timely professional pricing of instruments. The service covers 2.5 million fixed income, derivative instruments and loans priced daily.**

Prices are delivered throughout the day or at market closing times around the world depending on the asset class, with supporting commentary to give insight on the day's events. Of course, high levels of quality assurance and service along with a continuing investment in coverage enhancements to meet customers' evolving needs are part and parcel of our offering.

#### **FUNCTIONALITY AND FEATURES UNRIVALLED DATA COVERAGE**

Our pricing service covers a global universe of 2.5 million over-the-counter (OTC) fixed income and derivative instruments.

#### **CONTENT COVERAGE**

- Structured finance instruments, including asset-backed securities (ABS) and mortgage-backed securities (MBS)
- Structured products including equity linked notes, index linked notes, CD linked notes, etc.
- Corporate and Government securities, including all parts of capital structure from senior debt to preference shares, Islamic finance (sukuks), U.S. municipal bonds, convertible bonds, money market instruments
- Loans
- Derivative instruments

#### **LEADING EVALUATORS**

Professional, experienced evaluators apply consistent and transparent pricing

methodologies, reflecting regulatory and accounting standards. With over 100 evaluators in New York, London, Tokyo, Singapore and Bangalore, Thomson Reuters brings clients global coverage with local knowledge.

#### **ADVANTAGES FOCUS ON CUSTOMER NEEDS**

- The keystone for the Thomson Reuters DataScope Evaluated Pricing Service is the level of commitment to our clients
- Thomson Reuters is committed to improving the client workflow while never ceasing to increase the quality of the service offered
- Our staff work very closely with the clients in order to assure the highest level of services

#### **FULL-SCALE PRICING SERVICE**

- The evaluations process encompasses strict validation procedures, including checks that guarantee the absence of stale prices and/or outlying values, and a yield curve report that guarantees the accurate calculation and fitting of interest rates' term structures across all markets

#### **DELIVERY**

- Evaluated prices delivery is guaranteed within 45 minutes of the calculation cycle
- Thomson Reuters delivers prices at market closing times around the world, with supporting commentary to give insight on the day's events

#### **TRANSPARENCY**

- Clients can raise price challenges as soon as they receive their files, and they will be answered by an evaluator prior to the next pricing cycle

For all inquiries email us at [prdcmmunity@thomsonreuters.com](mailto:prdcmmunity@thomsonreuters.com)

For more information on our pricing and valuations services, please visit our website [www.prdcommunity.com](http://www.prdcommunity.com)



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THOMSON REUTERS™



**Tullett Prebon Information is a leading provider of independent real-time price information from the global OTC financial and commodity markets. Tullett Prebon Information's data is relied upon by customers in over 40 countries. Our independent pricing is unbiased, non-position influenced and backed up by an unrivalled track record in innovation.**

Tullett Prebon Information delivers the highest-quality independent price data using state-of-the-art technologies and data publication standards covering major markets including Rates, Fixed Income, FX and Money, Volatility, Energy, Inflation, Credit and Equities.

We provide a broad set of data fields on over 35,000 securities traded in the OTC markets. Data is available on a live, intraday, end-of-day and historical basis.

Tullett Prebon Information deploys quality assurance teams globally to monitor the quality and accuracy of its data. Our data capture and real-time data management technology, backed up by 24 x 6 global support, ensures the highest levels of accuracy and quality in our pricing services.

Data has no value unless you can make effective use of it, which is why we offer a range of delivery options and data formats. And we'll package both the services we offer and the commercial model we operate with you, to produce a solution that fits your specific data needs. So whether you need our data directly, via recognised industry vendors or through multiple channels, we can help.

If you need a limited data set for a very specific use on an end of day basis or comprehensive access to multiple data sets for industrial scale use, we can tailor a solution

### **Flexibility**

At the core of Tullett Prebon Information's business philosophy is a commitment to providing value to our customers. A key tenet of that value proposition is flexibility both in the services we offer and in our commercial model. We appreciate that customers consume and use data in ever more complex environments and that a standard "one size fits all" model will not always work.

We are happy to work with customers to design a solution that works best for the customer. So whether you need our data directly, via recognised industry vendors or through multiple channels, we can help.

### **Direct Delivery**

All of our content can be supplied directly from Tullett Prebon Information in a range of industry standard formats. We can deliver data in Real-Time, Intra-Day, End of Day and if required provide Historical Databases.

### **Partners**

We also offer our data via the global market data vendors and aggregators. We have customers in over 45 countries and partnerships across the globe with major distributors in all of the major markets.

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### Introduction to Tradition

**Tradition is the interdealer broking arm of Compagnie Financiere Tradition. We are the world's third largest interdealer broker (IDB) in over-the-counter financial and commodity related products, with a presence in 27 countries.**

### Global market data – straight to your desk

Tradition provides real-time, over-the-counter prices in many of the world's fastest moving markets, including hard-to-find prices in developing products and regions.

The result? A timely, accurate and independent view across all financial markets, supported by dedicated market professionals.

### Tailored to your needs

Whether you need data solutions for a single user or feeds for your entire organisation, we offer real-time and end-of-day market data, direct to your desk or via third party vendors. Historical data with research, analysis and commentary completes the package.

### Tradition Valuation Data

To meet increased demand for end-of-day settlement and pricing, Tradition has developed a suite of integrated valuation products. Daily and intra-day snapshots offer OTC price fixings from today and from previous days' trading. All data is sourced directly from broker screens and packages can be tailored to your needs.

### Trad-X Data

Trad-X is Tradition's hybrid trading platform for OTC derivatives and other financial instruments. Trad-X enables clients to trade interest rate swaps and the platform has been conceived with the ability to cover all currencies and products across the rates spectrum. The platform was designed together with market participants and founder streaming participants include: BNP Paribas, Citigroup, Credit Suisse, Goldman Sachs, HSBC, Morgan Stanley, Nomura, Societe Generale, Royal Bank of Scotland and UBS.

- Trad-X is designed to present a global future-proof method of trading OTC derivatives in a shifting regulatory landscape.
- Trad-X offers a flexible execution methodology utilising hybrid, voice and electronic capabilities and the provision of functionality that meets the demands of today's market.
- Trad-X has been designed and continues to be developed in conjunction with market participants in order to meet their requirements on an ongoing basis.
- Trad-X produces the best, fully electronic, irrefutable interest rate swap curve available in the market.

### Matt Evans

Director, Market Data

#### Market Data Tradition

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**Founded in 1996 in Frankfurt, Value & Risk is the leading independent valuation company in Germany and among the market leaders in Europe.**

We provide high-quality services to many of the largest and most well-known European and international financial institutions.

#### **Coverage**

We offer state-of-the-art valuation of almost any financial product on the market - from standard OTC derivatives to the most complex and illiquid structured deals, bonds, ABS, Schuldscheindarlehen, loans and other financing vehicles, private-equity, options and hybrid products.

#### **Customised solutions**

In interaction with our customers we provide full valuation coverage of their portfolios, structured as a single-point service and customized to their special requirements. We also provide valuations of smaller portfolios or single assets. We support every customer with a tailor-made solution of his individual needs and offer him the best balance between accuracy, transparency and commercial efficiency.

#### **Compliance with regulatory requirements**

Our solutions comply with current international, European and many country-specific valuation regulatory requirements such as IFRS, AIFM or KARBV.

#### **Documentation and transparency**

Our services are accompanied by transparent documentation, which describes in plain language the models, assumptions and market data used.

#### **Service Level Agreements**

We work on the basis of Service Level Agreements that precisely define the service package, reaction time (usually 2 hours), escalation levels and fall-back plans.

#### **ISAE 3402 (Type II) Engagement**

Our internal quality control system has been regularly audited in accordance with International Standard on Assurance Engagements No. 3402 (ISAE 3402, formerly SAS 70) Type II.

#### **Value added services**

In addition to the valuation, we provide many related value added services - Market Conformity Checks, Reporting, Risk Analysis, Consulting - and extend continuously our product range.

**Mr Gil Bender**  
Managing Director

#### **Value & Risk Valuation Services GmbH**

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## VALUE & RISK

We at Value & Risk empower investors with investment-bank front-office know-how. We provide commercial banks, asset managers, custodians, insurance companies and pension funds with high-quality valuation and value added services, covering all asset classes and complexity levels, in compliance with the regulatory and internal transparency requirements.



**Voltaire Advisors are specialists in Valuation Risk with deep domain knowledge of valuation methods, sources, data and processes not available to more general financial consulting and advisory firms. We work with a variety of clients in the valuation risk area, ranging from users and regulators through to vendors.**

Our team is composed of a cadre of highly experienced and seasoned executives with unrivalled expertise in the financial valuations industry. We believe that the repository of expertise, knowledge and competence enjoyed by Voltaire Advisors is unique in the industry.

#### **Our services**

We provide bespoke advice to service providers and end-users involved in the business of valuing and analysing the risk of financial assets...

*Our end-user clients benefit especially from our bi-annual private briefing programme, in which we present the detailed results of our annual user survey and vendor research. In this way, valuations users get invaluable insight into what their peers are doing to resolve their shared issues, and updated intelligence into what the vendors have planned in terms of product development and strategy.*

*We also work with company Board's and valuation operational teams within the firm to better educate them on Valuation Risk generally, and help to implement any changes required to ensure more robust compliance and best practice.*

We publish unique and acclaimed research and analysis into key aspects of valuation risk...

*Our annual **Valuation Risk Handbook**, incorporates a series of 'state-of-the-nation' articles on the valuations business and a comprehensive directory of firms involved in it, and our quarterly **Valuation Risk Review**, assesses the latest thinking on valuation regulation and services.*

*Our annual **Valuations Risk Survey** polls hundreds of valuations users on key issues related to their practical experience of valuation. The size and geographical breadth of the sample allow us to draw some important and illuminating conclusions about the practical business of valuation in financial institutions today.*

We organize important conferences and events bringing together vendors and users of valuation data, analytics and models.

*In our **Valuation Risk Forums**, vendor's panel review the latest issues in their part of the industry, and exhibit their products and services, for an invited audience of end-users.*

Valuation Risk is inherent and unavoidable for many financial asset classes, and one can never eliminate the risk entirely. The main issue associated with this is how to recognize, classify and subsequently *control* this risk. Voltaire Advisors can help you achieve this.

**Ian Blance**  
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## Common sense is not so Common.

### We...

- Provide **bespoke advice** to service providers and end-users involved in the business of valuing and analysing the risk of financial assets;
- Publish **unique and acclaimed research** and analysis into key aspects of valuation risk, and;
- Organize **important conferences and events** bringing together vendors and users of valuation data, analytics and models.

To learn more about us  
or our service offering,  
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## APPENDIX – USER SURVEY QUESTIONS

### 1. Please indicate the **PRIMARY** location of business for your firm.

- a. Europe, Middle East, Africa (EMEA)
- b. North America
- c. Latin America
- d. Asia Pacific

### 2. Please choose your **MAIN** type of business from the following list.

- a. Asset Management – Traditional
- b. Asset Management – Alternative
- c. Investment Banking
- d. Private Banking / Wealth Management
- e. Fund Administration / Custody
- f. Other (please state)

### 3. What is the **PRIMARY** use of the valuations determined by your unit?

- a. Fund NAV Calculations
- b. Performance Measurement
- c. Client Reporting
- d. Risk Management
- e. Product Control
- f. Regulatory Reporting
- g. Financial Reporting
- h. Other (please state)

### 4. What method do you **PRIMARILY** use currently to value the following OTC asset types?

Asset Class	Internal Model	Dealer / Counterparty	Vendor
Fixed Income			
Derivatives			
Structured Products			
Private Equity / Alternative Assets			

**5. How many of these instruments do you price and how do you see the number changing in the next three years?**

Asset Class	Today	Higher or Lower in 3 years?
Fixed Income		
Derivatives		
Structured Products		
Private Equity / Alternative Assets		

**6. How often do you need to value your asset holdings?**

- a. Daily
- b. Weekly
- c. Monthly
- d. Quarterly
- e. Annually

**7. Do you think that valuations will be required more or less frequently in the coming 3 years?**

**8. If producing daily valuations, how soon after market close is your valuation process typically run?**

**9. What is the MAIN regulatory requirement you face TODAY when it comes to oversight of valuations and what regulation do you think will be increasingly important for you in the next three years?**

**10. What, in order of importance, do you consider to be the key requirements for a valuations vendor?**

- a. Quality
- b. Coverage
- c. Timeliness
- d. Independence
- e. Transparency
- f. Reliability
- g. Cost



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