



Securities Markets Risk Outlook

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IOSCO Securities Markets Risk Outlook 2016*

*The IOSCO Research Department conducted a number of information-gathering exercises and held discussions to form the basis for the potential risks detailed in this Risk Outlook. The potential risks identified and described in this report should not be seen as representing the views of the IOSCO membership. Further, the assessments of the potential risks in this Risk Outlook are the judgement and views of the authors only and do not necessarily represent the views of IOSCO, the IOSCO Board, its committees, its task forces or its broader membership. The authors believe that the information and opinions presented in this report are from reliable sources.

All dollar figures are in US dollars, unless otherwise stated.

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ABOUT THIS DOCUMENT

The 2016 edition of the *IOSCO Securities Markets Risk Outlook* (the Outlook) is the third publication in an annual series of Outlooks produced by the IOSCO Research Department in cooperation with the IOSCO Committee on Emerging Risks that aims to identify and assess potential risks to the financial system stemming from activities in securities markets. The Outlook is a forward-looking report, focusing narrowly on issues relevant to securities markets, including whether these may be, or could become, a threat to the financial system as a whole. This edition of the Outlook has a widened scope to match the organisational scope of IOSCO more closely and, so, reflects risks relating to investor protection and market efficiency.

This Outlook is based on a number of inputs including data collection and analysis; construction of quantitative systemic risk indicators; market intelligence interviews, which occurred in major financial centres; risk roundtables with industry and regulators; a survey of experts on emerging risks;¹ studies from academia and the regulatory community; and risk reports and presentations by experts. The Outlook synthesises these inputs to adopt a global and forward-looking approach to understanding possible risks.

The purpose of the Outlook is three-fold:

- > First, it is intended to inform the IOSCO Board² and IOSCO members about potential risks to IOSCO's objectives.
- > Second, it contributes a securities markets perspective to the risk identification and mitigation process conducted by the Group of Twenty (G20), the Financial Stability Board (FSB), the International Monetary Fund (IMF) and other global organisations.
- > Third, the Outlook is intended to raise public awareness of potential risks in securities markets.

The staff of the IOSCO Research Department in cooperation with members from the IOSCO Committee on Emerging Risks prepared this Outlook, under the direction of Werner Bijkerk, Head of the IOSCO Research Department and Theodor Kockelkoren, former Chair of the Committee on Emerging Risks. The authors would like to thank David Wright, Secretary General of IOSCO, and Jennifer Marietta-Westberg, Chair of the Committee on Emerging Risks. We would also like to thank members of IOSCO Research Department's network³ for providing expert views through the Risk Outlook Survey and ongoing market intelligence sessions.

Any comments on the report should be forwarded to research@iosco.org.

1 S. Worner, "A Survey of Securities Markets Risk Trends 2015: Methodology and Detailed Results," *IOSCO Research Department Staff Working Paper*, December 2015

2 The IOSCO Board is the governing body of IOSCO and consists of 34 securities markets regulators around the globe.

3 The Network consists of members from regulators, industry and academia.

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EXECUTIVE SUMMARY

> The *IOSCO Securities Markets Risk Outlook 2016* (the Outlook) examines risks to IOSCO's objectives.

> The Outlook identifies and examines, in depth, four potential risk areas. Those risk areas are (1) corporate bond market liquidity; (2) risks associated with the use of collateral in financial transactions; (3) harmful conduct in relation to retail financial products and services; and (4) cyber threats. Additionally, given the current debates and global regulatory work underway, even though it is not seen as a risk area, this report also discusses issues around the asset management industry.

Key Trends in Financial Markets

Securities markets have been impacted...

...by interventions of central banks worldwide; official interest rates of major economies; and an increase in the Fed's interest rates...

> Central bank policies contain three main components: namely, (1) monetary and interest rates policy; (2) direct intervention in the financial system, including securities markets; and (3) regulations that may impact securities markets.

> Official interest rates in major economies continue to be at near zero levels. The direct operations of central banks into securities markets, for example through bond purchasing programs, have impacted prices of the relevant securities (and asset prices more generally).

> The U.S. Federal Reserve Board (Fed) has increased its interest rates, creating a divergence in monetary policy between the U.S. and other regions such as Europe and Japan. Further increases could have an impact on currencies and financial markets.

...and by falling commodity prices

> Declining commodity prices may have both positive and negative implications for securities markets, particularly in emerging markets (EM). The Bloomberg Commodity index fell almost 28% between the end of 2014 and the end of 2015.

> On the one hand, the interaction between declining commodity prices and rising debt levels in some major commodity-producing countries may be a cause for concern. On the other hand, the decline could encourage financial market development to fill the financing gap in some commodity-dependent emerging markets.

While global economic growth appeared to be picking up in 2014...

> Global economic growth appeared to be picking up in 2014, for the first time since the start of the financial crisis. However, in 2015, that growth slowed to 3.1%, down from 3.4% in 2014.

> While the U.S. and Europe are showing signs of growth, the decline in global economic growth is led by emerging markets (EM). Slowing of EM growth is likely to be due to weakening economic activity in some major EMs and falling commodity prices.

> The rate of economic growth in China has been on a downward trend since 2007, measuring 6.8% in 2015. Slowing growth in China impacts global demand and this, combined with declining commodity prices, is slowing economic growth in a number of commodity-exporting economies.

...capital raising through securities markets has been on a general upward trend over the last 5 years, falling slightly in 2015.

> Since 2012, the volumes of equity IPOs (initial public offering) have been on a strong upward trend, reaching \$934 billion in 2014, above the pre-crisis peak. The IPO volume in 2015 was slightly down from 2014 volumes, at \$911 billion.

> Mirroring equity markets, corporate bond issuance globally has been on an upward trend since 2011, reaching an all-time high of \$3.5 trillion in 2014. However, corporate bond issuance volume in 2015 was down from 2014 levels, to \$3.3 trillion. The majority of issuances continue to be investment grade, \$2.9 trillion in 2015, and high-yield issuances \$416 billion.

Recent trends in emerging markets securities markets relate to leverage, flows, and importance of market-based financing.

> Leverage across EM has increased. This is partly driven by low interest rates. For example, bank credit in China has more than tripled since 2008, reaching approximately \$28 trillion in 2014. In China, the number of corporate bonds outstanding has almost doubled since 2008 to \$2.7 trillion in 2015.

> China devaluated its currency to the U.S. dollar mid-2015, and the Chinese stock market showed a steep fall in prices. This decline caused volatility in securities markets worldwide. The Chinese authorities took a number of regulatory actions to mitigate the effects of the fall.

Technology and digital applications are changing the financial landscape...

> Securities markets continue to increasingly use technology. We are also seeing the transition or expansion of certain technology firms into financial service providers – so-called ‘fintech’ – rather than simply providing technology services to financial services companies. Some examples of potential channels for changes brought about by technological revolution – often referred to as “digital disruption” – in securities markets include: robo-advice for investment; payments (i.e. crypto currencies); capital raising through crowdfunding and peer to peer lending; the proliferation of Smartphone finance “apps”; distributed ledger technology; and the use of “big data” to better understand the needs of financial services consumers.

Potential Sources of Risk

> In this global context, we focused on the risks which are, in our view, the most pertinent risks to the IOSCO objectives. The first step of this process was to gather insights from market intelligence, analyses of reports, and data. We used these inputs to design a risk survey (the IOSCO Risk Survey), which was sent to IOSCO members and market experts, to collect diverse views on potential emerging risks from around the globe.

> The first output of this process was the generation of a *long list of risks*, which covers all the responses to the IOSCO Risk Survey. After further analysis, a *short list of risks* was then selected for more granular analysis in the Outlook. These risks related to core securities markets objectives of financial stability, market efficiency and/or investor protection.

> In 2015, these risks include: corporate bond market liquidity; risk associated with use of collateral in financial transactions; harmful conduct in relation to retail financial products and services; and cyber threats.

Corporate bond market liquidity

> With the expansion in corporate bond primary markets, there is some concern about whether the secondary market structure will be able to withstand periods of market stress going forward.

> Traditional measures of secondary market liquidity present an inconsistent story. On the one hand, the bond turnover ratio has decreased in U.S. and European secondary markets. Dealer inventories of corporate bonds also appear to be low; and, in the United States, appear to have recently entered negative territory, according to one measure.

> On the other hand, trading volume within U.S. secondary markets and certain other secondary markets has been growing over the last 5 years. In addition, bid-ask spreads have tightened since 2008.

> Contradictions in the picture of secondary market liquidity may be attributable to abnormal market conditions and changing market structure, away from a dealer-oriented principle-based model and towards an agency-based model.

> While dealer banks may be reducing their market-making role, it is not clear whether liquidity is in fact being critically affected.

> Non-primary dealer traders may be stepping in to provide liquidity. Also, the continued adoption of electronic trading and other alternative trading mechanisms may provide ways to bring together buyers and sellers.

> Nevertheless, it is important, from both an industry and regulatory perspective, to be aware of the structural and conjunctural changes happening in secondary bond markets and work to mitigate any potential risks that may arise. Further data gathering and monitoring may help to better understand the state of global corporate bond markets.

Risk associated with use of collateral in financial transactions

> Collateral has become an important tool for refinancing as well as a method of mitigating counterparty risk exposure. Several regulatory reforms now require the use of high quality collateral to mitigate counterparty risk in OTC transactions. Additionally, the financial industry has driven the need for collateral for more secured funding to help mitigate credit risk.

> As a response to regulatory changes that are expected to increase the demand for high-quality collateral, collateral management service providers have been developing their “suite of offerings” to clients in an effort to help alleviate collateral inefficiencies and mobilise other pools of collateral.

> Although the demand for such services such as *collateral optimisation*, *collateral transformation*, *collateral arbitrage*, *re-hypothecation* and *reuse* will continue to increase, each entails its own set of unique risks, especially when viewed on a system-wide basis.

> At best, many such collateral management service innovations represent a zero sum game that adds no value in aggregate. They might even impose their own systemic implications by making risks opaque that would otherwise be more immediately apparent. These collateral management activities may have inherent risk transfer as part of their make-up, lead to greater market interconnections, have greater asset encumbrance (in some circumstances) and may create the potential of risk concentration in those participants that provide such services.

> Consequently, better monitoring and surveillance is crucial. But to achieve such informational improvements, better quality and quantity of data are necessary.

Harmful conduct in relation to retail financial products and services

> Harmful conduct is a broad term that refers to conduct (not necessarily illegal conduct) by a firm or an individual market participant that could (1) harm the interest of investors; (2) jeopardize the operation of fair, efficient, and transparent markets; or (3) lead to potential systemic risk (or any combination of these). This report focuses on harmful conduct related to retail investors.

> The cases of harmful conduct in retail financial products and services, based on case studies that regulators of 17 jurisdictions provided, show that harm can appear in many different forms. Misselling of complex investment products was cited in this survey most frequently and caused most harm to investors, looking at the number of investors involved and the monetary repayments by firms to harmed investors. *Complexity* in investment products and services could therefore be considered a risk area for further investigation in connection with the goal of increasing investor protection.

> *Unit-linked products* have been sold to many investors and combine an investment fund with a life insurance policy. They typically involved long-term investments of considerable size (e.g., mortgage endowments and a pension) and caused the most monetary harm of all cases reported by the regulators. These products are inherently complex and, generally, many investors and advisers fail to understand them sufficiently. Because investment advisers earned high commissions from these sales, they “pushed” these products, leading to harm to investors. Consequently, millions of investors ended up with financial products that had a level of risk that did not match those investors’ conservative risk profiles. Regulators might want to consider further investigation of this risk area.

> *Structured retail products* were also reported by jurisdictions as being harmful to investors because of their complexity, embedded cost structures (fees), and the overall poor advice given on them. Academic analysis shows that the products have grown in complexity and riskiness. Regulatory efforts have been taken in many parts of the globe to mitigate the risks. Regulators might want to continue to monitor the suitability of these products and advice provided in relation to these products by intermediaries, and, by doing so, prevent harm to investors.

Cyber threats

> In securities markets, potential vulnerabilities of cyber threats may arise through: connections to unsecure third-party vendors; exploitation of information and communication platforms; patching and misconfiguration; threats to exchanges; and confusion around client/customer responsibility.

> Cyber threats have increased in number, sophistication, and complexity over the past few years. The growth in the number and cost of cyber threats, and the direct exposure of securities markets (and the banking sector) to cyber threats, drives the increasing frequency of citing cyber threats as a systemic risk.

> Securities markets regulators around the world are focusing on identifying, analysing and mitigating cyber risks and increasing the cyber resilience of financial systems. Regulatory responses include:

- > increasing focus on cybersecurity as part of or within broader governance and operational management requirements;
- > performing examinations and requiring self-assessments by market participants;
- > conducting surveys of its regulated population to better understand how such regulated entities are managing cyber challenges and reporting to the industry;

- > providing guidance to firms on reducing their risks, identifying opportunities to improve cyber resilience (e.g., increasing collaboration between industry and government), and meeting current legal and compliance obligations; and

- > preparing consumer guides to help individuals protect against online scams and cyber risks.

> Focus on the impact of cyberattacks in securities markets is expected to accelerate as these things occur: the role of technology in the provision of financial services deepens; interdependency and interconnectedness of the financial system grow; and the range of motivations behind cyberattacks widens.

Discussion on asset management

> The potential systemic risk associated with the activities of the asset management industry has received wide attention globally.

> Assets under management have grown since the crisis of 2008. Although growth has broadly been across all fund assets classes, in an environment of low interest rates and yield search, many investment strategies that are focused on less liquid asset classes, such as EM debt funds and funds with alternative strategies, have seen particularly significant increases in assets under management.

> Many funds — including those with less liquid strategies — offer daily (or T+2 or T+3) redemption, which could create a timing mismatch between when a fund is required to pay redeeming shareholders and when any asset sales that the fund executes in order to pay redemptions will settle.

> Coupled with this, some metrics indicate that bond market liquidity has declined since the 2008 crisis. Consequently, many commentators have expressed concern that in an environment of interest rate reversal from the current record lows, holders of funds may divest their holdings as their bonds decrease in value. Perceiving some so-called “first mover advantage,” unit holders may try to redeem, *en masse*, potentially forcing funds to liquidate their holdings in illiquid markets, amplifying price falls and thereby creating a price decline spiral.

> Liquidity risk management practices among asset managers are varied, with many tools in place to manage daily liquidity needs. However, data gaps exist with respect to funds’ liquidity risks and risk management practices. Thus, it is difficult to draw a definitive conclusion about the potential effects of declining bond market liquidity on asset managers as a whole. To enhance our understanding of the fund industry, there is a need to further examine, empirically, the fund sector, as well as to identify critical data gaps and develop testable hypotheses to provide much needed quantitative estimates of potential impacts.



1. INTRODUCTION

Scope and How To Use the Outlook

The *IOSCO Securities Markets Risk Outlook* (the Outlook) presents examination of risks and developments in the financial system from a securities markets perspective. This report has been developed based on analysis by the IOSCO Research Department and members of the IOSCO Committee on Emerging Risks and aims to complement implementation of IOSCO Principles 6 (“The Regulator should have or contribute to a process to monitor, mitigate and manage systemic risk, appropriate to its mandate”) and 7 (“The Regulator should have or contribute to a process to review the perimeter of regulation regularly”).⁴

Specifically, the Outlook has been developed to help inform IOSCO members, other organisations with interests complementing those of IOSCO, market participants, and the public about potential risks to investors; fair, efficient, and transparent markets; and financial stability.⁵ Individual securities regulators can use this report as an information source for their risk identification and for analysis and mitigation work.

In this report we recognise certain data limitations, such as scarcity of global data on secondary market trading of corporate bonds as well as data on securities used for collateralised transactions.

Structure of the Outlook

The Outlook is structured into seven chapters. *Chapter 1* contains an introduction of the Outlook and description of the methodology for selecting the risks for analysis. *Chapter 2* provides a broad overview of general financial sector and securities market developments. Specifically, that chapter focuses on key developments and trends related to the macroeconomic context; securities market activity and EM; and disruptive technology. *Chapters 3, 4, 5, and 6* present analyses on four risk areas relating to financial stability, market efficiency and/or investor protection, relevant from a securities markets perspective. These risk areas are corporate bond secondary market liquidity; harmful conduct in relation to retail financial products and services; risk associated with use of collateral in financial transactions; and cyber threats. *Chapter 7* includes a summary of the current debate on potential risks stemming from asset management.

⁴ IOSCO, *Methodology for Assessing Implementation of the IOSCO Objectives and Principles of Securities Regulation*, September 2011 (revised August 2013). <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD359.pdf>.

⁵ In this volume, we have widened our risk focus beyond potential systemic risks to also examine potential risks to the two other IOSCO core objectives: (1) protecting investors; and (2) ensuring that markets are fair, efficient, and transparent. This widened scope is in line with the new IOSCO Strategy, introduced in 2015.

Methodology

The IOSCO Research Department (RD) in conjunction with members of CER attempt annually to identify the most relevant risks to the three principal IOSCO objectives. The first step of this process is to gather insights from market intelligence, analyses of reports, and data. These insights are used to design a risk survey (the IOSCO Risk Survey) which is sent to IOSCO members and market experts, to collect diverse and global viewpoints on potential emerging risks.

The first output of this process is the generation of a *long list of risks*, which covers all the responses to the IOSCO Risk Survey.⁶ The long list of risks can be found in Annex 1 of this Outlook. After further analysis and consideration, a *short list of risks* is then selected for more granular analysis in the Outlook.⁷ The long and short list are not intended to represent a comprehensive or absolute list of possible risks but rather to provide a structured method for discerning a collection of risks relevant to the securities markets.

Short list of risks

The short list of potential risk areas identified for this Outlook includes those listed below.

1. Market liquidity.

For the purposes of this publication, market liquidity refers to concerns related to secondary corporate bond market liquidity. These concerns relate to potential run risk and the risk of ineffective price formation in times of volatility and in an environment of increasing interest rates. Despite the apparent ample availability of liquidity in primary corporate bond markets, some express concern that secondary market trading is being hampered by regulatory changes and the reduced role of market-makers. Staff of the IOSCO Research Department has previously published two analyses of the corporate bond markets⁸. The issue of secondary market liquidity will be analysed further in Chapter 3, specifically from the perspective of *fair, efficient, and transparent markets*.

2. Risk associated with use of collateral in financial transactions.

The use of collateral to underpin transactions mitigates credit and counterparty risk. This is an increasingly important function since direct interbank lending diminished after the global financial crisis of 2008. At the same time, counterparties' practices in their use of collateral have increased the procyclicality of these transactions due to heightened market interconnectedness, particularly where not well managed and regulated. As highlighted by the FSB, this propensity for procyclicality in collateral (particularly in collateral haircuts) could pose a risk to *financial stability*, especially in a scenario where good-quality collateral is in demand by financial firms to fulfil other international regulatory reforms that improve financial stability (e.g., CCPs and OTC derivatives reforms).⁹ Regulation requires high-quality, liquid assets to be placed with banks, CCPs, and central banks to promote financial stability. If those actions are combined with downgrades of existing collateral, the *efficiency of the markets* could be hampered. Transparency has improved and efforts are ongoing to improve data collection and aggregation. This is further analysed in Chapter 4.

⁶ For a more detailed explanation of the Risk Outlook survey and its results, see: S. Worner, "A Survey of Securities Market Risk Trends 2015: Methodology and detailed results," *IOSCO Research Department Staff Working Paper*, September 2015.

⁷ This short list is primarily based on the frequency of responses to the survey and expert judgement of the RD in consultation with the CER.

⁸ R. Tendulkar and G. Hancock, "Corporate Bond Markets: A global perspective," *IOSCO Research Department Staff Working Paper*, April 2014; and R. Tendulkar, "Corporate Bond Markets in Emerging Economies," *IOSCO Research Department Staff Working Paper*, December 2015.

⁹ FSB, "Regulatory Framework for Haircuts on Non-Centrally Cleared Securities Financing Transactions: Procyclicality of haircuts: Evidence from the QIS1, August 2014

3. Harmful conduct in relation to retail financial products and services

Harmful conduct is a broad term that refers to conduct (not necessarily illegal conduct) by a firm or an individual market participant that could (1) harm the interest of investors; (2) jeopardize fair, efficient, and transparent markets; or (3) lead to potential systemic risk (or any combination of these). An example of harmful conduct, in the context of investor protection, is the misselling of a financial product to investors whose risk profiles do not match the risks associated with the product. For the purposes of this publication, analysis of the risk of harmful conduct will focus on retail financial products and services. Chapter 5 analyses risks related to harmful conduct from an *investor protection perspective*.

4. Cyber threats

Cyber threats, for the purposes of this Outlook, relates to risks associated with cyberattacks launched against securities markets participants. A cyberattack can be defined as “a harmful activity, executed by one group (including both grassroots groups or nationally coordinated groups) through computers, IT systems and/or the internet and targeting the computers, IT infrastructure, and internet presence of another entity. An instance of cyber-crime can be referred to as a cyberattack.”¹⁰ Cyberattacks targeting financial actors, services, and infrastructure can result in high economic cost and undermine the integrity of the financial system, through disruption and sabotage, making cyber risk a potential risk to financial stability. From an investor protection perspective, cyberattacks can also affect investors through, for example, leakage of confidential investor information held within a financial institution and misappropriating investor assets in an account. From a market efficiency perspective, cyberattacks could also obstruct functioning of markets, through manipulation of trading venues.¹¹ Chapter 6 analyses this risk in greater depth.

10 R. Tendulkar, “Cyber-Crime, Securities Markets and Systemic Risk,” *Joint Staff Working Paper of the IOSCO Research Department and World Federation of Exchanges*, July 2013.

11 Previous work by staff of the IOSCO Research Department with the World Federation of Exchanges highlighted the cyber threat facing actors in securities markets, including stock exchanges, and defined cyberattacks as a potential systemic risk. See R. Tendulkar, *op. cit.*

2. KEY TRENDS IN FINANCIAL MARKETS AND REGULATION

This section of the Outlook focuses on three key contextual aspects underpinning the development of securities markets and this report’s discussion of risks. The three aspects are these: (1) the macroeconomic context; (2) general market activity and EM leverage and capital flows; and (3) disruptive technology.

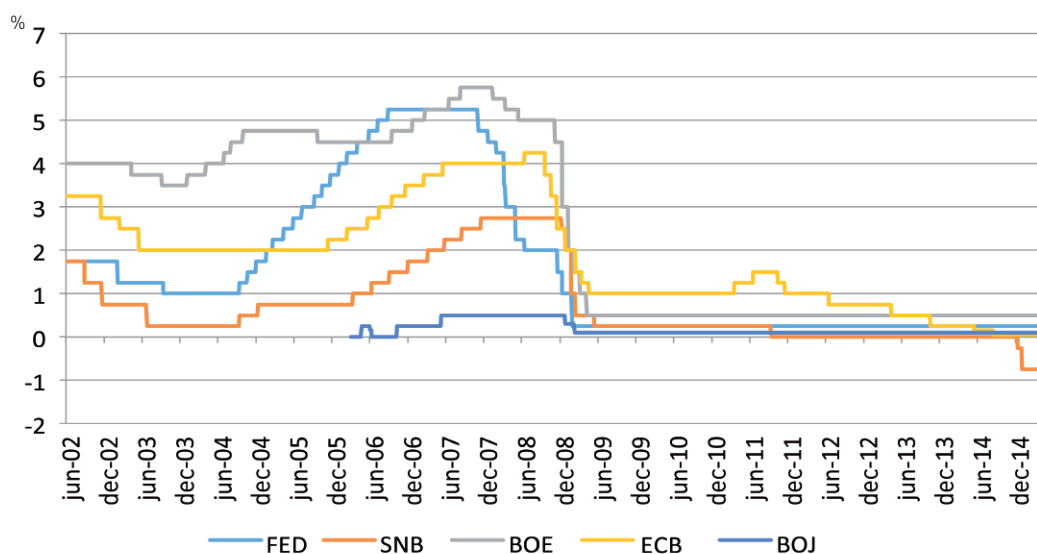
a. Macroeconomic context: central bank policies, commodity prices, and state of the worldwide economy

Continuing effect of central bank policies on the financial markets

Central banks worldwide continue to affect financial markets through their policies. These policies contain three main components: (1) monetary and interest rates policy; (2) direct intervention in securities markets (for example, through direct asset purchasing programs); and (3) enactment of regulations that impact securities markets (for example, bank exposure limits to money market funds).

Official interest rates in major economies continue to be at near zero levels (see Figure 1). The initial fall of official interest rates occurred at the end of 2008, reaching near zero levels at the beginning of 2009. This fall was reflective of the accommodative monetary policy stance of some major central banks, to support the financial system and encourage investment. During 2014 and 2015, the European Central Bank (ECB) and the Swiss National Bank (SNB) further lowered their interest rates, with the SNB rates reaching negative levels of -0.75%. The Bank of Japan joined introducing negative interest rates in early 2016.

Figure 1: Official interest rates of selected central banks



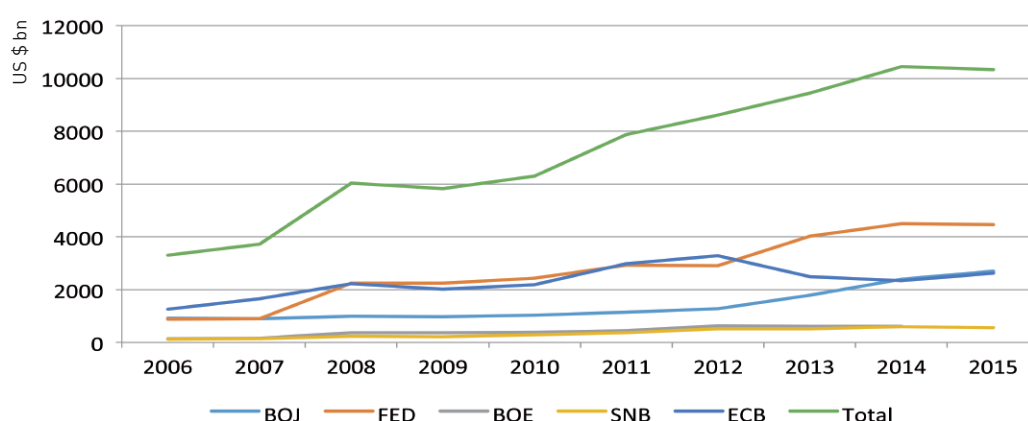
Source: Bloomberg and websites of central banks

The second component of monetary policy is the direct intervention of central banks into the securities markets. In the United States, the Fed announced cessation of its bond-buying program in October 2014. The program injected over \$4.5 trillion into the economy over a period of 6 years (from December 2008 to October 2014), through the purchase of Treasury bonds and mortgage-backed securities from the market.

In March 2015, the ECB launched a €1.1 trillion (approximately \$1.2 trillion) quantitative easing (QE) program, the Public Sector Purchase Program and involves monthly purchases of €60 billion worth of government bonds and securities from European institutions and national agencies. The ECB's decision to pump money immediately resulted in a rise in asset prices. Similarly, through the purchase of Japanese Government bonds, ETFs, and J-REITs, the BoJ announced its second Quantitative and Qualitative Monetary Easing program (QQE), with the aim of increasing the monetary base by an annual amount of JPY80 trillion (approx. \$650 billion). The BoJ's main aim is to achieve an inflation target of 2%, after many years of deflation.

The balance sheets of the main central banks contain securities purchased in the securities markets and mainly contain different types of debt securities that exceed \$10 trillion (see Figure 2). In the United States, the cutback on the asset purchase stabilised the Fed's balance sheet at \$4.46t trillion into the first quarter of 2015, down from \$4.5tn before QE was halted. In Europe, ECB's assets kept growing reaching \$2.6tn in the 2015Q1 from \$2.3n in 2014. BoJ's QQE further increased the size of BoJ's assets purchase to \$2.7tn into 2015 Q1. By 2017, the BoJ's asset purchases could reach one-half of total government bonds issued.

Figure 2: Balance sheets of selected central banks



Source: Bloomberg and central banks websites

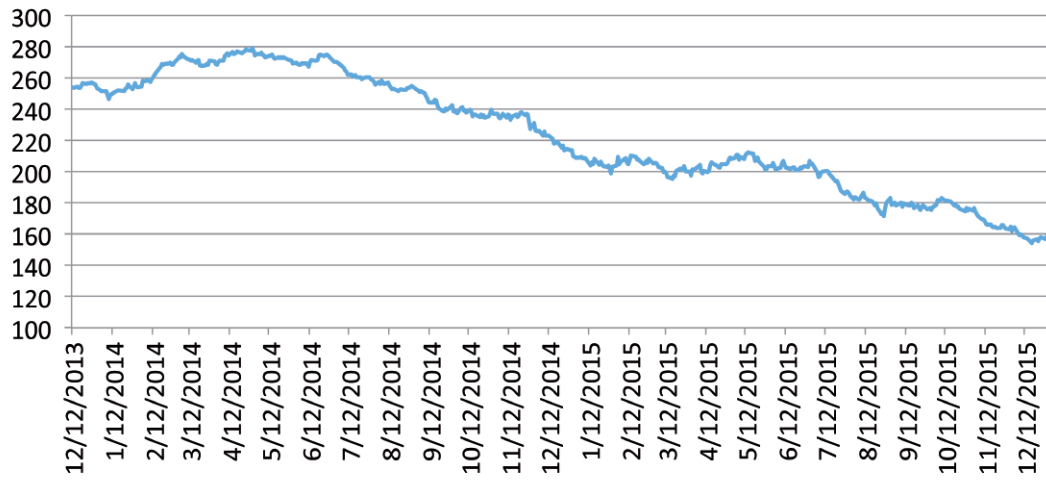
With its first increase short term interest rates in nine years, the Fed set the conditions for monetary policy that diverges from that in Europe and Japan. Potential forthcoming increases of the official interest rates by the Fed but not by European or Japanese authorities could have an impact on currencies, as well as securities markets more generally. The *Securities Markets Risk Outlook 2014-2015* analysed the potential risks involved.¹² This Outlook will focus on the impact on liquidity in corporate bond markets (see Chapter 3).

¹² See pages 50-84 of the 2014-2015 Report, for impacts on securities markets, including leveraged products and capital flows to economies of EM.

Falling commodity prices

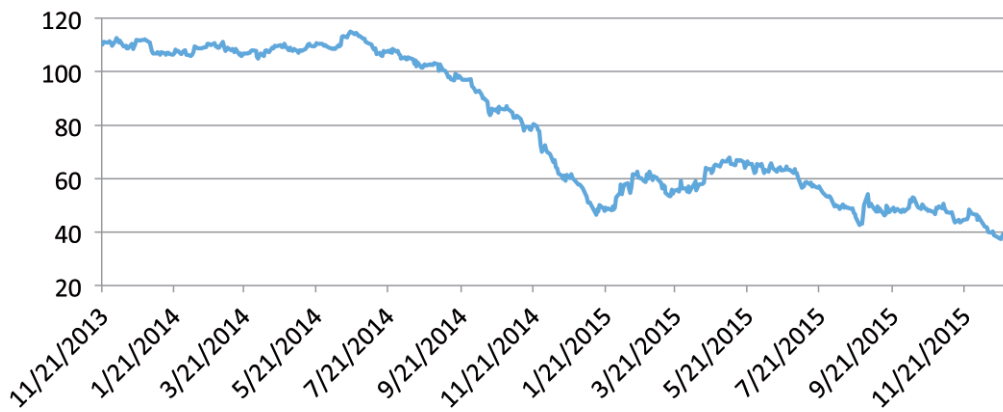
Falling commodity prices have impacted the global economy. The Bloomberg Commodity Index, an index composed of major commodities, fell almost 28% between the end of 2014 and the end of December 2015 (see Figure 3). A specific example is the price of Brent Crude Oil, which fell 67%, from \$115 per barrel to \$38 per barrel (see Figure 4).

Figure 3: Bloomberg commodity index



Source: Bloomberg

Figure 4: Price of Brent oil in U.S. dollars



Source: Bloomberg

Firms in net-commodity exporting countries, such as Australia, Brazil, Canada, Chile, Russia and South Africa, may face a fall in income due to falling commodity prices. In contrast, net-commodity importing countries, such as the United States, Japan, China and India, are benefiting from the declining commodity prices. While falling commodity prices ultimately may boost overall global growth,¹³ from a securities markets perspective declining commodity prices can have both positive and negative implications, particularly in EM. For example, on the one hand, declining commodity prices could encourage financial market development to fill the financing gap in some commodity dependant EM.¹⁴ However this can only happen if there is a deep financial market in the affected countries. At the same time, the interaction between declining commodity prices and rising debt levels in some major commodity producers may be a cause for concern, increasing the risks of default of commodity-oriented firms.¹⁵ Furthermore, global institutional investors invest in different asset classes including commodities. Therefore, a significant price decrease in commodities may cause retraction in other assets as well. Consequently, economies with less developed securities markets and a large commodity sector are especially vulnerable.

Slowdown of global economic recovery

Global economic growth appeared to be picking up in 2014, for the first time since the start of the financial crisis. However, in 2015, growth slowed to 3.1%, down from 3.4% in 2014 (see Figure 5).¹⁶ EM drove this decline. In advanced economies, growth improved slightly between 2014 and 2015, increasing from 1.8% to 2% in 2015. Latest forecasts suggest that this upward trend will continue into 2016, reaching 2.2%. What drives this growth is lower commodity prices, as well as recovering demand, investment, and exports. In EM, however, growth is down from 4.6% in 2014 to 4% in 2015, continuing a downward trend that started in 2009. The *BIS Quarterly Review*¹⁷ notes that moderation of EM growth, while not unexpected, is likely due to weakening economic activity and falling commodity prices. For commodity producing EM, falling commodity prices have led to depreciation of exchange rates. Nonetheless, the IMF predicts a break of this downward trend for 2016, with a forecasted growth figure of 4.5%.

From a country- and regional perspective, the U.S. economy grew 2.4% in 2014; 2.6% in 2015; and is expected to grow 2.8% in 2016, signaling a normalization to long-term growth conditions. In Europe the economic recovery has been steady, albeit slow, with the exception of Greece and Russia. Greece was in tense negotiations with the members of the Eurozone and with the IMF on new terms of support of their economy which remained in a deep crisis. The Russian economy was heavily hit by the steep fall in oil prices.

In Latin America, various large (in terms of gross domestic product—GDP) economies suffered from falling commodity prices, increasing inflation and slowing economic growth. Brazil in particular entered into a sudden period of negative economic growth, amidst a corruption scandal affecting some of the biggest firms and key political figures. The IMF expects, in 2015, a negative growth of -3% and, in 2016, -1%.

13 The IMF suggests a gain in global GDP between 0.3 and 0.7 % in 2015, due to declining commodity prices.

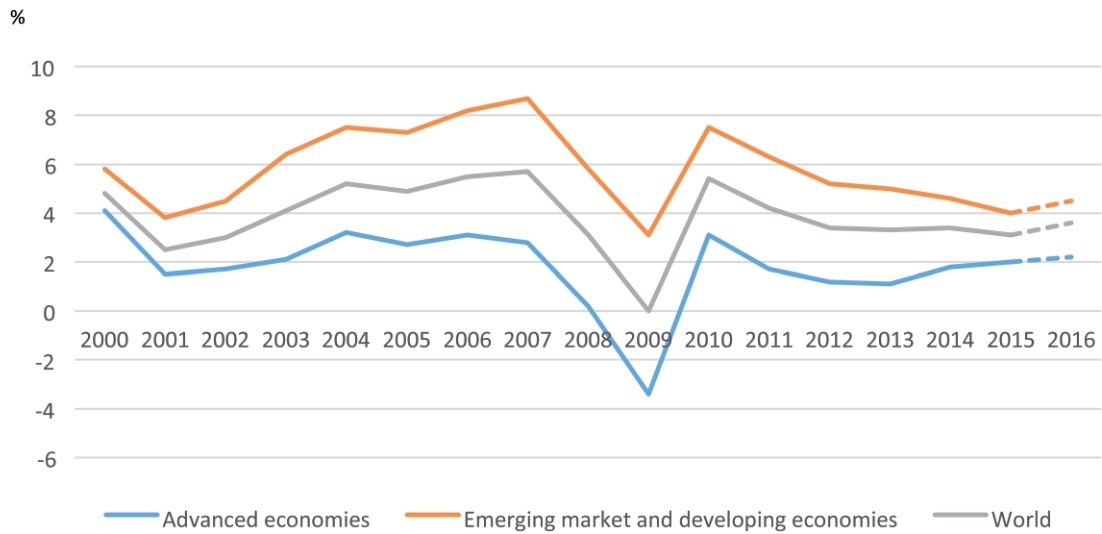
14 See R. Tendulkar, "Corporate Bond Markets: An Emerging Markets Perspective," *IOSCO Research Department Staff Working Paper*, October 2015.

15 This is accompanied with a drop in currencies of most commodity exporters. While this acts as a cushion to lower commodity prices (commodities are traded usually in US \$) those countries and firms with debt denominated in foreign currency (usually US\$) will be hit with rising debt servicing costs.

16 IMF, *World Economic Outlook*, October 2015.

17 BIS, "EME Vulnerabilities take centre stage," *BIS Quarterly Review*, September 2015.

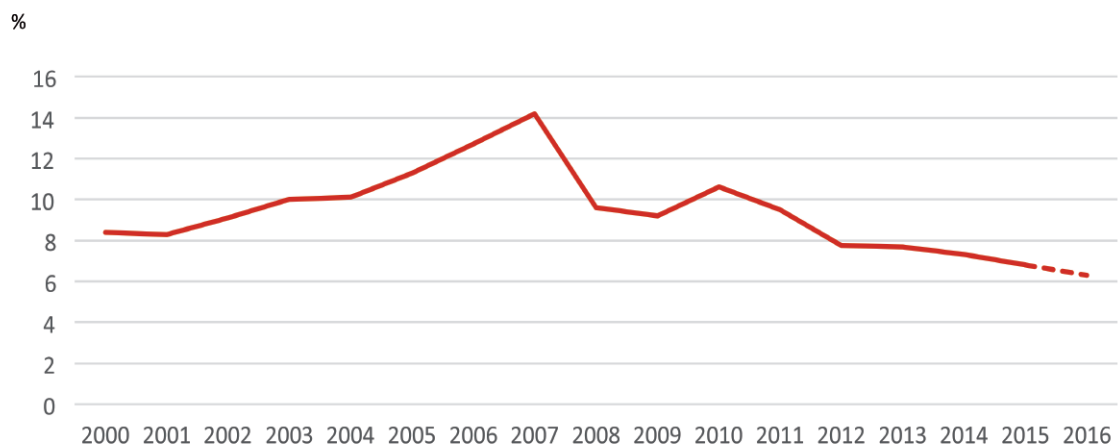
Figure 5: Economic growth 2000-2016 by yearly percentage change



Source: IMF, World Economic Outlook October 2015

Economic growth in Asia also showed signs of softening, with the exception of India. China, the largest Asian economy and the second largest economy in the world, saw its growth projections being reduced (see Figure 6). In 2007, economic growth in China was recorded to be at 14.2%. However, since then (with the exception of 2010), growth rates have been on a downward trend. Growth was 7.3% in 2014 and 6.8% in 2015. For 2016, the IMF expects a growth rate of 6.3%. Slowing growth in China impacts global demand and this, combined with declining commodity prices, is slowing economic growth in a number of commodity-exporting economies.

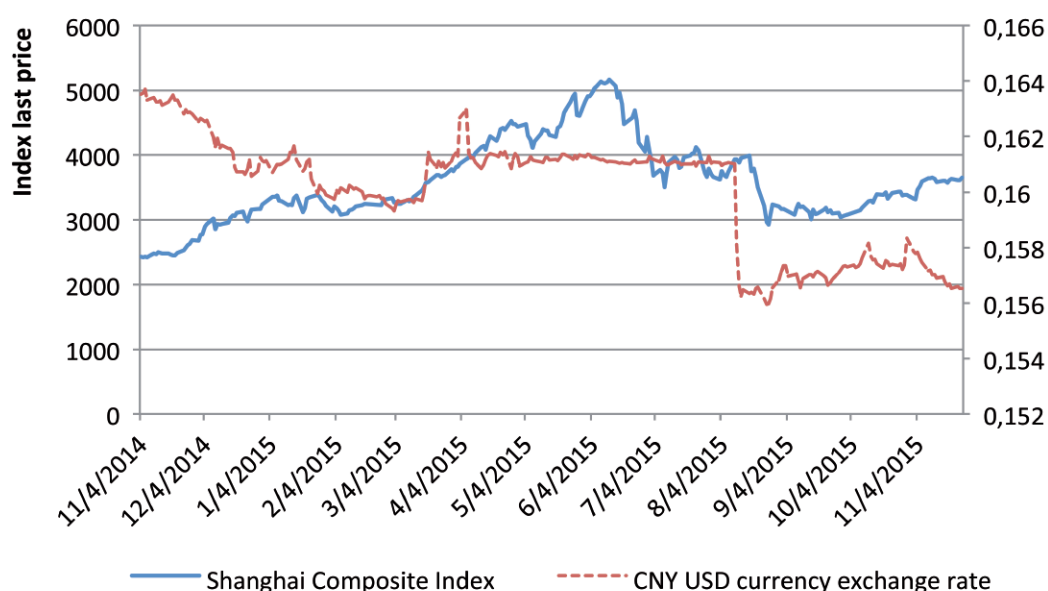
Figure 6: Economic growth in China by yearly percentage change



Source: IMF, World Economic Outlook, October 2015

In August 2015, China devaluated its currency relative to the dollar (see Figure 7). The Shanghai Composite Stock Index fell from its mid-June peak level of just above 5,000 points to below 3,000 points. China undertook a number of regulatory actions to mitigate the volatility in Chinese securities markets and dampen potential spillover effects to the real economy. The People's Bank of China (PBOC) intervened in securities markets through these three mechanisms: (1) by injecting more liquidity into the money market, through its reverse repo operation; (2) by cutting headline interest rates by 25 basis points; and (3) by injecting RMB100 billion (approx. \$15 bn) through its standing lending facility to the banks. Furthermore, the Chinese securities markets regulator, China Securities Regulatory Commission, temporarily halted IPOs and took measures to reduce margin lending. As a result, the stock market stabilised in September and recovered in both October and November, to a level of 3,600.

Figure 7: The Shanghai Composite Stock Index (lhs) and Value of Renminbi (RMB) in US dollars (rhs)



Source: Bloomberg

b. Trends in securities markets

Global market trends

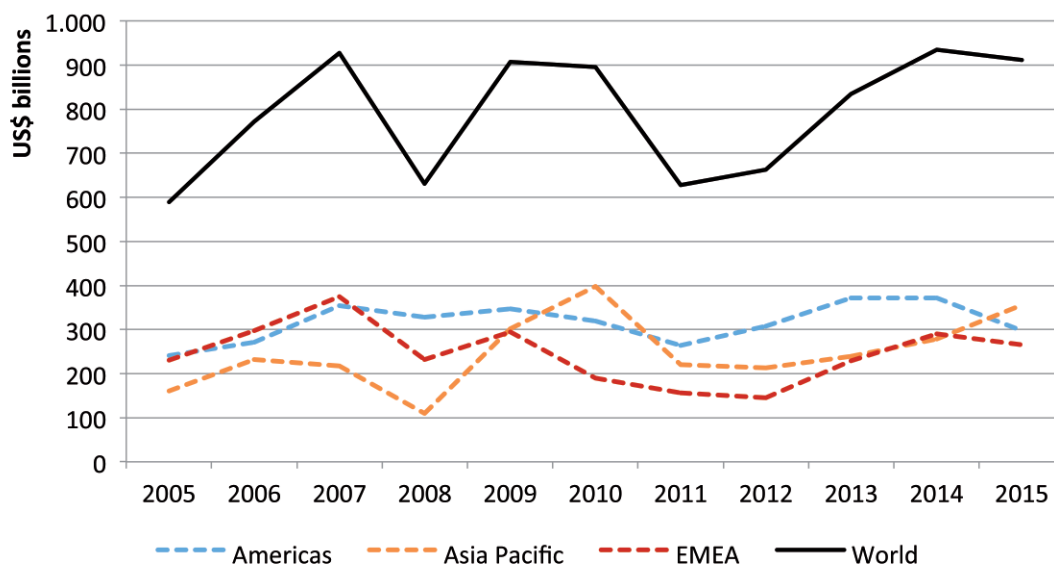
Equity markets

In the immediate aftermath of the global financial crisis, initial public offerings (IPOs) globally dropped steeply from almost \$928 billion in 2007 to \$631 billion in 2008 (see Figure 8). Since 2012, IPO issuance has been on a strong upward trend, reaching \$934 billion in 2014, above the pre-crisis peak. In 2015 issuance volume was \$911 billion, slightly down from 2014 volumes.

Regionally, in 2015, growth in IPO issuances was dominated by Asia Pacific, although IPO volumes across the three regions (Asia Pacific, Americas and Europe, Middle East and Africa) were at similar levels. In 2015, IPOs in Asia Pacific were \$356 billion; IPOs in the Americas reached \$297 billion; and IPOs in Europe, the Middle

East, and Africa (EMEA) totalled \$265 billion. Comparing 2015 volumes with 2012 volumes, IPO volumes are 66% higher in Asia Pacific, just 3% higher in the Americas, and 75% higher in EMEA. IPO volumes are down from 2014 levels in the Americas and EMEA but up from 2014 levels in Asia Pacific.

Figure 8: IPOs



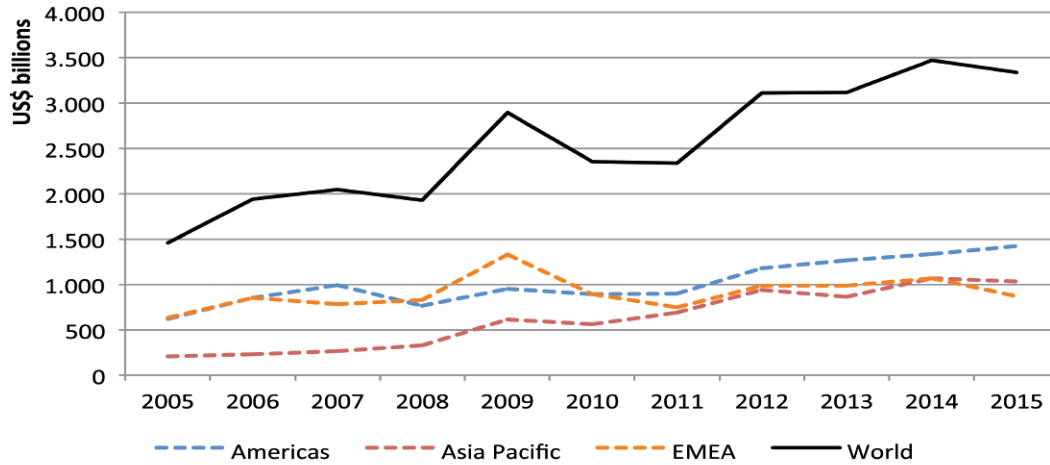
Source: Dealogic

Corporate bond markets

Mirroring equity markets, corporate bond issuance globally has been on an upward trend since 2011, reaching \$3.5 trillion in 2014, well above pre-crisis levels (see Figure 9). Nevertheless, after a steep rise in issuance volume in 2012, growth has been relatively flat. Corporate bond issuance volume in 2015 is just 7% higher compared to 2012 levels and down from 2014 levels, at \$3.3 trillion.

Regionally, corporate bond issuance volume in the Americas dominated in 2015, reaching \$1.4 trillion, up on 2014 figures. In Asia Pacific and EMEA, corporate bond issuance volumes are down from 2014 figures totalling \$1.0 trillion and \$873 billion in 2015, respectively. Comparing 2015 volumes with 2012 volumes, corporate bond issuance volume is 21% higher in the Americas and 10% higher in Asia Pacific. In EMEA, the volume of corporate bond issuance in 2015 is actually 12% lower compared to 2012 levels.

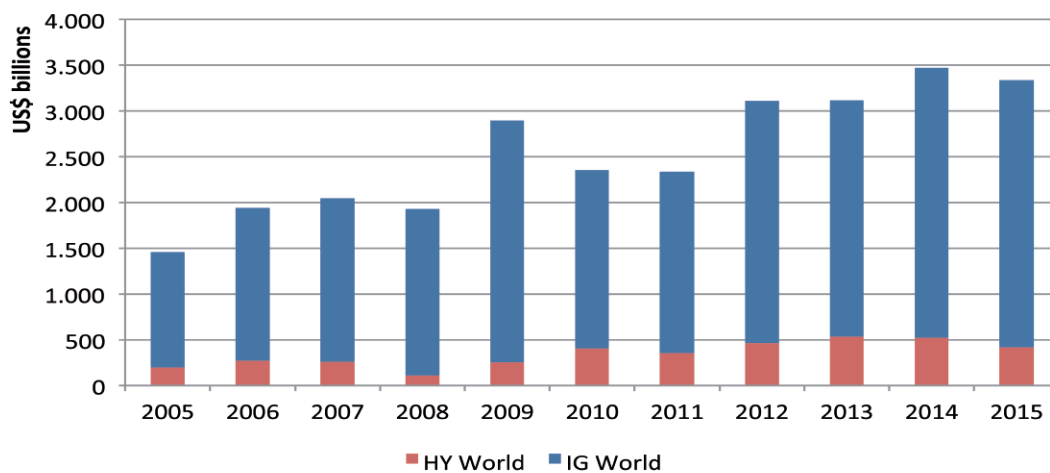
Figure 9: Corporate bond issuance volume



Source: Dealogic, figures end 2015

The majority of corporate bond issuance in 2015 continues to be investment grade (88%), with investment grade issuances totalling \$2.9 trillion in 2015 and high-yield issuances at \$416 billion (see Figure 10). Compared to 2008 levels, investment grade issuances in 2015 are 60% higher, while high-yield issuances are almost four times 2008 levels. Nevertheless, over the last couple of years, growth has flattened for investment grade issuance (10% change in 2012 vs. 2015) and declined for high yield issuances (-10% change in 2012 vs. 2015). Trading of corporate bonds on secondary markets is discussed in more detail in *Chapter 3*.

Figure 10: Global corporate bond issuance - High Yield vs. Investment Grade

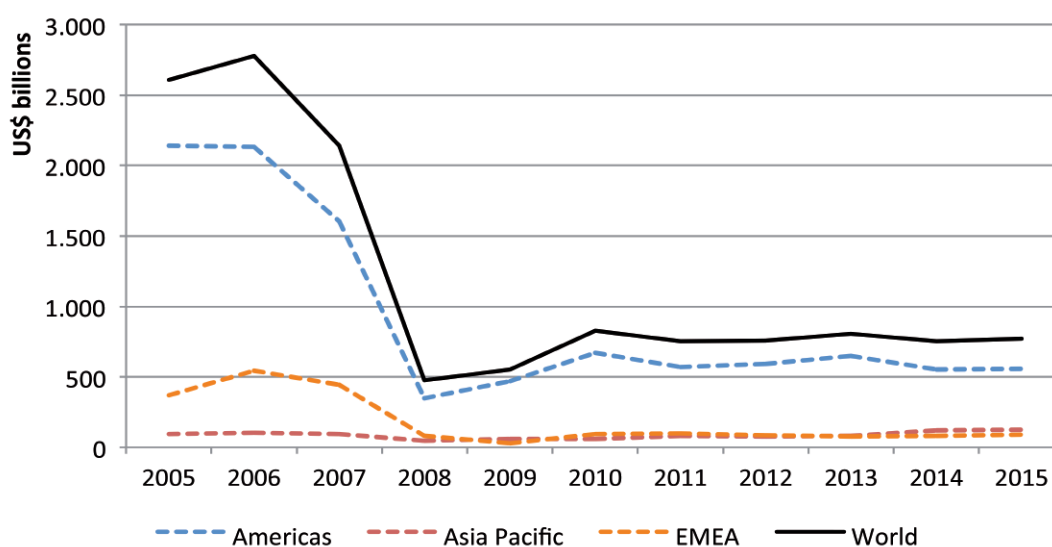


Source: Dealogic, figures end 2015

Securitized products

The issuance of securitized products in the immediate aftermath of the crisis fell substantially, as quality of the assets securitized, combined with leverage had caused severe problems. Since 2008, the growth in their issuance has remained flat at a global level. In 2015, the annualised issuance is expected to be around \$770 billion, far from the levels issued pre-crisis (see Figure 11).

Figure 11: Securitized products (Asset-Backed Securities—ABS and Mortgage-Backed Securities—MBS)



Source: Dealogic, figures end 2015

Regionally, this same pattern is mirrored in the Americas and EMEA. In the Americas, 2015 issuances was \$556 billion, almost one-fifth of pre-crisis levels. Similarly in the EMEA region, issuances in 2015 reached \$88 billion, a 20% decline on their post-crisis high of \$100 billion and roughly one-seventh of their pre-crisis highs (\$545 billion in 2006). The real growth story of securitized products has been the Asia Pacific region. Since the crisis, issuances in Asia have grown steadily from \$45 billion in 2008 to a high of \$126 billion in 2015, an all-time high.

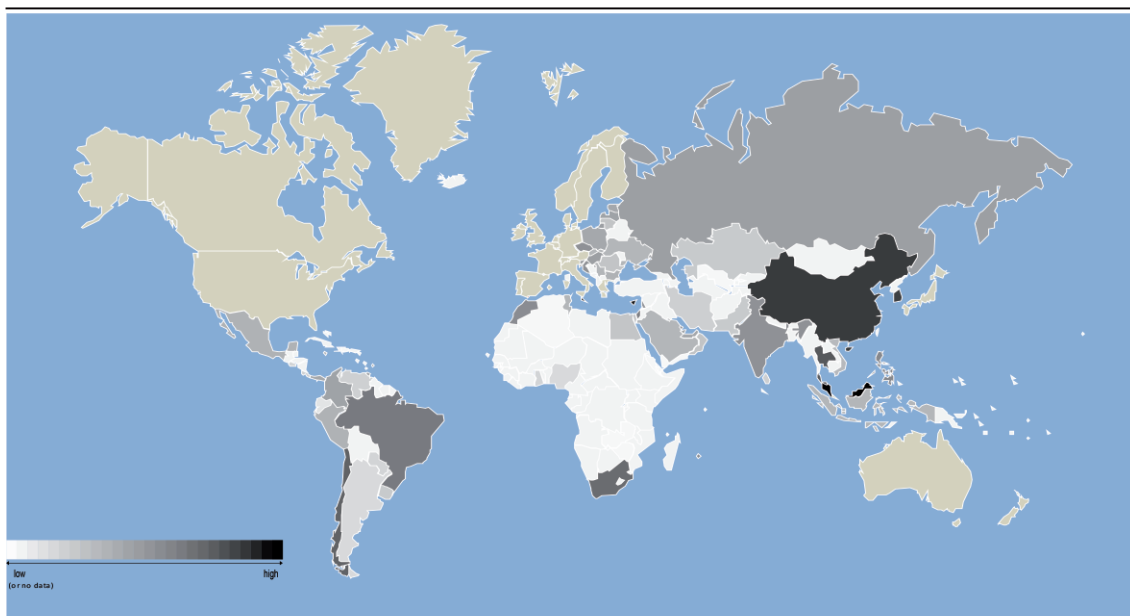
Emerging markets, leverage, flows, and importance of market-based financing

The degree of financialisation¹⁸ across EM differs from country to country. Figure 2 presents a heat map of financialisation for EM countries, extracted from a 2015 IOSCO Staff Working Paper on corporate bond markets.¹⁹ Financialisation tends to be concentrated in certain regions, in particular EM economies in the Asia region tend to rank higher on the financialisation index.

¹⁸ Financialisation is approximately measured through the use of an index (sum of bank assets, corporate bonds outstanding, and equity market capitalization, relative to overall as a percentage of GDP).

¹⁹ R. Tendulkar, "Corporate Bond Markets: An Emerging Markets Perspective," *IOSCO Research Department Staff Working Paper*, October 2015.

Figure 12: Emerging market financialisation index heat map (emerging markets only)



Source: R. Tendulkar, "Corporate Bond Markets: An Emerging Markets Perspective," *IOSCO Research Department Staff Working Paper*, October 2015.

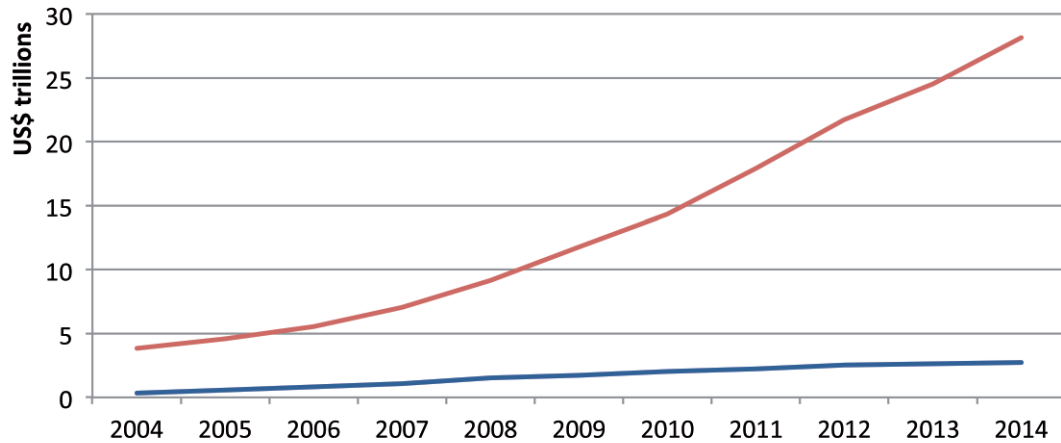
Note 1: On the basis of data from HelgiLibrary (bank assets--in cases where data are not complete, data are extrapolated from available data to produce figure for 2013); IMF (GDP); World Bank (Equity market cap); BIS, Dealogic, internal IOSCO data collection exercises, and local authorities (corporate bonds outstanding).

Note 2: Data are as of 2013.

Note 3: Advanced economies (AEs) are noted by tan color – that data not included in heat map. As such, colour coding should not be taken as an indication of globally relative 'size' of markets.

Nevertheless, despite varying levels of financial sector depth across EM, a distinguishing factor in global markets today is the general increase in leverage across EM. For example, in terms of total debt, China's bank assets have more than tripled since 2008, totalling approximately \$28 trillion in 2014 (see Figure 13). The number of China's corporate bonds outstanding has almost doubled since 2008 to \$2.7 trillion in 2015.

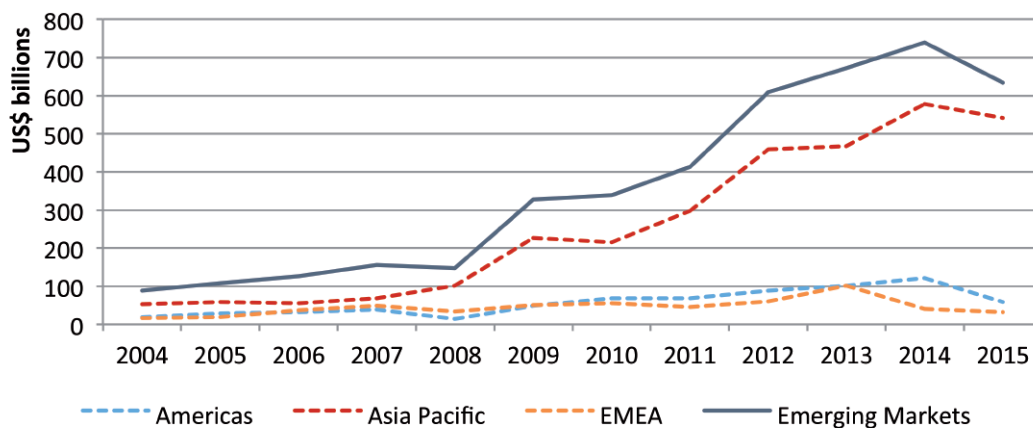
Figure 13: China – Bank assets and corporate bonds outstanding



Source: Data derived from 2004-2012 (HelgiLibrary); 2013 CBRC; 2014 Statista.

As to the nonfinancial economy only, in its October 2015 *Global Financial Stability Report*, the IMF notes that “the corporate debt of nonfinancial firms across major emerging market economies quadrupled between 2004 and 2014. At the same time, the composition of that corporate debt has been shifting away from loans and towards bonds.”²⁰ In fact, corporate bond issuance across EM nonfinancial firms increased more than seven times from \$88.4 billion to \$739.4 billion between 2004 and 2014 (Figure 14). Most of this growth has been driven by EMs in the Asia Pacific Region; however, the increasing trend is observable across the Americas and Europe, the Middle East, and Africa. However, between 2014 and 2015, nonfinancial corporate bond issuance in EM declined 14% to \$633.7 billion.

Figure 14: Nonfinancial corporate bond issuance in emerging markets

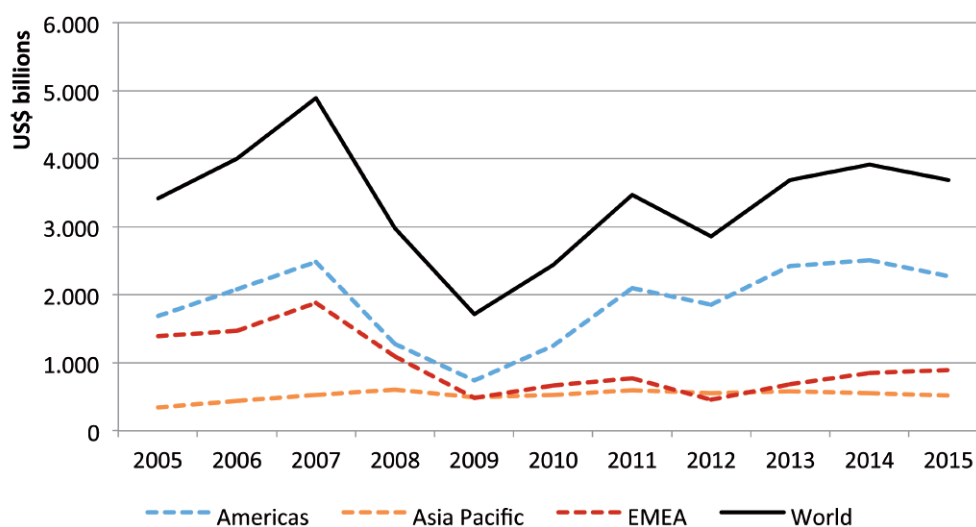


Source: Dealogic figures end 2015

20 IMF, “Vulnerabilities, Legacies and Policy Challenges: Risks Rotating to Emerging Markets,” *Global Financial Stability Report*, October 2015.

Another notable trend is the origination of tradeable loans in EM. In 2015, origination of tradeable loans across EM reached \$626 billion (see Figure 15). While these loan volumes dropped in the immediate aftermath of the crisis, they have been growing since then and have now surpassed the peak reached in 2007 of \$574 billion. This expansion suggests a deepening of financial markets and, combined with the growth in corporate bond issuance, underscores both increasing leverage and the growing importance of market-based financing in EM.

Figure 15: Tradeable loan issuance, emerging markets



Source: Dealogic

The Institute of International Finance (IIF) reports that capital flows to EM have entered negative territory at the end of 2015.²¹ While leverage is increasing in emerging markets, GDP growth has been on a declining trend. Underpinning this context are push factors (low yields in advanced economies) and pull factors (higher yields and improving fundamentals in EM), which have combined to increase foreign investment into EM asset classes. This has contributed to the increased exposure of EM to global economic, financial, and policy developments and concerns over the ability of some EM to service their debt, as economic conditions and yields pick up in the rest of the world.²²

c. Technology and digital disruption

Securities markets continue to increase their use of technology. Change brought about by technological revolution is often referred to as “digital disruption.” In 2014, Forrester Research interviewers found that 93% of executives noted that their industries would experience digital disruption in 2014.²³ While technological innovation in the financial system may refer to how technology can be used to *improve* the current way of doing things, digital disruption often refers to how technology can fundamentally *change* the current way of doing things.

²¹ IIF, *Capital Flows to Emerging Markets*, 19 January 2016.

²² The previous two editions of the Outlook have analysed, in depth, risks associated with cross-border flows, or more specifically, a potential reversal of capital flows. In addition, the IOSCO Research Department released a staff working paper analysing developments and risks associated with corporate bond markets in EM. See R. Tendulkar, *op. cit.* October 2015.

²³ N. Fenwick and M. Gill, *The Future of Business is Digital*, 10 March 10.

Given the penetration of technology into our everyday lives and into how financial markets operate, understanding technological innovation and digital disruption is a critical step, going forward, in understanding the changing risk landscape for securities markets. Between 2005 and 2015, the percentage of the global population that had access to the internet has tripled to a total of more than 3 billion people.²⁴ Projections indicate that by 2017, 2.55 billion of the world's population will be using the global online social network, which is also an increasingly important communication tool for market participants.²⁵ Furthermore, in 2015, Smartphone usage reached 1.9 billion people.²⁶ Financial firms' reliance on technology is also evident as global investment in financial technology ventures has more than tripled from less than \$1 billion in 2008 to almost \$3 billion in 2013.²⁷

From a *business perspective*, the focus is on how new technology changes the competitiveness and value of existing business models and financial goods and services. Questions that stem from this perspective include these three: What goods and services will new technology make obsolete?; How should I change my business model to remain competitive?; What opportunities do these new technologies afford me to improve my business, and what are the risks involved?

A study by Oliver Wyman notes five main areas of innovation that might potentially disrupt the financial services industry. The five areas noted are: (1) account services; (2) payments; (3) financing; (4) investment; and (5) business services.²⁸ Some concrete examples of channels for disruption in securities markets include those listed below.

- > ***The increasing entrance of technology firms such as Google and Facebook into the financial services segment***, e.g. through online payment systems and the potential for traction in other financial activities such as asset management. In Asia, Alibaba and Tencent, online payment services, are distributing asset management products. Yu'e Bao fund platform from Alibaba's Alipay service has grown into the largest money market fund in China with a value of \$81 billion in 2014.²⁹
- > ***Smartphone "Finance Apps."*** Smartphone "Finance Apps" have proliferated, but there are also financial services available that allow individuals to do financial transactions using a non-Smartphone. For example, almost two-thirds of the population of Kenya use the M-Pesa mobile payment service,³⁰ which was introduced in that country in 2007. That service has since spread through the African continent, as well as in Asia and Europe.
- > ***Equity crowdfunding and peer-to-peer lending platforms.*** Such platforms are offering an alternative financing channel to small-size and medium-size businesses.³¹
- > ***Robo-advice for investment.*** Robo advisers are automated financial advice robots which draw information on a client and suggest an ideal investment or investment portfolio based on an algorithm, without the need for human financial planners.

24 Data as of November 2015, Internet usage information come from data published by Nielsen Online, by the International Telecommunications Union, by GfK, by local ICT Regulators and other reliable sources. Data obtained from www.internetworldstats.com

25 Accenture, Statistics

26 eMarketer; AP (see: <http://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>)

27 Accenture, Statistics

28 The Digital Disruption Battlefield. Winning in a Time of Change, 2015

29 Deloitte, 2014.

30 This system works on a regular cell phone (rather than a Smartphone) and allows individuals to transfer money to another user or non-user through texting.

31 E. Kirby and S. Worner, *op.cit.*

- > ***Distributed ledger technology.*** Distributed ledger technology (also known as blockchain), which also underpins virtual currencies such as Bitcoin, provides a number of avenues for innovative disruption. A distributed ledger is a record of digital events that is made robust through being shared between multiple parties in distributed ledgers. This technology could be used to change a variety of financial market activities, including settlement and payments systems.
- > ***Big data analytics.*** According to IBM³³, 90% of the world's data have been created in the last 2 years. It is estimated that data, including transactional data from financial and nonfinancial firms, are being generated at 2.5 quintillion bytes of data a day. The field of big data is one that acknowledges the vastness and complexity of the data, especially in terms of managing it, and attempts to interpret and derive value from it. Big data are increasingly being used in decision making, marketing, and innovation in all segments of the economy, including financial services.

Digital disruption offers to the financial markets some potential benefits, which might appear obvious. Examples include these positive effects: economic efficiencies through scale effects; availability of “better” information to support market participants and regulators; increasing financing channels for the real economy and reduced concentration; and increased financial inclusion and accessibility of services with lower cost. However, it is also important to consider the potential risks and vulnerabilities of digital disruption.

The following factors could potentially present risks and vulnerabilities as a result of digital disruption: (1) the concentration on usage of very specialized technological systems. For example, only a few providers in the world produce high-frequency trading (HFT) cables, which connect traders to exchanges. If these providers are breached in some way, numerous firms would be vulnerable; (2) the increasing complexity introduced by digital disruptors. This complexity may be difficult for investors, supervisors and/or regulators to disentangle; (3) the ambiguity of law surrounding digital disruptions. The pace of advancement can be difficult to keep up with, resulting in certain new financial products and activities entering the markets without regulatory oversight; (4) investor misunderstanding of the risk designs and limitations of innovative investment tools such as robo advisers; and (5) new forms of harmful behaviour facilitated through innovation in digital channels, e.g., cybercrime and market manipulation through propagation of rumours via social media platforms and online chat rooms dedicated to trading activity.

From a regulatory perspective, digital disruption may impact the objectives of investor protection and also affect market development and efficiency. The mitigation of systemic risk in securities markets raises questions about technology different than those coming from a business perspective, such as the following: How is technology facilitating/suppressing the sound growth of financial markets? How can we ensure that the increased financial access that technology affords does not come at the price of investor protection? How is technology increasing the global interconnection of financial markets, and do we need to change how we think about contagion risk? What kinds of product innovations does technological integration support, and are monitoring and surveillance technologies able to keep up? The new forms of harmful behaviours facilitated by digital innovations are especially relevant, considering the increasing cyber risk facing securities markets, and the way the securities regulators deal with these risks. These issues are discussed in more detail in *Chapter 6*.

³² <http://www.forbes.com/christopherfrank/2012/03/25/improving-decision-making-in-the-world-of-big-data/#3f05dd094b4d>

³³ According to the McKinsey Global Institute, Big Data can be defined as “large pools of data that can be captured, communicated, aggregated, stored and analysed.”

3. CORPORATE BOND MARKET LIQUIDITY

Introduction

As discussed, accommodative monetary policies have driven down real interest rates and reduced borrowing costs associated with issuing corporate bonds. In the previous edition of the Outlook, it was noted that these forces have contributed to a global search for yield. This search for yield reverberates strongly in corporate bond markets, with primary market issuance showing strong growth in some regions as strong demand has pushed down costs, especially in some advanced economies.

Some analysts have noted that secondary markets for corporate bonds are not keeping up with this growth, resulting in deteriorating secondary market liquidity conditions.³⁴ Assessing this concern proves difficult since long series and global data on secondary market trading of corporate bonds are scarce or non-existent, and interpretation of standard liquidity measures sometimes reveals contradicting results. Nevertheless, this chapter of the Outlook presents some available data to shed light on this issue.

Understanding the risks

With growth in the primary corporate bond markets, there is some concern about whether secondary market liquidity is prone to evaporation and, going forward, whether the secondary market structure will be able to handle periods of market stress. This issue could be especially salient in the event of significant interest rate increases, where investor's bonds will depreciate in value.³⁵ If investors are well-informed, experienced, and have diversified or hedged their risks properly, liquidity pressures resulting from interest rate hikes—on their own—are unlikely to pose a systemic risk or introduce investor protection issues. Nevertheless, there is concern that if secondary market liquidity is low, sellers will face difficulties in selling their devalued bonds to new investors. If there is a widespread sell-off, and not enough buyers in the system to absorb this outflow, some commentators speculate a “run” scenario where prices are pushed further down as bondholders and funds compete to offload their devalued bonds on an illiquid market.

³⁴ PricewaterhouseCoopers (PwC), *Global Financial Market Liquidity Study*, August 2015;

--H. Chien and W. Rhode, *Real-time corporate bond prices: Panacea or Pipedream*, TABB Group, April 2013;

--BlackRock, *Setting New Standards: The Liquidity Challenge II*, May 2013;

--T. Adrian, M. Fleming, J. Goldberg, M. Lewis, F. Natalucci, and J. Wu, “Dealer Balance Sheet Capacity and Market Liquidity during the 2013 sell-off in Fixed Income Markets,” *FEDS notes*, October 2013;

--N. Panigirtzoglou, S. Mac Gorain, M. Lehmann, J. Vakharia, *Flows & Liquidity: How liquid are corporate bonds?*, JP Morgan, 12 July 2013; and

--M. King, *Back to black: Positioning for the wrong sort of recovery*, Citi Research, October 2013.

³⁵ This is generally true with some exceptions. If the interest rate increases alongside better economic growth expectations, high yield bonds could show an increase in value. In this case the expectations of lower default outpace the effect of the increase in the interest rate.

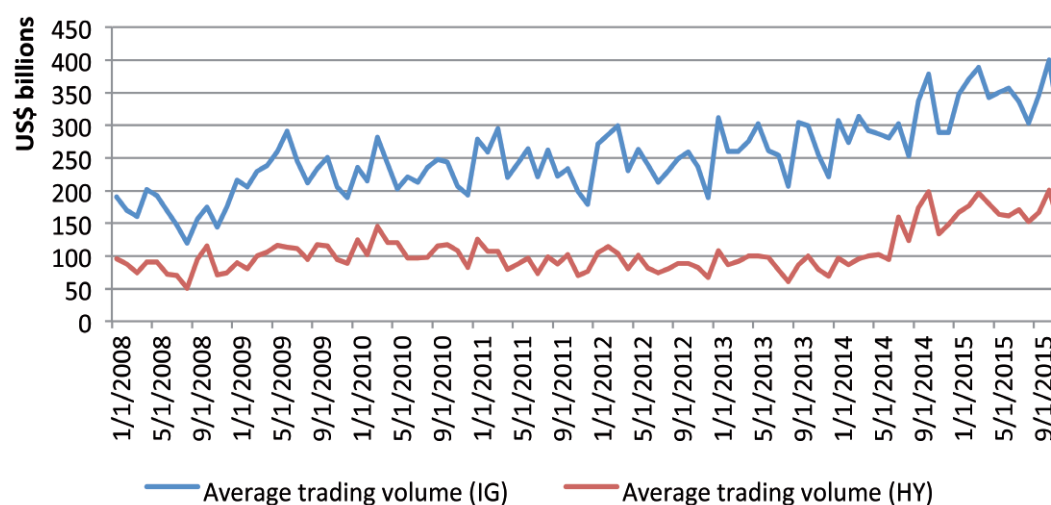
There are a number of measures of secondary market activity, such as the following ones, that can provide insight into the current size, functioning, and liquidity of corporate bond secondary markets:

- 1) trading volume;
- 2) the bond turnover ratio;
- 3) dealer inventories of corporate bonds;
- 4) the bid-ask spread and price impact; and³⁶
- 5) the trade size.

Trading volume

Data on secondary market trading of corporate bonds on United States and European secondary markets are provided by MarketAxess. It is important to note that trading volume does not take into account growth or decline in primary markets (the supply of bonds in secondary markets) and therefore is not generally a good proxy measure of overall liquidity. Nevertheless, trading volume can provide insight on the size of, and activity on, secondary markets. Figure 16 shows that secondary market activity on U.S. markets has been growing since 2008. Trading in both investment grade and high yield bonds have increased by approximately 50%.

Figure 16: Trading volume of corporate bonds on U.S. secondary markets

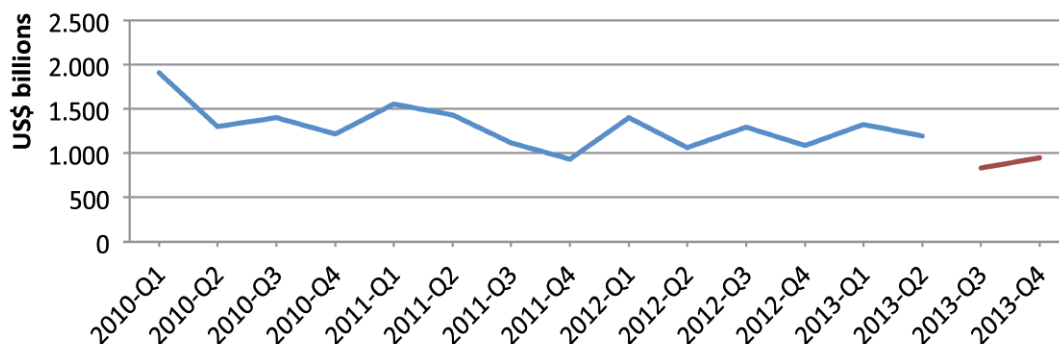


Source: TRACE data from MarketAxess.

Data on trading activity on European secondary markets are less complete. Figure 17 shows corporate bond trading activity on European markets since 2010. Growth in activity has been slowing down since inception of the data. In 2013 Q3, the methodology was changed to avoid double counting, resulting in a drop in volume towards the end of the line chart.

³⁶ The bid-ask spread is a measure of the cost of demanding liquidity.

Figure 17: Trading volume of corporate bonds on European secondary markets

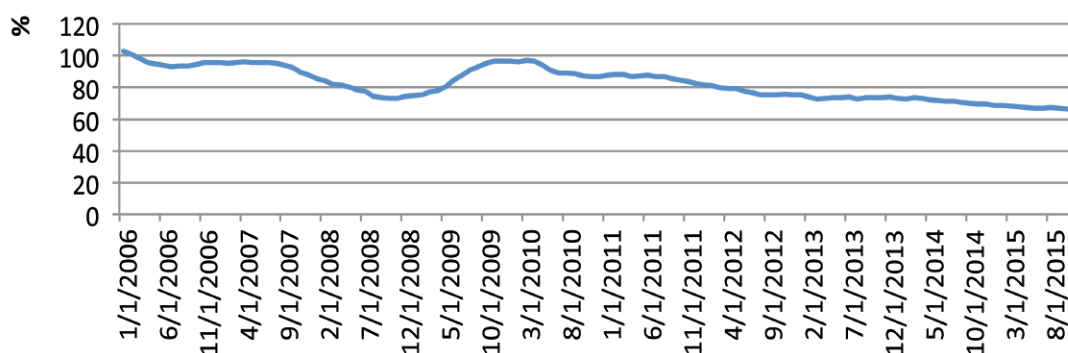


Source: TRAX a subsidiary of MarketAxess

Bond turnover ratio

Figure 18 shows that the bond turnover ratio has been on a decreasing trend in U.S. secondary markets since 2010. As shown in Figure 16 trading in secondary markets (trading volume), has grown around 50% since 2008; but this growth is relatively smaller than the large increase in the size of the primary market (outstanding). The data thus suggests that the declining bond turnover ratio, therefore, is not so much attributable to “less secondary market activity” as it is to primary market growth outpacing secondary market trading volume because of market conditions promote primary issuances.

Figure 18: Annual bond turnover (12-month rolling turnover)



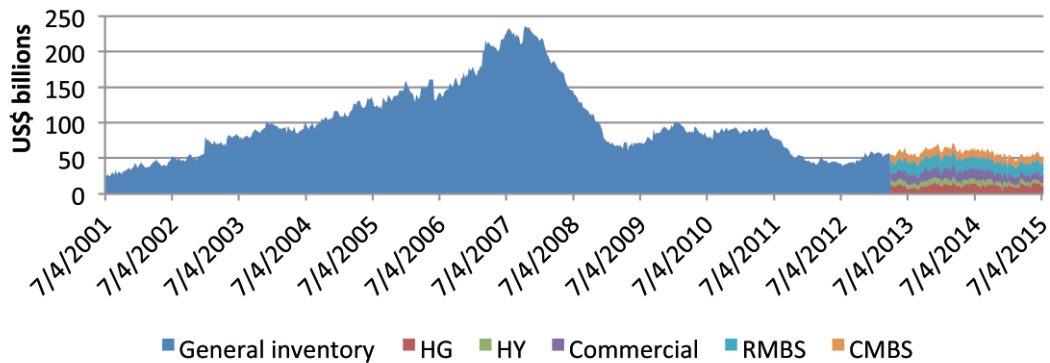
Source: MarketAxess

Dealer inventories of corporate bonds

Dealer banks, particularly in the United States, have traditionally engaged in market-making in the secondary corporate bond market. When it suits their risk appetite, dealers may actively take on the bonds that investors wish to sell and hold them until they can find a buyer. For this reason, dealer “inventories” of corporate bonds are sometimes used as a measure of secondary market liquidity and functioning of corporate bond secondary markets.

Data on U.S. dealer credit net positions show a rapid decline since the 2008 financial crisis. However, it is not clear from this data what proportion of this net position pre-crisis was accounted for by corporate bonds. Figure 19 below presents data on dealer net positions, with a breakdown of components, beginning in 2013.

Figure 19: Dealer credit net positions – U.S.



Source: Federal Reserve Bank of New York

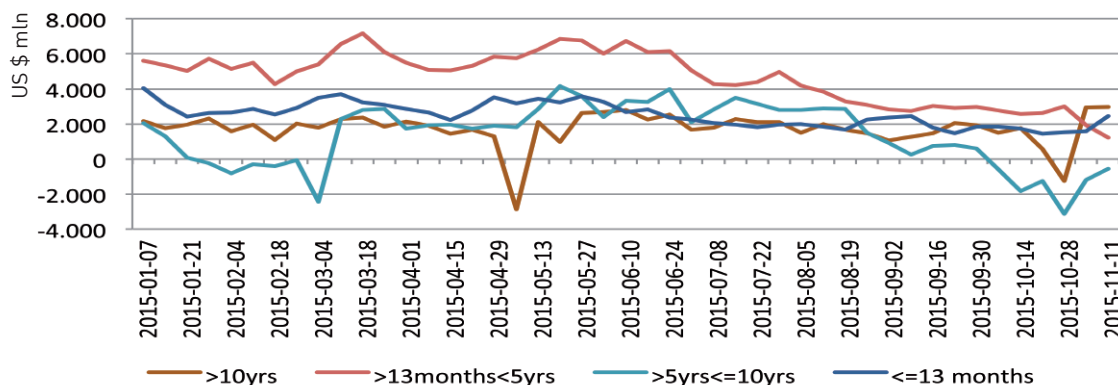
In the report *Corporate Bonds: A Global Perspective*,³⁷ the authors noted that the data on net positions pre-2013 include other types of corporate credit, such as asset and mortgage backed securities, issuance of which declined rapidly after the onset of the crisis and as new regulations were introduced. This follows a trend similar to the decline in dealer net positions.

In Q4 2015, dealer inventories dropped into negative territory for corporate bonds (with maturity of 5 years) (see Figure 20). This suggests a shift in market structure. For example, this trend may suggest that while there is demand to buy bonds in the secondary markets (hence negative dealer inventories), dealer banks themselves may be moving from a more principal based trading model, where they put their own capital at risk, to a more risk-less principal or agency approach, negating the need to hold large inventories of bonds.³⁸

³⁷ R. Tendulkar and G. Hancock, "Corporate Bond Markets: A Global Perspective," *IOSCO Research Department Staff Working Paper*, 2014.

³⁸ The numbers also aggregate inventories across the banks. It may still be true that market-making desks within a bank have strong positive inventories, but these inventories are offset by large short positions at other desks within the bank.

Figure 20: U.S. primary dealer net positions of investment grade corporate bonds, notes, and debentures post-january 2015

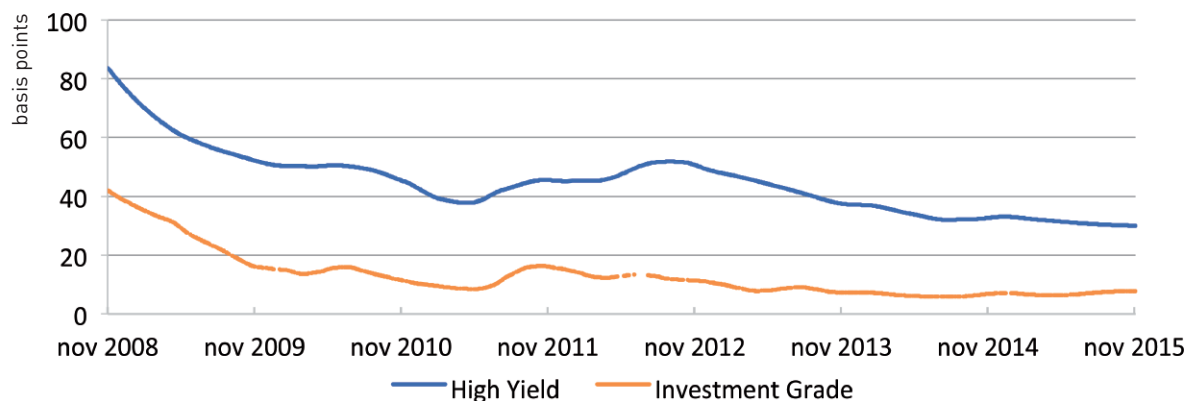


Source: Federal Reserve Bank of New York

Bid-ask spread and price impact

Liquidity in secondary market corporate bond markets does not appear to be reduced, as measured by bid-ask spreads and price impact from November 2008 to November 2015. Bid ask spread and price-impact measures on U.S. secondary markets have actually tightened and declined, respectively, since 2006. Figure 21 shows that bid ask spreads for both high-yield and investment grade corporate bonds have been on a declining trend since 2008.

Figure 21: Bid-ask spreads



Source: Data from MarketAxess; Chart from the investment Company Institute

A price impact measure in U.S. corporate bond secondary markets, calculated by the New York Fed suggests that “price impact has been declining since the crisis and is now well below pre-crisis levels.”³⁹ While tightening bid-ask spreads suggests less incentive for dealer banks to make markets, they also suggest that liquidity is indeed being provided, which is further confirmed by the low-price-impact measure.

39 T. Adrian, M. Fleming, O. Shachar and E. Vogt, “Has U.S. Corporate Bond Market Liquidity Deteriorated?” *Liberty Street Economics*, October 2015.

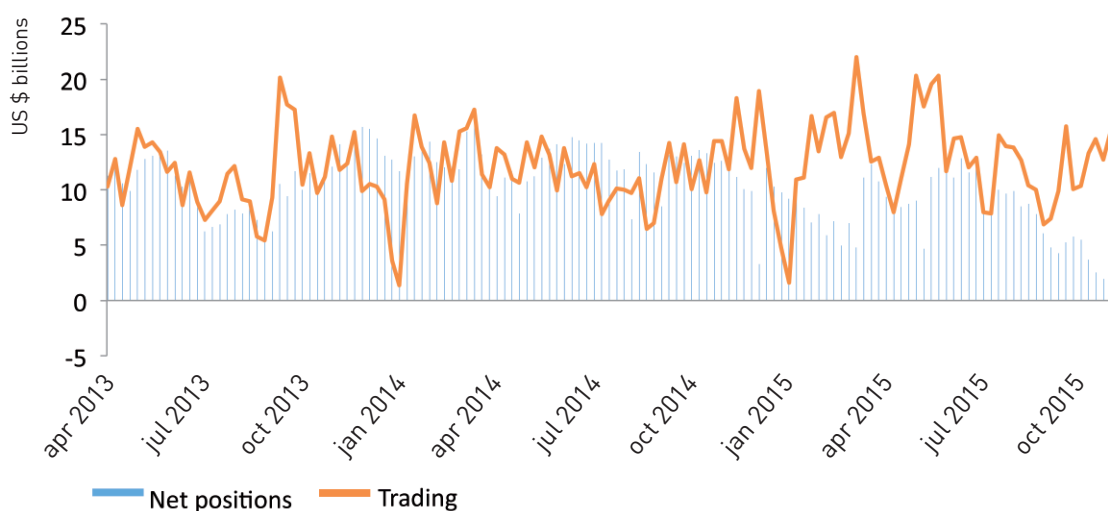
Assessing the risk

Traditional measures of corporate bond secondary market liquidity do not provide a consistent picture of current conditions. The low interest rate environment is encouraging issuance in the primary market, while dealer banks appear to be transitioning from a principal model to an agency model.⁴⁰ Both these factors make it difficult to draw conclusions when comparing current liquidity conditions with pre-crisis liquidity conditions and, more importantly, to extrapolate current liquidity conditions into the future.

In terms of unusually favourable primary market growth conditions, the current low interest rate environment has contributed to a surge in primary issuance of corporate bonds. (The low interest rate environment corresponds to low borrowing costs for firms, making issuing debt favourable to issuing equity).⁴¹ The large size of the primary markets can bias secondary market liquidity indicators such as “the bond turnover ratio.” As interest rates normalise, the comparative borrowing cost of issuing debt for a firm may increase relative to issuing equity, making IPO offerings favourable to issuance of corporate bonds and thereby increasing indicators such as the bond turnover ratio. If the surge in new corporate bond issuances slows, investors wishing to invest in bonds may increasingly have to turn to the secondary market.

In terms of changing market structure, it appears that dealer banks are stepping back from their market-making role. However, it is not clear that liquidity in corporate bond secondary markets is in fact declining. Traditional liquidity measures such as the bid-ask spread and price impact suggest that liquidity has improved compared to pre-crisis times. Interestingly, there appears to be a decoupling between net dealer inventories and trading on the secondary market (see Figure 22). Data obtained from the Investment Company Institute (ICI) reports that correlation has dropped to -0.03. Since January 2015 there have been clear blocks where the trend in trading activity and the trend in dealer inventories have moved in opposite directions.

Figure 22: Net dealer inventories of corporate bonds vs. secondary market trading



Source: ICI

⁴⁰ International Capital Markets Association, *The Current State and Future Evolution of the European Investment Grade Corporate Bond Secondary Market: Perspectives from the Market*, November 2014.

⁴¹ This may also relate to tax arbitrage.

Thus, while dealer banks may be stepping back from their market-making role in corporate bond secondary markets, constituting a fundamental shift in market structure, it is not clear that liquidity is in fact being critically affected. However, some commentators point out that while liquidity may not be in decline currently, it may be prone to evaporation.⁴² At the same time, other actors may be stepping in to provide liquidity; looking forward, electronic trading and other alternative trading mechanisms may provide a way to facilitate liquidity provision in the market during stressed and normal conditions, with regards to corporate bond markets. For example, during the taper tantrum of 2013, electronic trading volume of corporate bonds spiked.⁴³ On the other hand, recent liquidity episodes in other markets, such as equity (for example high frequency trading)⁴⁴ and government debt securities (for example US Treasury markets in October 2014),⁴⁵ draw a more mixed picture when discussing the benefits of electronic trading to facilitate liquidity during periods of market stress.

Box 1: Nature of corporate bond market liquidity

Corporate bond market liquidity has always been thin, relative to the more active secondary markets of equity and government bonds. There are several reasons that may account for this.

Two main reasons relate to “lack of standardisation” and “the nature of investor strategies.”

A lack of standardisation of corporate bond is driven by the ability to be tailored to the specific needs of the issuing firm. Unlike equity securities, which are more standardised, corporate bonds have varying issue dates, maturities, contractual terms, and yields. In fact, one single firm may have a significant variety of different corporate bonds on the market at any one time. Although the different features of debt contracts are designed optimally for each firm, as a consequence, this feature of the bond market contributes to a lack of standardisation – hindering trading, especially via electronic trading platforms. Furthermore, the lack of standardisation may encourage liquidity to be provided via newer issuances, resulting in newer issuances trading more often than older ones and leading to less liquid secondary corporate bond markets.

In terms of the nature of investment strategies, from an investor perspective, corporate bonds represent a financial instrument that can provide a stable and continuous cash flow. Barring default, corporate bonds promise a yield until maturity and eventual repayment of principal to the investor. If default occurs, bondholders are paid out before equity holders. This structure differs from equity markets, where a liquid secondary market is a more significant component of investment decisions, since dividend payments can be reduced or withheld and there is no guarantee of return on investment or principal repayment.

⁴² See for example, IMF, ‘Market Liquidity Not in Decline, but prone to Evaporate’, in *Global Financial Stability Report*, September, 2015

⁴³ *Ibidem*

⁴⁴ Securities and Exchange Commission, & Securities and Exchange Commission. (2010). Findings regarding the market events of May 6, 2010. Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee on Emerging Regulatory Issues (<https://www.sec.gov/news/studies/2010/marketevents-report.pdf>).

⁴⁵ A.Bouveret, P.Breuer,Y.Chen, D.Jones, T.Sasaki (2015), “Fragilities in the U.S. Treasury Market:Lessons from the “Flash Rally”of October 15, 2014”, *IMF Working Papers*, October 2015

Investors in corporate bonds include mainly institutional investors such as pension funds, insurance funds, and mutual funds. To a lesser extent, individual retail investors may invest in certain types of corporate bonds. Investors in equity markets include venture capitalists; angel investors; private equity, high-income, sophisticated individual investors; and retail investors. Different strategies limit the demand for secondary trading.

Therefore, in assessing the risks in the corporate bond secondary markets, a number of issues that may be taken into account including (1) the ambiguity of data and interpretation of trends; (2) the impacts of a changing market structure; (3) abnormal primary market growth conditions; and (4) the historically thin liquidity in corporate bond secondary markets due to the nature of the market.

Looking forward

If interest rates rise, the market value of a held bond will generally decline. If secondary market liquidity conditions are reduced, investors wishing to mitigate interest rate risk may be unable to sell the bonds they previously acquired and reinvest at the higher interest rate, constituting a monetary loss. However, at the same time, as interest rates rise, the relative price of previously acquired bonds will decline, which may encourage other investors (e.g., hedge funds) to provide liquidity to the market by absorbing these “cheap” bonds that other investors wish to sell. These forces make it difficult to anticipate how investors will actually react to a further drop in liquidity and causes issues when trying to extrapolate current conditions to fit with potential systemic risk scenarios in more volatile times.⁴⁶

As mentioned, long-series, global data on secondary market size, functioning and liquidity are limited. Available secondary market data are largely U.S.-specific, and indicators used to measure liquidity factors are biased by current abnormal market conditions, making extrapolation to the likelihood of systemic risk scenarios difficult. Further data gathering and monitoring may help to better understand the state of global corporate bond markets and any investor protection, market efficiency, and systemic risk issues.

IOSCO, through its policy Committee 2 for secondary markets, is currently undertaking further work to access better data and acquire insights into secondary market liquidity. Furthermore, its Committee 5 on Collective Investment Schemes is assessing the role of asset management activities on secondary market liquidity.

46 C. Himmelberg and B. Bartlett, “Why market liquidity has deteriorated,” *Top of Mind*, Goldman Sachs, Issue 37, August 2, 2015.

4. RISK ASSOCIATED WITH USE OF COLLATERAL IN FINANCIAL TRANSACTIONS

Introduction

The use of collateral in transactions is not new. It has been a long-standing practice in many financial transactions to ensure protection against counterparty risk. Collateral has become more important, though, in post-crisis financial markets. Because unsecured transactions in the interbank market have fallen, secured transactions have become an important source of liquidity and essential for the smooth operation of global capital markets.

Many regulatory reforms, such as the Dodd-Frank Act⁴⁷ and the European Market Infrastructure Regulation (EMIR),⁴⁸ now demand the use of collateral to mitigate counterparty risk in OTC transactions. Additionally, the securities industry has driven the need for collateral for more secured funding to help mitigate credit risk. With the new regulatory requirements on capital and leverage under Basel III,⁴⁹ it is more important for banks to hold a greater supply of more liquid assets. Collateral is the main risk mitigation tool throughout the financial system and is the foundation for many transactions such as those listed below.

- > funding by banks from central banks, other banks, and broker dealers;
- > regulatory capital requirements for transactions under, for example, Basel III;
- > funding by fund managers via prime brokerage firms;
- > derivatives transactions (through the posting of initial and variation margins for OTC and exchange traded derivatives transactions);
- > members' contribution to the CCP default fund; and
- > securities lending and repurchase agreements (repo).

This increased use of collateral to mitigate credit risk has led to some concerns that there may be a lack of sufficient high-quality collateral in the system to meet the increase in demand. There has been much written about the predicted imbalance between the demand for collateral and the supply of collateral.^{50 51} Consequently, this chapter does not focus on the risks such demand-supply imbalances entail. Rather, the chapter deals with the key characteristics of collateralised transactions and the key risks that such transactions bring to market participants and the system as a whole. We also examine the latest trends and innovations in collateralised transactions. Finally, we conclude our discussion with a call for increased data collection to enhance transparency.

47 Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203 (2010).

48 Regulation (EU) 648/2012.

49 In 2010-11, the members of the Basel Committee on Banking Supervision agreed on a global, voluntary regulatory framework on bank capital adequacy, stress testing, and market liquidity risk, known as The Third Basel Accord or "Basel III."

50 I. Fender and U. Lewrick, "Mind the Gap? Sources and implications of supply-demand imbalances in collateral asset markets," *BIS quarterly report* (Q3 2013).

51 IOSCO, *Securities Markets Risk Outlook 2013-14*, 2013.

Understanding the risk

As briefly touched on in last year's Outlook, innovative solutions for making collateral more mobile and accessible for obligations are important market-based initiatives that market participants are undertaking. These innovations include collateral transformation and upgrade, collateral arbitrage, reuse and rehypothecation, and collateral optimisation.⁵²

Collateral has become an important tool for refinancing as well as a method of mitigating counterparty risk exposure. Additionally, firms also recognise the profit potential of providing collateral services.⁵³ As a response to regulatory changes that are expected to increase the demand for high quality collateral, collateral management service providers have been developing a variety of service offerings in an effort to help alleviate collateral inefficiencies and mobilise other pools of collateral. The securities industry, too, is evolving to help address the regulatory needs of collateral requirements.⁵⁴ For example, some firms are centralising collateral management functions to achieve benefits such as:

- > more efficient identification of collateral pools within organisations;
- > better aggregation and inventory recording; and
- > better allocation to meet collateral needs and exposures.⁵⁵

The innovations occurring in collateral management have clear benefits for the markets, especially in boosting liquidity. They also have the potential to improve market efficiency and transparency. Further, better consolidation of information on available collateral will allow participants to mobilise available securities to: (1) more easily fulfil collateral obligations; or (2) undertake transactions to obtain better rates of return.⁵⁶

Figure 23: Collateral optimisation and transformation services and meeting collateral obligations



Source: IOSCO Research

⁵² IOSCO, *Securities Markets Risk Outlook 2014-15*, October 2014.

⁵³ International Swaps and Derivatives Association, *ISDA Margin Survey 2015*, April 2015. One-third of firms consider collateral management as a front office (and therefore a profit centre) activity and important enough that they manage their collateral in-house. Of responding firms, 34.8% reported that collateral management (including optimisation) was managed out of the front office, while 86.8% indicated that none of their collateral is managed external to the firm.

⁵⁴ Sapient Global Markets, *Collateral Optimisation: The Next Generation of Collateral Management*, 2015.

⁵⁵ Depository Trust and Clearing Corporation, "Trends Risks and Opportunities in Collateral Management," *Collateral Management White Paper*, January 2014.

⁵⁶ Committee on Payment and Market Infrastructure, *Developments in collateral management services*, 2014.

Collateral optimisation

Once inventory is catalogued and established, the collateral can be optimised. But collateral optimisation is only one of the many innovations or services taking place to help the securities industry manage collateral and ultimately meet collateral obligations. The need for collateral optimisation services has increased, as with movement towards a market ecosystem with the following characteristics:

- > a greater number of transactions are being centrally cleared (including repo transactions). An estimated 41.6% of OTC derivatives trades are now being centrally cleared;⁵⁷
- > cash and government securities are used as collateral in 90% of all uncleared OTC transactions;⁵⁸
- > increased use of collateral in uncleared transactions as a result of regulation; and
- > instances of increases in the price of collateral.

Historically sell-side firms have used optimisation tools to meet collateral needs in the financing of securities transactions. Put simply, collateral optimisation is the use of specific infrastructures and protocols that, once aggregation has taken place, allow market participants to maximise the effective and efficient use of their asset portfolio to meet collateral obligations. With collateral optimisation, assets are better sourced, priced, and allocated.

Another form of collateral optimisation is the use of alternative forms of collateral, or enhancing the list of eligible collateral. New forms of collateral have gained importance and popularity as beneficial owners have seen value in the premium available for accepting non-traditional collateral. For example, in 2014, the International Swap Dealers Associations (ISDA) reported that the use and acceptance of “other subcategories” of cash had grown, with the Australian and Canadian Dollars and the Swiss franc accounting for 80% of cash collateral received beyond the standard “G4” currencies.⁵⁹

Collateral transformation

When an entity cannot meet its collateral obligations with the portfolio of assets it holds, services such as collateral upgrade or collateral transformation can help satisfy those collateral needs. Collateral transformation/upgrade is a practice that the markets have been undertaking for quite some time.⁶⁰ Essentially, the collateral transformation process takes a pool of collateral that is available, but is ineligible (or not creditworthy) for regulatory purposes, and exchanges it for another pool of securities that meets the eligibility requirements of a firm’s collateral obligations.

There are many ways to achieve a collateral upgrade. A market participant could lend out corporate bonds and borrow a high-quality security, such as a government treasury bond. Similarly, a firm could repurchase the same corporate bond and then use it to purchase a high-quality eligible security.

Given the increased demand for high-quality collateral, it is likely that the demand for collateral transformation services will increase. Many organisations, including custodians, dealers, and settlement houses, are looking to offer collateral transformation or collateral upgrade services to their clients.⁶¹ Very little data exists on the demand for such services. The CPPI reported that “... interest in collateral transformation by market participants to meet increased collateral demands remains muted.”⁶²

57 Calculation based on data presented in BIS, *Regulatory reform of over-the-counter derivatives: an assessment of incentives to clear centrally*, 2014.

58 International Swaps and Derivatives Association, *ISDA Margin Survey 2014*, April 2014.

59 The G4 comprises the four central banks managing the currency blocks of nearly 85% of the capital markets that trade in the world. G4 currencies therefore include the Pound Sterling, Euro, U.S. Dollar, and Japanese Yen.

60 Committee on Payment and Market Infrastructure, *Developments in collateral management services*, 2014

61 M. Agami and C. Ding, *Cracking the Trillion Dollar Collateral Optimization Question*, Celent 2012.

62 Committee on Payment and Market Infrastructure, *Developments in collateral management services*, 2014

However, anecdotal evidence that the IOSCO RD gathered from several leading market participants suggests that their demand for collateral transformation services is on the increase due in large part to the banks' need to meet new capital charges requirements that were being implemented. Mandatory clearing requirements, which are expected to drive an increase in demand, had not been fully implemented at the time of writing, so we do not know the extent of the effects of those reforms on collateral needs; however, it is likely that these reforms will also affect the demand for collateral transformation service.

Collateral arbitrage

Collateral management is changing. Largely seen in the past as a cost centre of a firm, many firms are transforming their collateral management operations into front-end profit centres. Consequently, some market participants in the OTC derivative space have, in addition to implementing the collateral optimisation protocols mentioned above, also added an activity known as collateral arbitrage.

Collateral arbitrage takes many forms, but unlike traditional arbitrage activities that “lock in” a guaranteed profit, collateral arbitrage does not seek to gain profit from trading price differentials with little to no initial investment. Rather, collateral arbitrage seeks to transfer received collateral so that it covers a greater amount than the collateral posted.

The first, known as *classical collateral arbitrage*, occurs when a market participant takes in more collateral than it pays out. More specifically, such a transaction is achieved by an asymmetric agreement or market position where a participant, using its superior market position, insists on receiving more collateral from clients than it pays out for roughly the same transaction in the market place.

Genest, Rego, and Freon highlight an example of collateral arbitrage. In December 2009, Goldman Sachs' \$110 billion net collateral balance was almost three times the deposits at its regulated bank subsidiaries. This collateral could have earned the bank an annual return of \$878 million, assuming it was financed at the Fed funds effective rate of 0.15 % and reinvested in 2-year Treasury notes yielding 0.95% (at that time).⁶³ Bloomberg reported a second example of this, explaining that JPMorgan received cash collateral equal to 57 % of the fair value of its derivatives receivables after accounting for offsetting positions, according to data contained in the firm's most recent annual filing. It posted collateral equal to 45 % of the comparable payables, leaving it with a \$37 billion net cash collateral balance, according to regulatory filings at the time.⁶⁴

The second is referred to as “*back-to-back*” *collateral arbitrage*, where a firm takes a position on a collateralised product and simultaneously takes the opposite position on the same asset, which contains no collateral component.

Finally, the third refers to the use of *low-quality collateral being posted to central banks in return for larger amounts of liquidity*. In effect, small, weak banks are transferring credit risk to the central banks. For example, Fecht, et al. show that, in Europe, “systemic credit risk transfer” and, ultimately collateral arbitrage is funnelled to the central bank by low-quality collateral from weaker banks.⁶⁵ Nyborg attributes this to the collateral framework implemented in the European context.⁶⁶

Rehypothecation/reuse

Collateral received may have the right of reuse. Collateral reuse is common across the industry and serves an important role in reducing collateral funding costs.

63 B. Genest, D. Rego, and H. Freon, “*Collateral Optimization: Liquidity & funding value adjustments – best practices*,” MPRA paper No. 62908, 2014

64 Bloomberg, *Goldman Sachs Demands Collateral It Won't Dish Out*, 15 March 2010.

65 F. Fecht, K. Nyborg, J. Rochol, I and J. Woschitz, *Collateral, central bank repos, and systemic arbitrage*, 2015.

66 K. Nyborg, *Central bank Collateral Frameworks*, 2015.

Like many other activities taking place in the collateral space, the actual extent to which collateral is being re-hypothecated/reused is not clear. There are insufficient quality data on the use of it, compounded by the fact that measuring the so-called “chains” of collateral is problematic. However, recently ISDA reported that of the cash, government securities, and other assets pledged as collateral, cash was more likely to be rehypothecated (see Table 1).⁶⁷

Table 1: Amount of collateral assets received: eligible vs. actually rehypothecated

	Cash	Govt. securities by issuer	Other securities
Total received (\$US mil)	855,508	155,059	109,629
Eligible to rehypothecate	91.6%	77.7%	53.2%
Actual rehypothecation	82.2%	52.8%	26.9%

Source: International Swap Dealers Association - Margin Survey 2015

Assessing the risk

Collateral is important in mitigating against counterparty and credit risk; reducing investor risk aversion; and ensuring an efficient operating financial system. However, using collateral is not entirely without risks. Below is a discussion of risks that are inherent in using the collateral. Gaining a full understanding of the risks inherent in use of the collateral is challenging, though, mainly due to the piecemeal nature of data collection in this area, if data is collected at all.

Risk transfer through and over-collateralisation in collateralised transactions

The risk profiles of collateral received and posted differ greatly. Cash is risk free but underpins more than 70 % (see Table 2) of received and delivered collateral transactions, while the risk profile of the security on the other side of the transaction is not risk free. This is not necessarily a problem where transactions are over-collateralised to compensate for such differences in risk profiles and the uncertainty in the pricing of the underlying collateral asset, but the practice of over-collateralisation itself poses some interesting issues.

Table 2: Composition of collateral received and delivered against non-cleared OTC derivatives transactions 2014 in US \$ billions

Type of collateral	Delivered	Received
Cash	767.6	603.0
Gov. securities	134.0	139.9
Other securities	100.8	33.6
Total	1002.4	776.5

Source: International Swap Dealers Association - Margin Survey 2015

⁶⁷ International Swaps and Derivatives Association, *ISDA Margin Survey 2015*, August 2015.

Collateral specifically converts counterparty and credit risk into liquidity risk. These are the potential risks involved with collateral:

- > the market risk of an adverse movement in the price of an asset accepted as collateral because of factors occurring between the last collateral valuation and its realised value; and
- > the inability to liquidate collateral in event of default by the borrower.

With over-collateralisation, the receiver of collateral has its risk reduced by the collateral from the deliverer. The deliverer of collateral (with title transfer) now has a claim for the excess collateral posted. So, in effect, the exposure is now flipped.⁶⁸ But a true assessment of the risk profile differential and the extent of over-collateralisation are hampered by a lack of quality data in the area.

Risks associated with collateral innovations

One of the innovations underlined previously was *collateral transformation*, the act of swapping lower-grade assets, ineligible as collateral for higher quality assets, for a fee. An obvious consequence of collateral transformation is that it increases the linkages in the financial system and thus in effect replaces firm-specific, idiosyncratic risk with contagion and systemic risk.⁶⁹ While lessening the probability of collateral shortages of high-quality eligible assets, it comes at a cost of increased interconnectedness through securities lending and repo transactions and other transformation services.⁷⁰

Alternatively, when viewed systemwide, a collateral transformation really just represents a zerosum game rather than a financial engineering activity. It adds no value in aggregate. It might even detract from such value by masking opaque risks that would otherwise be more immediately apparent and by raising asset encumbrance.

Increasing asset encumbrance can also mask risk, making risk assessment of a potential transaction more difficult for investors. Not understanding which assets and how many assets are encumbered as part of the creditor hierarchy and not being able to price and understand the underlying balance sheet of financial entities can impede investors in making a proper investment choice.

Additionally, the timing of the collateral upgrade trade is normally different than the underlying transaction it is financing. Hence, there is an element of rollover risk being introduced into such transactions. For example, in a report in 2014 the Bank for International Settlements (BIS) highlighted that the timeframe for repo transactions before the crisis was typically 1 to 2 weeks. Consequently, the transaction and the assets used to finance the trade did not change for the duration of the deal. However, since the crisis the timeframe of securities lending and repo trades has been extended to 30 days and beyond. In such a scenario, the assets that finance a trade could change a number of times throughout the life of a transaction.⁷¹

As to *collateral optimisation*, with the increasing widespread use of automated optimisation systems, eligible but lower-quality collateral might be provided to meet obligations. This is because these automated systems operate under a “cheapest-to-deliver” algorithm.⁷² Under such a scenario, the automated system will post the cheapest, and therefore lowest quality, eligible collateral to fulfil obligations. This creates two potential problems. First, in this circumstance, transactions are collateralised with lower quality along with higher quality assets; and second, in periods of stress lower quality collateral is more susceptible to liquidity issues, higher volatility, and, therefore, price swings. Thus, an accurate pricing of the collateral may not be straightforward.

68 D. Murphy, “The risks and roles of financial collateral,” *Journal of International Banking and Financial Law*, 2014.

69 Eurofi, *Addressing the risks and mobilisation challenges of expanding collateral use and reuse*, April 2014.

70 Bank for International Settlements, *Asset encumbrance, financial reform and the demand for collateral assets*, CGFS papers, no. 49, 2013.

71 Committee on Payment and Market Infrastructure, *Developments in collateral management services*, 2014.

72 “Cheapest-to-deliver” is a computer algorithm that uses the lowest cost collateral in an available pool to fulfil an obligation.

Finally, with an increase in the use of automated collateral optimisation systems, there is an increased operational risk because of the inherent complexity and volume of collateral transactions.⁷³ This can be magnified if firms use multiple custodians for the holding and cataloguing of collateral.

Lack of effective coverage of procyclicality issues in recent regulatory reforms

During periods of market stress, there is an increase in the use of collateral underlying transactions. This is only natural since collateral is a hedge used to avert risk. An example of this during the financial crisis was when the issuance of covered bonds spiked because of increased risk aversion. Hence, there are procyclical effects associated with collateral, which under certain scenarios could amplify stress in the system.

There are three ways that procyclical effects can occur: (1) through the exclusion of certain assets from the pool of eligible collateral during times of stress, thus increasing demand for other eligible collateral in a time when it is scarce; (2) through higher “haircuts”⁷⁴ on collateral assets as counterparty risk is on the rise, meaning more collateral needs to be posted for any given transaction; and (3) through increased margin requirements on centrally cleared and non-centrally cleared OTC derivatives to cover increased counterparty risk and volatility. Many have written about the procyclicality in margin calls and in collateral haircuts. Therefore, we will not focus on these areas, particularly given the FSB’s current work in this area.⁷⁵ Instead, we will look at the procyclicality issues associated with supply, downgrades, and liquidity hoarding.

In times of stress, owners of high quality securities will be more likely to keep their high-quality collateral in-house. Also, an owner’s propensity to lend may decrease, in conjunction with the propensity to repo assets during periods of stress.

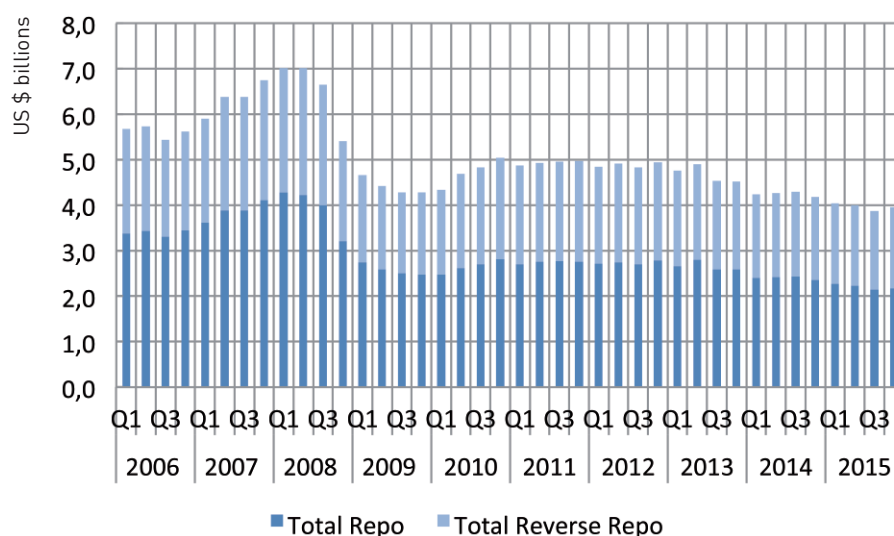
Figure 24 highlights that in the 2008 crisis, the average daily amount of repo and reverse repo transactions outstanding decreased sharply.

⁷³ Automated systems may decrease human error, though.

⁷⁴ A “haircut” is a reduction in value of securities used as collateral in a securities transaction.

⁷⁵ For examples, please see the following studies:

- > Financial Stability Board, *Strengthening Oversight and Regulation of Shadow Banking: Regulatory framework for haircuts on non-centrally cleared securities financing transactions*, 2014.
- > Financial Stability Board, *Regulatory Framework for Haircuts on Non-Centrally Cleared Securities Financing Transactions - Procyclicality of haircuts: Evidence from the QIS1*, 2014.
- > Financial Stability Board, *Proposed regulatory framework for haircuts on securities financing transactions: Instructions for the Quantitative Impact Study (QIS2) for Regulated Financial Intermediaries (Banks and Broker-Dealers)*, 2013.
- > Financial Stability Board, *Proposed regulatory framework for haircuts on securities financing transactions: Instructions for the Quantitative Impact Study (QIS2) for Agent Securities Lenders*, 2013.
- > Financial Stability Board, *Proposed regulatory framework for haircuts on securities financing transactions: Instructions for the Quantitative Impact Study (QIS2) for Non-Banks*, 2013.
- > Financial Stability Board, *Strengthening Oversight and Regulation of Shadow Banking: Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos*, 2013.

Figure 24: Primary dealer average daily amount of repo and reverse repo outstanding

Source: SIFMA

Additionally, in times of stress, both firms and the securities they issue can receive credit downgrades. The effects of downgrades on eligibility are twofold. For one, the downgrade precipitates a price decline, which invokes margin calls. Also, in times of stress, an asset that suffers a credit downgrade may become ineligible for use as collateral. Consequently, transactions that have been underpinned by such collateral need to be replenished with new, higher quality eligible collateral, precisely at a time when such assets might be difficult to source because of the factors mentioned above.

Looking forward

Collateralised transactions will continue to be an important part of the functioning of the financial system for the foreseeable future, because of three factors: changes in market structure; the way that participants transact with one another; and, importantly, changes in regulations.

With the expected increase in the use of collateral transformation services and the automation of collateral optimisation services, the Committee on the Global Financial System recently suggested active monitoring of those activities. These activities have inherent risks as part of their makeup, and can lead to greater market interconnections, greater asset encumbrance (in some circumstances) and the potential of risk concentration in those participants that provide such services.

To achieve better monitoring and surveillance of such a market-wide activity, better quality and quantity of data are necessary. Currently, comprehensive, detailed data are not available. What does exist is piecemeal, covering specific segments of the industry, as mentioned previously. This makes a true assessment of the activity more difficult. As the U.S. Department of the Treasury, Office of Financial Research (OFR), pointed out in 2015, “*The spotty data make it difficult to understand the U.S. repo market as a whole and the relative importance of its different segments.*”⁷⁶ This sentiment also applies to the difficulty of understanding risk in collateralised transactions worldwide.

76 V. Baklanova, Repo and Securities Lending: Improving Transparency with Better Data,” *OFR Brief Series*, No. 15-03, 2015.

However, this Outlook is not the first publication to suggest increasing the quality and granularity of collateralised transaction data.⁷⁷ Gauging the size, growth rate and the type of risk in transferring collateral associated with certain financial transactions will give insight in and highlights those areas where we have large knowledge gaps. Globally, there is no one consistent framework for the collection of data in this area; hence, there is no global overview. Steps are being taken to remedy this. The OFR has been working with the Federal Reserve in the United States to fill gaps in data about repurchase agreements (repo). In the EU, the European Council is expected to soon adopt a regulation on securities financing transactions.⁷⁸ Additionally, the Investment Industry Regulatory Organization of Canada (IIROC), the self-regulatory organization (SRO) for investment dealers, has begun phasing in reporting by its members, on a post-trade basis, all fixed income transactions, including repo and reverse repo transactions. Although IIROC would not make public individual transactions, it intends to make public an *aggregate* of statistics.^{79 80}

77 See T. Adrian, B. Begalle, A. Copeland, and A. Martin, "Repo and securities lending," *Federal Reserve Bank of New York Staff Reports*, No. 529, 2013; A. Kirk, J. McAndrews, P. Sastry, and P. Weed, "Matching Collateral Supply and Financing Demands in Dealer Banks," *FRBNY Economic Policy Review*, December 2014; and V. Baklanova, *op.cit.*

78 See http://europa.eu/rapid/press-release_MEMO-15-5931_en.htm

79 More specifically, starting November 1, 2015, all Canadian dollar (CAD) denominated, fixed-income trades entered into by Government Securities Distributors (GSD) in the primary and secondary markets (including repos) are to be reported to IIROC. Starting November 1, 2016, all other trades in fixed-income products will be reported to IIROC. This includes all primary and secondary market transactions entered into by IIROC members, regardless of currency denomination (including repos).

80 OSC, *Proposed requirements for Debt Securities Transaction Reporting*, No. 13-0058, 2013.

5. HARMFUL CONDUCT IN RELATION TO RETAIL FINANCIAL PRODUCTS AND SERVICES

Introduction

Harmful conduct is a broad term that refers to conduct (not necessarily illegal conduct) by a firm or an individual market participant that could (1) harm the interest of investors;⁸¹ (2) jeopardize fair, efficient, and transparent markets; or (3) lead to potential systemic risk (or any combination of these). An example of harmful conduct, in the context of investor protection, is the misselling of a financial product to investors whose risk profiles do not match the risks associated with the product.

In the IOSCO Risk Survey,⁸² a high number of respondents classified harmful conduct as a prominent risk to investor protection. Respondents to the survey noted the risk of harmful conduct related to the misselling of products; a culture of greed evidenced by excessive fees undermining the quality of retail financial products; and deficient disclosure of financial risks leading to investors making decisions on the basis of inaccurate information.

The high number of respondents that classified harmful conduct as a risk may reflect the growing list of scandals plaguing financial institutions, which have shocked financial markets and affected millions of investors worldwide. Some of these scandals include the manipulation of the Libor, Euribor, and Tibor benchmarks; manipulation of the foreign exchange market; and the misselling of insurance such as payment protection insurance.⁸³ While harmful conduct can cover a broad number of activities, this chapter focuses on the risk of harmful conduct associated with *investment products and services*, in line with the main concerns expressed through the IOSCO Risk Survey.

Analysis of harmful conduct in this chapter is based on case studies that regulators of 17 jurisdictions provided,⁸⁴ interviews with experts, and analysis of relevant literature. The analysis below seeks to provide further insight on how harmful conduct could, in the future, pose risks to regulatory objectives in the securities markets.

81 Analysis in this chapter harmful conduct is related only to retail investors.

82 See S. Worner, *op.cit.*

83 IOSCO has published various reports with principles and standards for benchmark operators. See IOSCO, *Review of the Implementation of IOSCO's Principles for Financial Benchmarks by Administrators of Euribor, Libor and Tibor*, July 2014, and *Principles for Financial Benchmarks*, July 2013.

84 Those 17 jurisdictions are members of the Committee on Emerging Risks, the Growth and Emerging Markets Committee, and the Inter-American Regional Committee. The Affiliate Members Consultative Committee Task Force on Emerging Risks also provided its views and inputs. The cases of the 17 reporting regulators were selected by each of the regulatory agencies as being their most important examples of harmful conduct in their jurisdictions over the last years. Most of the reported cases are public. This chapter does not pretend to present a full list of cases of harmful conduct in the reporting jurisdictions.

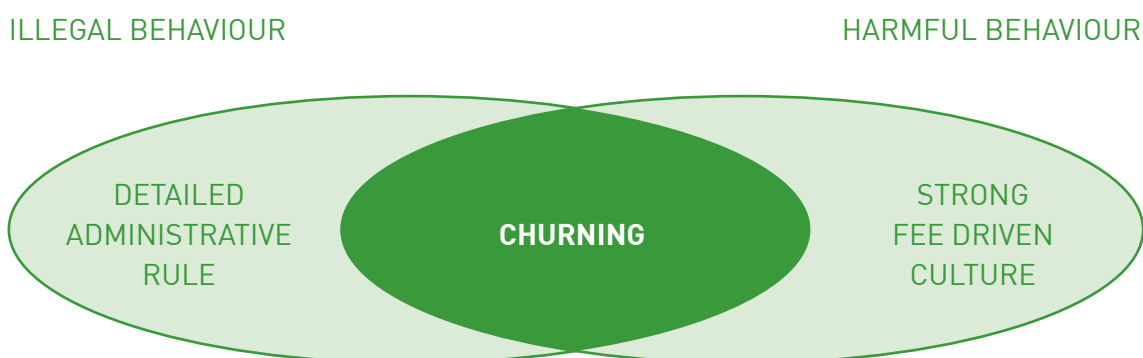
Understanding the risks

The nature of what constitutes harmful conduct varies. Reported cases range from harmful but not illegal conduct to individual firms contravening the law. Harm can impact a small group of individual investors or all investors in entire asset classes. In this section, focus is on identifying major trends and concentrations of harmful conduct within and across jurisdictions.

The theory of harmful conduct,⁸⁵ or harm in more general terms, presents various difficulties in analysing harm. From a regulatory perspective, analysing the risks of harmful conduct is a complex task. The challenges faced, when analysing harmful conduct, are (1) defining it; (2) measuring it; and (3) identifying it.

Defining harmful conduct. Many harmful practices are not specifically prohibited in laws or regulations. Therefore not all harmful conduct can be considered illegal. Figure 25 below illustrates the difference between harmful and illegal behaviour and the overlapping part where harmful behaviour is illegal and thus enforceable by the regulator.

Figure 25. Illegal and harmful behaviour



Source: IOSCO Research Department, based on M. Sparrow.

As illustrated in the conduct circles above, there are certain illegal behaviours (prohibited by detailed administrative rules) that do not harm any investor. An example is the placement of the name of a firm in the wrong corner of a disclosure document. If regulators focus on the detection and enforcement of *illegal* conduct only, they will not be able to detect all harmful conduct. A problematic area is the strong fee-driven culture of the financial industry, shown above as an example of harmful conduct that regulation does not forbid in many jurisdictions. Harmful conduct that the regulator can identify as illegal is an ideal situation, because the regulator can then take enforcement action. For example, “churning,”⁸⁶ which is clearly detrimental to the interest of investors, is, in most jurisdictions, illegal. It is much harder for regulators to address harmful conduct that is not

⁸⁵ The literature on harmful conduct in financial markets is limited. It addresses corporate behavior that is harmful to society. M. Sparrow, *The Regulatory Craft: Controlling Risks, Solving Problems, and Managing Compliance*, Brookings Institution 2000; and M. Sparrow, *The Character of Harms: The Operational Challenges in Control*, Cambridge 2008/2015, provides a good general overview of the regulatory challenges assessing harmful conduct. Discussions on harmful conduct can also be found in N. Passas, “Lawful but Awful: ‘Legal Corporate Crimes’”, *The Journal of Socio-Economics*, 2005, p. 771 and following, and D. McBarnet, “After Enron Will ‘Whiter than White Collar Crime’ Still Wash?”, *British Journal of Criminology*, 2006, p. 1091 and following

⁸⁶ Churning is excessive trading by a broker in a client’s account, largely to generate commissions.

captured by existing regulations.⁸⁷ Adoption of laws and regulations to cover types of conduct that identified as harmful need to take place before a regulator can legally enforce. However, the legislative and regulatory process is a complex and lengthy one.⁸⁸

Measuring harmful conduct. Measuring harmful conduct also is difficult. For example, even if one had access to the full list of enforcement actions in harmful conduct cases from regulators around the world, there would not be one clear way to measure trends. In the face of harmful conduct, regulators use alternative measures, rather than enforcement actions, such as convincing and settling with firms to “voluntarily” repay the harm to investors.⁸⁹ This alternative approach has occurred in individual cases but also in cases where the regulator noted that all firms in an asset class were conducting operations that harmed investors.⁹⁰ Thus, quantitative measures such as “the number of enforcement cases,” “dollar value of fines,” “number of investor claims” etc., provide some value for shedding light on the magnitude of harmful conduct in a jurisdiction but they cannot solely relied.

Identifying harmful conduct. In terms of identification, some categories of harmful conduct remain invisible, even if the regulator has processes in place to detect harmful conduct that is both illegal and legal. These invisible cases are referred in criminological literature to as *dark figures*. An example of this are certain kinds of fraud. A firm can be inadvertently involved in fraud, sometimes even without the firm’s own risk management and compliance function units detecting the activity. If even the firm itself cannot identify fraud, it would be difficult for the regulator to detect it. And, even if the firm detect the fraud and stops it, it may be reluctant to report it to the regulator, for fear of punishment. However, some regulators have put in place mechanisms to encourage firms to report possible illegal activity, though whistle-blower programs, deferred prosecution agreements, credit for cooperation, etc. Other reasons why actors may fail to notify regulators of harmful conduct include these: lack of expertise on the part of investors in recognizing that they were enticed to invest in unsuitable products; reputational issues facing firms or investors if they report it; lack of trust that authorities are competent to alleviate the issue; or investors deciding to take the matter into their own hands.⁹¹

Classifying harmful conduct from a securities markets perspective.

Harmful conduct can be classified in a number of ways: by actor (such as producer or broker/advisor); by regulated object (producer, product or service, broker/advisor, mandatory reporting and information provision); by cause of harm (one person or group of persons, a firm, all firms in a market segment); by the size of harm; and by the type of harm.

For our analysis in this report, we classify harmful conduct by type of harm. Therefore, below we list in the top-cited harmful conduct cases from the risk survey, classified by type of harm.⁹²

Category 1: *Missold Financial Products.* Financial products (and their fee structures) are often complex. In many cases financial products include a derivative component. In the cases of harmful conduct examples under review, the issue appears to be that investors were unable to understand the risk/reward profile of the products they were purchasing and were thus negatively surprised when products incurred unexpected losses. Even when financial products were not complex, misselling occurred with the recommendation of speculative stocks and products to investors who had a conservative risk profile. Another example of misselling of financial products

87 M. Sparrow, *op. cit.*, 2000.

88 The relevant Ministry/Government usually (and exclusively) performs lawmaking functions. Regulators have only an advisory role in lawmaking, but do conduct regulatory rulemakings.

89 In some jurisdictions, settlements are enforcement actions and are pursuant to a court order.

90 In some jurisdictions an asset class wide settlement was reached which was followed by all firms that had sold a certain financial product

91 M. Sparrow, *op. cit.*, 2008/2015, p.169-253.

92 This classification also includes some overlap in regulated object but allows for a detailed case-by-case description of the harm.

outlined in the cases includes the advising of investors to make an investment or change an investment, with a resulting monetary loss to the investor.⁹³

Category 2: Fraud with Investments. For cases in this category, the main issue is that a firm misuses the investments entrusted to it by an investor. For example, the firm may use customers' investments in an unauthorized manner; the firm may invest in securities outside of the scope of the agreement; the firm may not invest at all; or it may steal the investment.

Category 3: Negligent Behaviour. The *negligence* of firms leading to harm to investors, such as failures in administrative organisation and internal control hampering the investment or the service to the investor. This negligence, which is a firm's unintended behaviour, can be harmful and illegal.

The potential impact of the harmful conduct to investors can be both monetary and nonmonetary. Monetary impact may manifest directly or indirectly. In the cases reported by the regulators, direct monetary impact occurs in circumstances where investors incur either unexpected losses or unexpectedly lower revenues (or both of these). In some of the reported cases, regulators provided calculations of the monetary harm. In other cases, regulators did not specify the exact monetary cost of the harm. In the Outlook, indirect monetary losses refer to potential revenues that investors may have missed (opportunity costs) because, for example, they invested in products that were not suitable for their risk profile.

In the Outlook, nonmonetary harm includes harm that the market suffers when investors lose trust. One of the potential consequences of this loss of trust is that investors use financial markets and products less. This can stifle the development of socially and economically efficient financial products as well as capital formation.

Finally, there is a potential risk that the impact of harmful conduct could be systemic. The monetary losses that may result from harmful conduct can potentially be large for both investors and firms. Regulators may be able to require firms to recompense investors for the harm they caused and may be able to penalize them on top of that. Both groups can thus incur heavy losses or expenses or even bankruptcy. And when the group of harmed investors is sizeable, this can result in an impact to the real economy.

Assessing the risks

This section presents further detail on specific cases of harmful conduct across a selection of cases reported by the regulators from 17 jurisdictions.

Misselling of financial products

In many jurisdictions, regulators reported misselling of financial products as one of the most important risks associated with investment products and services. Across a number of jurisdictions, harmful conduct in this context is divided into these three categories (1) misselling of complex products; (2) misselling of noncomplex products to investors; and (3) misselling of investment services leading to misinvestment.

In terms of misselling of complex products, regulators from various jurisdictions reported cases where investors were encouraged to buy financial products that did not match their risk/reward profile or that they did not understand (or both of these), because of the product's complexity. The complexity of financial products is often attributed to the derivative component (or similar product feature), which causes nonlinear behaviour⁹⁴ in the product. Specific financial products that regulators described as missold, across the case studies, include

93 "Misselling" can be defined as a practice of a firm in which the investor ends up with a product or service that does not suit him and therefore could cause harm to him. This harm can be monetary loss, opportunity costs of having an unsuitable product, or a product that has more risk than his risk profile allows.

94 The price of the product moves differently than the price of the underlying investment.

structured retail products and unit-linked products. In terms of misselling of noncomplex financial products to investors, some cases included the selling of commercial paper and investment funds. Finally, misselling of investment services leading to misinvestment occurred where portfolio managers invested in securities that did not match the risk profile of the client. Table 3 below sets out instances of misselling of complex products from the responding jurisdictions.

Table 3. Cases of misselling in various jurisdictions

Jurisdiction	Product or service causing harm	Indication of magnitude of harm
Australia	Unsuitable investments for the risk profile of investors Unsuitable and fraudulent investment advice by financial advisors and planners	Millions of dollars of damage to thousands of investors
Brazil	Unsuitable investments in derivatives markets	Millions of dollars
Dominican Republic	Unsuitable commercial paper	Hundreds of investors
Hong Kong	> Structured retail products > Derivatives products > Life settlement funds	> Tens of millions of dollars > n/a > Millions of dollars
Mauritius	> Unsuitable structured retail products > Crowdfunding to unsuitable investors > Real estate fund sold as bank deposit	> Thousands of investors > Dozens of investors > Hundreds of investors
Mexico	Misselling and unsuitable advice to retail investors on: > Private corporate debt instruments > Subordinated Debentures	> Hundreds of investors
Netherlands	> Unit-linked products > Structured retail products > Unsuitable contingent capital convertible obligations (CoCos) > Poor quality of pension advice	> Billions of dollars > n/a > None because of early warning regulator > n/a
Panama	Unsuitable structured retail products	Thousands of investors
Portugal	> Complex financial products sold as bank deposits > Unsuitable complex speculative swaps > Unsuitable commercial paper	> Thousands of investors > Hundreds of investors > Thousands of investors

Jurisdiction	Product or service causing harm	Indication of magnitude of harm
Singapore	Unsuitable structured retail products	Thousands of investors, hundreds of millions of dollars
Spain	Unsuitable complex contracts for differences	Thousands of investors
South Africa	Unsuitable unlisted securities sold to pensioners	Thousands of pensioners
Turkey	Unsuitable portfolio management services	n/a
United Kingdom	<ul style="list-style-type: none"> > Unsuitable structured retail products > Poor quality of advice on structured retail products > Endowment investment policies > Unsuitable unregulated collective investment schemes > Unsuitable trade life policies > Unsuitable advice leading to pension switching 	<ul style="list-style-type: none"> > Thousands of investors > 46% of sales were unsuitable > Billions of dollars > Hundreds of millions of dollars per year > n/a > 16% of the cases
United States	<ul style="list-style-type: none"> > Unsuitable complex security based swaps > Unsuitable products to senior citizens > Potential misselling of securities to unaccredited investors > Misselling and unsuitable recommendations/ advice of stocks with excessive risks to conservative investors 	<ul style="list-style-type: none"> > Hundreds to thousands of investors > Many thousands of investors > Thousands of investors > Hundreds of thousands of investors

Source: IOSCO Research Department, based on cases provided by 17 regulators.

Note: Report of monetary harm standardised in US dollars.

The most significant monetary impact reported across the cases occurred because of the misselling of unit-linked products. These products combine an investment fund with a life insurance policy and are commonly sold to investors for long-term investment goals such as pensions and the reimbursement of the principal of interest-only mortgages at the end of the mortgage period. The long investment period means that the amount of money accumulated, due to multiple, periodic investments, is significant. In the United Kingdom, financial firms repaid harmed investors almost \$19 billion due to misselling. In the Netherlands, repayments by financial firms that missold unit-linked products are also increasing to several billions of dollars.

There were multiple aspects to, and causes for, the misselling of unit-linked products. One reason for misselling was that investors did not fully understand the inherent complexity of the products they purchased. Specifically, the following three factors came into play: the daily changing prices of securities, which change the value of the investment fund; the changing cost of the insurance product because of the gender and age of the investor; and the interdependency of the cost of the insurance policy with the value of the fund. These factors have a complex, nonlinear mathematical relationship that is very difficult to understand, even for investors with good mathematical training.

Another cause of the misselling of unit-linked products was that advisers did a poor job of explaining them to investors, compounded by the fact that the advisers themselves did not understand the complexity of the products. This was further aggravated by insufficient written information about the products. Further, the products attracted many investors because they promised very high yields (double-digit percentages) based on very short historical performance, which, in reality, could not be matched. Lastly, the costs for these products and advisory services were high, with correspondingly high profit margin for firms and fees for advisers, so advisers “pushed” the sales of these products.

The cases of unit-linked products in the Netherlands⁹⁵ and the United Kingdom present examples of harmful conduct that was, for the most part, not illegal at the time: these products and their sales channel (financial intermediaries) were only partly regulated during the period in which most of the sales of the products took place and at the time of the first regulatory action. In the Netherlands, there was a light regime—which was supervised by the conduct of business regulator, the Netherlands Authority for the Financial Markets (AFM)—for disclosure of some basic product features. However, the AFM did not supervise either the product itself or the financial intermediaries who sold the product. Also, at that time there was no existing regulatory requirement that the investment had to be “suitable” for the investor. In some cases, the investment fund in which the product invested was regulated. There existed prudential regulation, supervised by the Netherlands Bank (DNB), which consisted of a profit test in which firms needed to show that the product, in adverse circumstances, would not cause losses to the firm that could threaten its viability. This prudential requirement made firms build additional profits into the products, which in turn led to higher costs and, in many cases, unsuitability for investors.

In the Netherlands, due to the fact that this harmful conduct (for the most part, at the time) was not illegal, enforcement actions by the regulator could not be taken. The AFM used other means to compel firms to compensate investors for the harm they caused. In addition, the national financial Ombudsman intervened to establish a basis for firms to make voluntary repayments. Moreover, numerous private individual and collective investors—who felt harmed and wanted to receive compensation—brought law suits. Several of these led to court decisions in which the court fixed the amount of repayments; numerous other cases are still pending.

Meanwhile, new rules were introduced to mitigate the risks of misselling of unit-linked products at the product level and on advisers and advice, commissions and suitability. As a global standard-setter, in 2013, IOSCO published a policy report titled *Suitability Requirements With Respect To the Distribution of Complex Financial Products*⁹⁶ and the Joint Forum (consisting of IOSCO, the Basel Committee for Banking Supervision, and the International Association for Insurance Supervision) published a review of regulatory practices on suitability. The European Commission⁹⁷ has developed a new regulatory regime for packaged retail and insurance-based investment products and introduced a “key information” document, which gives key facts to investors in a

95 For an extensive factual explanation about unit-linked products in the Netherlands see: AFM, *Feitenonderzoek beleggingsverzekeringen*, October 2008.

96 IOSCO, *Suitability Requirements With Respect To the Distribution of Complex Financial Products*, January 2013 and Joint Forum, *Customer Suitability in the Retail Sale of Financial Products and Services*, April 2008,

97 http://ec.europa.eu/finance/finservices-retail/investment_products/index_en.htm

clear and understandable manner, covering not only collective investment schemes but also other “packaged” investment products that banks or insurance companies offer.

Among the 17 responding regulators, two regulators reported *unit-linked products* as cases of harmful conduct: the Netherlands and the United Kingdom. Unit-linked products, however, are sold in many other jurisdictions, often by the same firms who offered these products in the Netherlands and the United Kingdom. Unit-linked products have caused similar problems in Ireland and India.⁹⁸ Because the product features and regulatory regimes in those and other countries do not differ greatly from the products in the Netherlands and the United Kingdom, similar risks could exist.

Finally, subsequent reports by the European Insurance and Occupational Pensions Authority⁹⁹ suggest that insurance firms are expanding the sales of unit-linked products. They have an incentive to do so for various reasons. The first reason is that life insurance products with guaranteed yields are increasingly difficult for insurance firms to sell, since the interest rates are historically low. Secondly, guaranteed products that have been sold in the past weigh heavily on the liabilities of the insurers, because the low interest rates require high capital provisions. This makes unit-linked products as opposed to guaranteed products attractive for insurers to sell: in unit-linked products the risks of investments are with the investors, who are offered higher potential yield, and they require few capital provisions from the firm.

Besides unit-linked products, investors have run into unforeseen and substantive losses with other types of complex products. Six regulators reported that *structured retail products* also caused considerable harm to investors. The IOSCO Working Group report¹⁰⁰ on the regulation of structured retail products defined them as follows for its report: “Generally, structured products encompass a broad range of typically complex financial instruments. These instruments share the characteristic of having an embedded derivative that provides economic exposure to reference assets, indices or other economic values and pay-offs on predefined dates.”

Examples of those products that proved to be harmful to investors are the “mini-bonds” that the globally operating investment bank Lehman Brothers backed in Hong Kong and Singapore. After the demise of Lehman Brothers in 2008, these products became worthless. In both of those jurisdictions, the regulators have taken supervisory action.¹⁰¹ The intermediaries who sold the products settled the multimillion dollar losses with the harmed investors. Other regulators report products being unsuitable because of their complexity, embedded cost structures (fees), and the poor advice given on them. The United Kingdom Financial Conduct Authority (FCA) reported that 46% of the advice on structured retail products was unsuitable.

98 For India, see, e.g., D. Bhaskaran and M. Halan, “Investors lost Rs.1.5 trillion due to insurance mis-selling. The Ulip rip-off was an institutional defrauding of the small investors”, *Working paper of the Indira Gandhi Institute of Developmental Research*, Mumbai. For Ireland, see, e.g., B. Logue, “Scandals in insurance sector set alarm bells ringing. Time for more transparency in pricing clients’ investments, writes former regulator Brendan Logue,” *Independent*, 26 January 2014. India and Ireland did not participate in the survey underpinning this chapter. We have no information about whether their regulatory systems are similar to those of the Netherlands and the United Kingdom nor whether enforcement and/or other actions were taken by their regulatory agencies.

99 EIOPA, *Financial Stability Report*, December 2015 and earlier versions

100 IOSCO, *Regulation of Retail Structured Products*, December 2013, p. 3. The full definition used by the working group was at p. 7: “The Working Group has used the following approximate definition of structured products to guide its work: “Structured products are compound financial instruments that have the characteristics of combining a base instrument (such as a note, fund, deposit or insurance contract) with an embedded derivative that provides economic exposure to reference assets, indices or portfolios. In this form, they provide investors, at predetermined times, with payoffs that are linked to the performance of reference assets, indices or other economic values. This definition excludes instruments such as stand-alone options, contracts for difference or futures because in those cases the derivative is not embedded in another financial instrument. The definition also does not capture asset-backed securities, including collateralized debt obligations or securitisation products, nor exchange-traded funds.”

101 In Hong Kong the Securities and Future Commission reached an agreement with the Royal Bank of Scotland to make a repurchase of all eligible customers holding outstanding products. In Singapore, the Monetary Authority of Singapore (MAS) issued directions to ten distributors of these products to deal in or provide financial advice on structured notes for a specific period of time, with effect from 1 July 2009. MAS also directed the distributors to rectify weaknesses identified during MAS’ inspections and to review various aspects of the distributors’ training, marketing and sales processes. MAS, in consultation with the financial advisory industry, conducted a review which led to the introduction of an enhanced regime for the sale of investment products to retail investors, and a policy change to raise the overall standards of financial advisory representatives. See: MAS, *Investigation Report on the Sale and Marketing of Structured Notes linked to Lehman Brothers*, July 2009

Like unit-linked products, the functioning of structured retail products, especially the more complex ones, is difficult for most investors and advisers to understand.¹⁰² A study by Célérier and Vallee¹⁰³ categorizes almost 55,000 of those products sold to retail investors in 16 European jurisdictions between 2002 and 2010, in levels of complexity, by the number of product features. They conclude that the complexity of products has grown over the years.

Furthermore, the study by Célérier and Vallee shows that the more complex structured products expose investors more frequently to a complete loss of their investment. Thus, the more complex the products, the riskier they are for investors. They also conclude that low-rate environments lead to the production of more complex products with high headline yields. Finally, they find that more complex products are more profitable for banks which issues these products, and that the performance of these products is lower than less complex products.

If this European trend is true for other parts of the world,¹⁰⁴ the risk of harm from structured retail products could have increased. International standard setters have developed information and reports and regulators across the globe have taken actions to mitigate these risks. In its December 2013 report, *Regulation of Retail Structured Products*, IOSCO¹⁰⁵ provides an inventory of potential tools that regulators can use in mitigating the risks. The European Commission, recognizing that disclosure material (prospectuses and brochures) in the EU fell short in explaining the functioning of the products to investors, has developed a regulatory regime for packaged retail and insurance-based investment products, which is also targeted at the structured retail products. The regime will be implemented by the national competent authorities of the European Union.

Other complex financial products that regulators reported as “missold” were contracts for difference, complex products sold as bank deposits, derivative products, and unregulated collective investment schemes. The common cause of harm there was again the fact that investors did not understand the complexities of the products or the products did not match the investor’s risk profile, or both of these things.

Those regulators who responded to the survey gave fewer details about the impact of the harm of the mis-selling of *noncomplex* investments than they did about the harm of the mis-selling of *complex* products. Respondents did not estimate the monetary impact but in many cases made clear that the harm was spread over a number of investors. This number varies from a few investors to many thousands of investors. In various cases regulators took enforcement actions and other regulatory actions ranging from invoking licenses and monetary fines to public warnings against specific firms or product classes. In one case, in the Netherlands, the regulator identified the risk at an early stage and was, therefore, able to warn investors before any harm could occur. On the few occasions where respondents described the risk and harm in monetary terms, such as in Mexico and in Hong Kong, it became clear that the harm caused was much less than with complex products. One reason for this difference seems to be that the investments in the complex products category were often used for long-term investments with periodical investments to fund important goals in the life of investors, such as a pension and a mortgage repayment, unlike most of the investments in noncomplex products. Therefore, mis-selling of noncomplex products involves less money. Moreover, its spread among investors seems less widespread. Nonetheless, some jurisdictions, such as Mexico, have implemented regulatory measures for such noncomplex products as the implementation of robust internal rating and analysis mechanisms as those used for complex products, in order to prevent harmful conduct for retail investors.

Just like with complex products, there are multiple aspects to, and causes for, the mis-selling of *noncomplex* investments. The first aspect that is represented repeatedly, in the cases reported, is the offering and sales of

102 See, e.g., Netherlands Authority for the Financial Markets, *Exploratory Analysis of Structured Products*, May 2007.

103 C. Célérier and B. Vallee, *Catering To Investors Through Product Complexity*, October 2015.

104 The authors do not know of any literature that is similar for parts of the world other than the European market.

105 IOSCO, *Regulation of Retail Structured Products*, December 2013.

investment with high risk to investors with conservative risk profiles. There is a pattern of striking examples of widespread harmful practices of selling risky investment products to elderly people: they predominantly have high-risk products sold to them, even though they have conservative risk profiles. Both South Africa and the United States have reported this harmful practice. The IOSCO Affiliate Members Consultative Committee's Task Force on Emerging Risks also highlighted this as a prominent risk.

A second aspect is the intended or unintended practice of investment products with high risk being recommended to all classes of investors, including those with conservative risk profiles and those who are not accredited or eligible for this type of investment. This harmful conduct is illegal, and regulators indicated that they have enforced the law in many of these cases.

Fraud with investments

In the case examples, fraudulent investment management and solicitation of investors was also reported across a number of jurisdictions (see Table 4). There are boiler rooms and scams that are set up from the outset with false promises to cheat investors. Another type of fraud was where investors entrusted their money to a manager or a firm for a certain purpose, while the funds were being used for other purposes. One regulator also highlights the enhanced risks of fraud through social media, offering cheap, easy, immediate and anonymous access for fraudsters to reach a big group of potential investors that could be harmed. Regulators noted that in most cases enforcement actions were undertaken. In various cases they also published warnings against firms and fraudulent practices.

Table 4. Fraud with investments

Jurisdiction	Description of harm	Estimated magnitude of harm
Mauritius	Funds being used for purposes other than investments	Many investors worldwide
Netherlands	Boiler rooms offering nonexistent investments	Varying, difficult to estimate
Portugal	Financial intermediary trading in own stocks through offshore firms inflating prices	Thousands of investors
South Africa	Selling of unregulated hedge funds resulting in a Ponzi scheme	About US \$250 million affecting thousands of investors
Turkey	Misuse of investor's securities in portfolio management	n/a
United States	> Scams, sales of fraudulent investment programs > Enhanced risk of social networks to promote fraudulent investments	> Many thousands of investors > Possibly many thousands of investors

Source: IOSCO Research Department, based on cases provided by 17 regulators.

The pecuniary damage of fraud is often hard to measure as fraudulent activity is not always reported to authorities (dark figure). Regulators do not always know how many investors have been harmed. However, regulators state in their reported cases that scams and boiler rooms are damaging many thousands of investors. Furthermore, they underline that fraudulent investment offers are a persistent problem and a continuous threat to investors because scams with new shapes and names come along weekly.

Furthermore, fraudulent solicitation of investors is also an international issue. Communications by telephone and email and through the internet have made it easy and cheap to solicit investors from anywhere in the world. This makes detection and enforcement difficult. In order to assist in detection and help investors worldwide to protect themselves from harm, IOSCO has set up an Investor Alert Portal that gathers weekly, from its members, on a voluntary basis, information on firms who are soliciting investors without being registered with the appropriate regulator.¹⁰⁶

Negligence

Negligence was also described, to a lesser degree, in the cases provided as examples. Failures in administrative organisation and internal control and unauthorised investment offers and services are the most reported type of negligence (see Table 5 below).

Table 5. Negligence

Jurisdiction	Description of harm	Estimated magnitude of harm
Argentina	Unauthorised public offering and irregular intermediation of nonregistered agent	n/a
Brazil	> Unauthorised portfolio management services > Unauthorised online offering of investment products	> One million \$ > Tens of thousands of \$
Hong Kong	> Investment advice for unauthorised funds > Deficiencies in systems and controls in relation to sales of unlisted investment products > Deficiencies and inadequate internal controls in relation to distribution of fund	> Hundreds of thousands of \$ > \$99 million of value of products involved > n/a
Mauritius	Unauthorised investment products	Thousands of investors
Panama	Unauthorised products or services offered	Hundreds of investors
Turkey	Incompatibility with regulations and failures of internal control	n/a

Source: IOSCO Research Department, based on cases provided by 17 regulators.

106 Accessible through: http://www.iosco.org/investor_protection/?subsection=investor_alerts_portal

Regulators in Hong Kong and Turkey mention failures in the administrative organisation and internal control as the main type of harmful conduct. In Hong Kong, deficiencies in the administrative organisation and internal control system led to the sales of unsuitable investments to investors. Turkey reports a similar case. In both cases, respondents were not able to calculate the monetary harm.

Regulators also described firms that forgot to request authorisation for the sales or the intermediation of certain products or services. Examples of unauthorised products and services are portfolio management by unauthorised managers leading to losses for various investors and the advice and sales of unauthorised investment products. The cases of unauthorised selling of investment products and services seem to be concentrated in EM jurisdictions. Many of the regulators from mature economies do not report such type of unauthorised selling, which could suggest that this practice is of less frequency or less harmful than other types of harmful conduct, such as the misselling of complex products.

In most of the cases, the illegal actor targeted a relatively small group of investors, so the harm was limited. However, in Mauritius the group of investors who were harmed numbered in the thousands, while in Brazil there were several cases of online offerings of investment products. The regulators also made clear that they had taken strenuous actions. The enforcement actions included the closure of firms; banning from the market the people responsible for these illegal activities; and redress of lost money and fines.

Looking forward

From our analysis of the various cases of harmful conduct across jurisdictions, we can present a number of insights about the risks posed by this type of conduct. Firstly, regulators reported that the misselling of complex investment products was the most frequently occurring harm and was also the cause of the most harm to investors. Investors had a difficult time understanding the complexity of the products and their fee structures, a classic problem of information asymmetry, which poses a high risk of misselling. Therefore, the *complexity of investment products and services* could be considered a risk area for further investigation, in terms of investor protection.

Secondly, in the cases provided as examples, the combination of a *high number of investors involved and long-term investments of considerable size* (such as mortgage endowments and pensions), resulted in the most monetary cost, mostly borne through inflated fees and subsequent repayments by the involved institutions. An example of such products causing harm is unit-linked products; regulators described these as being the products causing most harm to investors. These products are inherently complex, and both investors and advisers do not understand them very well. Because investment advisers would earn high commissions for these sales, they “pushed these products,” leading to misselling and, as a consequence, millions of investors ending up with unsuitable products.

Among the 17 responding regulators, two regulators reported *unit-linked products* as cases of harmful conduct: the Netherlands and the United Kingdom. Unit-linked products, however, are sold in many other jurisdictions, often by the same firms who offered those products in the Netherlands and the United Kingdom. Because the product features and regulatory regimes in other countries do not differ greatly from the products in the Netherlands and the United Kingdom, similar risks could exist. Therefore, regulators with similar unit-linked products in their jurisdictions might want to consider further investigation of this risk area in terms of investor protection.

Regulators who decide to assess the potential risks involved in unit-linked products might encounter difficulties in doing so, because the products and/or advisers might *not be fully covered by regulation*, making enforcement challenging.¹⁰⁷

Thirdly, regulators reported that structured retail products caused harm to investors. Six regulators reported harm through these products, which were characterised as being unsuitable because of their complexity, embedded cost structures (fees), and the poor advice given on them. Moreover, an academic analysis referenced above shows that the products have grown in complexity and riskiness. Similar to unit-linked products, banks and securities firms, operating in various jurisdictions, produce structured retail products. Despite regulatory efforts in many parts of the globe to mitigate these risks, regulators might want to continue to monitor the suitability of these products for the investors to whom they are sold to prevent harm to investors.

¹⁰⁷ Such being the case, regulators can look to Principle 7 of IOSCO, which states that “a regulator should have a process to review its regulatory perimeter periodically.”

6. CYBER THREATS

Introduction

The chapter provides an overview of recent trends and emerging vulnerabilities in the cyber resilience space, relevant from a securities markets regulators' perspective. Analysis centres around:

- > Findings from two studies conducted by IOSCO on the nature of cyber-threats in securities markets and the state of available mitigation tools;
- > Areas in securities markets that are potentially vulnerable to growing interference of cyber threats and crime;
- > A select number of different initiatives currently undertaken by financial regulators in response to cyber threats.

While technological innovation in the financial sector can facilitate increased efficiency, speed, and access, it can also give rise to new vulnerabilities. Certain actors can use the method of cyberattacks to exploit those vulnerabilities.

A cyber-attack can be defined as

“a harmful activity, executed by one group (including both grassroots groups or nationally coordinated groups) through computers, IT systems and/or the internet and targeting the computers, IT infrastructure and internet presence of another entity. An instance of cyber-crime can be referred to as a cyber-attack.”¹⁰⁸

For the purposes of this chapter, the term ‘cyber threats’ is used to refer to all forms of potential and actual cyber risk, including cyberattack, cybercrime, or other cyber intrusion.

A cyber threat and the associated “cyber threat environment” is typically assessed as an IT-related risk. However cyber threats should be thought in a much broader context than just Information Technology. Some characteristics that define the scope of cyber threats and distinguish them from IT-related risks include the fact that cyber threats are *not* accidental or incidental; are *not* caused by non-malicious errors or omissions; are *not* due to natural or manmade disasters; and are *not* instances of technological “glitches” or software errors. Cyber threats are malicious and planned intrusions that people orchestrate.

This last factor, the prominence of people in the execution of cyber threats elevates this risk, and thus raises concepts such as cyber-resilience, above being simply “IT issues.” It also highlights why the financial sector may increasingly present an attractive target for cybercriminals. The extent of financial assets flowing through financial infrastructure may be one motivating factor behind cyber threats. Another motivating factor may be the interconnectedness and prominence of the financial system as a symbol of economic power. This makes the financial system not only a monetary target, but a political and ideological one as well.¹⁰⁹ Disruption,

¹⁰⁸ R. Tendulkar, “Cyber-Crime, Securities Markets and Systemic Risk”, *Joint Staff Working Paper of the IOSCO Research Department and World Federation of Exchanges*, July 2013

¹⁰⁹ R. Tendulkar, “Business as usual?” in *Securing the Cybersphere*, International Cybersecurity Research Group, News Desk Media, 2014, at <http://securingthecybersphere.com/Index.aspx>.

destruction, or theft from financial sector enterprises, through cyberspace, provides a convenient and often untraceable way of disrupting, destroying, and stealing from the financial system more generally, making cyber threats a principal concern for financial market participants and financial market infrastructure as a potential systemic risk.¹¹⁰ In fact, a report by Websense Labs discovered that the financial services industry encounters cybersecurity incidents three times more frequently than other industries.¹¹¹

A growing global and cross-sectoral trend

Cyber threats have increased in number, sophistication, and complexity over the past few years. PWC's Global State of Information Security Survey 2016¹¹² found that the total number of cybersecurity incidents detected in 2015 was 38% higher than the 42.8 million incidents in 2014. The survey also found that since 2009, security incidents have expanded at a 66% compound annual growth rate. However, these figures do not take into account incidents that go either undetected or unreported, and hence do not represent the total number of cyber incidents. The survey estimated that as many as 71% of security compromises go undetected.¹¹³

Cyber threats occur for a number of reasons, not all of which relate to the potential for financial gain. Regardless, many cyber threats do impose financial loss on the economy. The Centre for Strategic and International Studies has estimated that the annual cost of cybercrime to the global economy may range from \$375 billion to \$575 billion.¹¹⁴

Cyber threats facing financial sector entities are also escalating in terms of sophistication, seriousness, and breadth. The 2015 Verizon Data Breach Investigations Report notes that the financial services industry is in the top three industries affected by cyber threats.¹¹⁵ PWC's 2014 Global Economic Crime Survey revealed that cybercrime was the second most common type of economic crime for financial sector actors.¹¹⁶ In terms of annual change, the previously cited PWC Global State of Information Security Survey 2016 notes that in 2015, information security incidents in the financial sector fell by 3% and the cost of those incidents declined by 12%.

Understanding the risks

The growth in the number and cost of cyber threats, and the direct exposure of the financial services sector to cyber threats, drives the increasing concern that regulators, industry, investors, and consumers all share. IOSCO has already conducted work to better understand the nature of the risk in the context of securities markets.

For example, the IOSCO Research Department and the World Federation of Exchanges produced a joint Staff Working Paper¹¹⁷ in 2013 in an effort to better understand and raise awareness around the cyber threat facing securities markets. The report included a systemic risk assessment of cyberattacks and presented the results of a survey to 46 stock exchanges around the world.¹¹⁸

Furthermore, IOSCO's Affiliate Member Consultative Committee (AMCC)¹¹⁹ undertook a second fact-finding exercise internally in 2014, using inputs from AMCC members and a selection of market participants.¹²⁰ Work

110 Please see: Depository Trust & Clearing Corporation (DTCC), *Cyber Risk – A Global Systemic Threat*, White Paper, October 2014; DTCC, *Systemic Risk Barometer: Results Overview*, 2015 Q1; World Economic Forum, *Global Risks 2015 – Technological Risks: Back to the Future*, 2015; and R. Tendulkar, "Cyber-Crime, securities markets and systemic risk," *IOSCO/WFE Staff Working Paper*, July 2013.

111 <http://www.websense.com/assets/reports/report-2015-industry-drill-down-finance-en.pdf>

112 PWC, *Global State of Information Security Survey: 2016*

113 *Ibidem*

114 Centre for Strategic and International Studies, *Net Losses: Estimating the Global Cost of Cybercrime*, June 2014

115 Verizon, *Data Breach Investigations*, 2015

116 PWC, *Global Economic Crime Survey 2014*, 2014

117 R. Tendulkar, *op.cit.*, 2013

118 Stock exchanges are part of our core financial infrastructure and are also interconnected providers of essential (and non-substitutable) services. Some are owners of CCPs.

119 The AMCC is comprised mainly of exchanges, self-regulatory organisations, industry associations, CCPs and CSDs.

120 The TF received 56 responses to the survey, 22 were AMCC members and 34 were other market participants. Given the small survey size, and the diversity among survey respondents, the exercise did not attempt to draw definitive conclusions but rather provide insights on some of the cyber-related challenges faced by a sample of market participants, infrastructures and SROs around the world and on the attitudes adopted to meet these challenges.

was then refined in 2015 with two separate work streams focusing respectively on specific cybersecurity risks and practices in the asset management industry and at trading venues. The findings provide insight into the nature of cyberattacks facing a wide range of securities markets participants, and the elements to consider to deal with the threat.¹²¹

The increasing and changing cyber threat

In the IOSCO/WFE staff working paper (SWP) survey, more than half of exchanges surveyed reported experiencing cyberattacks. Although exchanges from the Americas were most likely to report having had an incident, no region was immune. Similarly, while larger exchanges were most likely to report having experienced a threat, some smaller exchanges were also targeted.¹²² In the AMCC survey, around 38 % of respondents indicated that they had experienced more than five cyberattacks per month and 37 % of respondents reported that cyberattacks appear to be increasing in frequency.

The responses to the IOSCO/WFE SWP survey indicate that the vast majority of attacks were disruptive rather than financially motivated. Denial-of-service attacks and infiltration of malicious software were the most common forms of threat. Respondents also noted that cyberattacks have not yet touched critical process and that financial impacts have been minimal. However, some exchanges acknowledged that future attacks could be far more damaging and costly.

Industry preparedness

Findings from the IOSCO/WFE survey suggest that exchanges have a high level of awareness and preparedness. Nearly all of the exchanges surveyed reported that their senior managers discuss and understand cyber threats and have clear lines of “upward reporting” in place. Most exchanges also reported in the survey that they have in place internal plans addressing cyber threats, although smaller exchanges were less likely to.

Most respondents also offered some form of cybersecurity training for staff, although smaller exchanges and exchanges in Europe, Africa, and the Middle East were less likely to have it. Only about 70 % of smaller exchanges reported that they made training available for their staffs.¹²³ However, even some larger exchanges reported that they did not provide general staff training and of those that did, when we look at the regularity of this training, only around 60 % offered training at least once a year.¹²⁴ Regular staff training is important because cyber threats often involve the use of sophisticated social engineering¹²⁵ to manipulate user behaviour and get past cyber defences.

While, in the IOSCO/WFE SWP Survey,¹²⁶ all exchanges reported a myriad of defence and protection measures in place, many noted that “100 % security” is impossible and that cyber resilience measures require operating under the assumption that eventually a large-scale cyberattack will breach even sophisticated defences. Thirty percent of respondents were either not sure or did not believe that current measures were sufficient to deal with the impacts of a large-scale cyberattack.¹²⁷ The AMCC’s more recent work on cybersecurity practices at trading venues demonstrated that both the threats and the solutions being developed evolve rapidly, requesting the industry to adapt continuously and preserve flexibility. In addition to proper risk assessments, controls and protection measures, response and recovery capabilities are critical.

121 IOSCO, “Report from the Chair of the Affiliate members Consultative Committee), *Annual Report*, 2014

122 R. Tendulkar, *op.cit.*, 2013

123 *Ibidem*

124 *Ibidem*

125 Social engineering is defined by ‘searchsecurity’ as a “non-technical method of intrusion hackers use that relies heavily on human interaction and often involves tricking people into breaking normal security procedures.”

126 R. Tendulkar, *op.cit.*, 2013

127 *Ibidem*

Sharing of global information is lacking

Both the IOSCO/WFE SWP survey¹²⁸ and the AMCC fact finding exercise highlighted the need for enhanced sharing of information on cyber-related developments across different jurisdictions and greater collaborative efforts at an international level.¹²⁹ In the IOSCO/WFE survey, 70 % of exchanges reported information-sharing arrangements with other actors, authorities, or regulators, although these sharing arrangements tended to be restricted by national borders. For exchanges in Europe, Africa, and the Middle East, only half of the exchanges reported sharing any information at all.¹³⁰ The AMCC exercise also emphasized the importance of collaboration between public authorities and the private sector to reinforce overall cybersecurity, and noted that, in addition to strengthening their own cyber-resilience, market infrastructures, self-regulatory organizations and industry associations have an important role to play in increasing awareness and promoting best practices.¹³¹

Assessing the risk

Cyber threats and systemic risk

As the awareness of cyber threats in financial markets grow, it is increasingly identified as a systemic risk. The IOSCO-WFE survey to stock exchanges in 2013 found that almost 90 % of the exchanges that responded viewed cyber threats as an avenue for potential systemic risk. The World Economic Forum (WEF) identified large-scale cyber threats as one of the high-impact global risks of 2015.¹³² In a DTCC survey of its financial market clients, 46 % of respondents ranked cyber threats as the biggest potential source of systemic risk, up from 33 % in September 2014 and 24 % in March 2014, and significantly ahead of geopolitical risk and the impact of new regulations.¹³³ In the latest edition of the survey, 61% of risk managers believe the probability of a high-impact event in the global financial system has increased during the past six months, the threat of a cyber-attack being the key driver behind the increased concern among respondents.¹³⁴ The DTCC itself identified cyber threats as arguably the top systemic threat facing global financial markets and associated infrastructures.¹³⁵

A successful cyberattack on a systemically important financial institution (for example, large global banks) or critical/core financial market infrastructure (for example, exchanges, clearing and settlement systems, and payments systems) is likely to have a more significant impact on the functioning of the financial system and broader economy, compared to a cyberattack against a smaller player. However, because of the increasingly interconnected financial environment, cyberattacks on smaller (and/or less systemically important) organisations may still have substantial implications for investor protection and market integrity. In addition, those smaller attacks may create unanticipated and widespread reverberations in the global financial system, via counterparty interconnectedness. This could result in reputational damage to the sector and ultimately damaged confidence. The degree of resilience of all financial market institutions to cyber threats will determine the likelihood of systemic risk as an outcome.

128 R. Tendulkar, *op.cit.*, 2013

129 IOSCO, "Report from the Chair of the Affiliate members Consultative Committee), *Annual Report*, 2014

130 R. Tendulkar, *op.cit.*, 2013

131 IOSCO, "Report from the Chair of the Affiliate members Consultative Committee), *Annual Report*, 2014

132 WEF, *Global Risks 2015*, 10th Edition, 2015

133 DTCC, *Systemic Risk Report*, Q1, 2015

134 DTCC, *Systemic Risk Barometer Survey*, Q3, 2015.

135 DTCC, *Cyber Risk – A Global Systemic Threat*, October 2014

Sector-specific vulnerabilities

Identifying all areas of vulnerabilities and the full scope of the systemic risk posed by the cyber threat to our financial markets is challenging. The cyber threat, in its current form, is relatively new and is evolving quickly, making it difficult to forecast future trends, impacts, and patterns of attack. Nevertheless, understanding past developments can shed some light on where systemic risk may stem from and which sectors are particularly vulnerable. Some recent examples of cyberattacks in the banking and financial services industry are shown in Table 6.

Table 6: Examples of cyber threats in the financial services industry

Target	Case reported
Banks	<ul style="list-style-type: none"> > Compromise of JP Morgan’s client contact details and internal information (July 2014) ¹³⁶ > Morgan Stanley’s employee leak client data (Dec. 2014) ¹³⁷ > Run on Bulgarian banks due to panic brought by false messages sent to customers (2014) ¹³⁸ > Attack on 32,000 computers and servers serving three South Korean banks (March 2013) and subsequent credit card security breach affecting 105 million accounts > Citadel botnet responsible for \$500 million in losses to consumers, banks, and other financial institutions (2013) > GameOver Zeus botnet which captured banking credentials from infected computers to initiate or redirect wire transfers (losses → \$100m) > Two criminal plots to ransack British commercial banks using keyboard, video, mouse switched directly on the banks’ systems (Sep. 2013) ¹³⁹
Markets	<ul style="list-style-type: none"> > Report of M&A cyberattacks targeting market-moving information about deals (Nov. 2014) ¹⁴⁰ > Hacking of the Associated Press Wire’s Twitter account with a false announcement of an attack on the White House that had a temporary impact on the market (April 2013) > Cyberattack on the Chicago Mercantile Exchange (CME) that resulted in the compromise of 7,000 passwords of its ClearPort clearing system (July 2013) ¹⁴¹ > Infiltration into the Nasdaq OMX Group’s confidential document-sharing service (2011) ¹⁴² > Breaches in the EU’s carbon trading market leading to the theft of 30 million EUR of emissions allowances and the suspension of trading for a week (2011)
Asset Managers	<ul style="list-style-type: none"> > Some reports of spear fishing attacks, stealing of trading information or algorithm codes, or other cases of hedge funds being locked out of their computer files by hackers ¹⁴³ > Reports of breaches in the systems of private equity firms or property trusts ¹⁴⁴ > Leakage of data containing information on 120,000 entities from fund administrator (2013) ¹⁴⁵

Source: AMCC Task Force, based on various sources. Note: Information on all examples provided is in the public domain.

¹³⁶ US SEC, “Form 8-k”, Current Report, JPMorgan Chase & Co, October 2 2014

¹³⁷ Wall Street Journal, “Morgan Stanley Fires Employee Over Client-Data Leak”, January 5, 2015

¹³⁸ The Economist, “Why the run on banks?”, 1 July, 2014

¹³⁹ C. Martin, “Speech at Financial Services Summit 2014”

¹⁴⁰ Financial Times, “M&A cyber hackers target deal information”, 1 December, 2014

¹⁴¹ CME, “CME Group confirms cyber intrusion”, Press Release, 15 November, 2013

¹⁴² Reuters, “Nasdaq hackers spied on company boards”, 20 October, 2011

¹⁴³ Coco Connect, Peer Group Network; see also FT, Cybercrime threat stalks fund houses, February 1, 2015 and Cybercriminals target algorithms, February 22, 2015.

¹⁴⁴ Fitch Wire, “Apartment REIT’s Data Breach Could be Harbinger”, Fitch, October 2014

¹⁴⁵ COOConnect, “Hedge Funds should improve risk assessments on service providers/ security policies”

In addition to these specific examples, some sector-specific developments are listed below:

Exchanges and clearing houses

Those perpetrating cyber threats are also increasingly targeting market operators. As revealed in the IOSCO/WFE SWP survey, similar to the banking industry, denial-of-service attacks are common, along with the download or installation of malicious software and data theft.¹⁴⁶ According to respondents to the survey, trading or clearing platforms have not been directly breached, since these are usually segregated from web services.¹⁴⁷ Exchanges and clearing institutions provide a critical service but are relatively few in number, highlighting their importance. Also, the high level of interdependency and interconnectivity between these infrastructure providers and other financial market participants heightens the systemic consequences of failure from cyber threats.

Payment and settlement systems

The risk of cyber threats also extends to payments systems. Payment systems are becoming less bank-centric and more diverse, increasing the entry points for those looking to steal, divert, or disrupt payments. Continued threats to payment systems may erode user confidence, increasing transaction costs and, hence, efficiency of the system. In an extreme case, this could crystallise in settlement failures affecting the ability of financial institutions to make payments to other parties, including their customers. Such failures, if sufficiently large, could cause liquidity shortages and significantly disrupt the financial system.¹⁴⁸

Asset managers

The prevalence of outsourcing in the asset management industry means that investment managers, service providers, and other stakeholders must work together closely to prevent cybercrime, as information and data are increasingly shared.¹⁴⁹ There is also a growing opportunity for fund managers to participate in improving corporate cyber resilience through assessing corporate management of cyber risks as they do on other social responsibility initiatives.

Broker-dealers

Investors' growing use of online accounts and electronic trading are likely to contribute to increased cyber threats for market participants. There have been cases of client accounts being hacked or manipulated, but those activities did not have a systemic effect, as the victims were generally retail investors.¹⁵⁰

Alternative finance participants

Alternative financing methods include crowdfunding and the use of peer-to-peer (P2P) lending platforms. These types of crypto-currency exchange platforms are vulnerable to cyberattack. This is especially so since these participants tend to operate their business mainly or solely via the internet. Further, start-up companies in this field may have low budgets and limited resources available to put towards maintaining their own cyber resilience. These challenges are significant because these start-up companies may hold valuable client information or privacy content that could be attractive to a cybercriminal. Mt. Gox, a bitcoin exchange, suffered extensive denial of service attacks in February 2014. The attacks forced a halt in services and left investors unable to access their bitcoins. As a consequence of this cyberattack, Mt. Gox filed for bankruptcy after news of the attack went public, although there are still questions about the origination of the attack, with recent evidence suggesting that it might have been a case of embezzlement.¹⁵¹

146 R. Tendulkar, *op.cit.*, 2013

147 *Ibidem*

148 <http://download.asic.gov.au/media/3062900/rep429-published-19-march-2015-1.pdf>

149 PWC, *Threats to the Financial Services Sector*, 2014.

150 <http://download.asic.gov.au/media/3062900/rep429-published-19-march-2015-1.pdf>

151 M. Gehem, A. Usanov, E. Frinking and M. Rademaker, "Assessing Cyber Security: A meta analysis of threats, trends, and responses", *The Hague Centre for Strategic Studies*, 2015

Banking sector

News of a number of cyber threats against banking institutions have made it into the public sphere. These high-profile threats bring to light investor and customer protection issues, drawing attention to the importance of banks defending against breaches of customer accounts. The visibility and status of large global banks also means that they are a consistent target for DDoS attacks aimed at compromising the availability of network and systems. Verizon estimates that crimeware (including Malware used to launch DDoS attacks), web applications, and skimming attacks make up 75 % of all cyber incidents affecting financial services firms in 2014.¹⁵² Large DDoS and data theft attacks may have the potential to affect confidence in the proper and continuous functioning and integrity of the financial system.

Third party vendors and outsourced partners

A firm's business ecosystem now involves online data sharing and access to the networks and systems of their business partners, vendors, and other third parties. This makes financial firms more interconnected, including across jurisdictions. Increased reliance on third-party vendors without corresponding cybersecurity monitoring may act as a point of vulnerability in the financial services industry. Large firms may not extend their cybersecurity practices and monitoring to third parties in their business ecosystem.¹⁵³ As this ecosystem expands with the addition of new vendors, firms face an increasing "threat surface" for cybercriminals to exploit.¹⁵⁴ See Box 2 for an example.

Box 2: Example – credit card information theft as a result of third party vendor's intrusion.

In December 2013, the credit card information for more than 40 million credit cards was stolen from the systems of the United States retail chain Target Corporation, causing damages of more than US\$ 200 million, in addition to severely damaging consumer confidence. Hackers had breached Target's security measures through the systems of a third-party vendor of air conditioners. The vendor had access to Target's systems for remote maintenance of the air conditioning system. By installing malware on the IT systems of the vendor, hackers were able to infect Target's payment terminals and collect the credit card information.

The majority (69 %) of respondents to a U.K. survey reported that they did not assess, for cyber risk, the suppliers and/or customers they trade with.¹⁵⁵ This trend is particularly of concern to the financial services sectors/firms that face compressed margins and are increasingly relying on this service to lower costs. When margins are low, firms are likely to passively manage third-party vendors. Similarly, cybercriminals consider small and mid-tier organisations easier targets because of a lack of funding and resources put towards preventing cyber threats.¹⁵⁶

To address third-party risks, the current "self-certification" process for monitoring and mitigating this risk may need to be replaced with more active management.¹⁵⁷ However, some evidence suggests that active monitoring of third-party vendors has not been improving. In the PWC Global State of Information Security Survey, 2015, only 50 % of firms surveyed conducted risk assessments on third-party vendors in 2014 (down from 53 % in 2013).

152 Verizon, *Data Breach Investigations Report*, 2015.

153 PWC, *Global State of Information Security Survey: 2015*, 2015.

154 Deloitte, *Transforming cybersecurity: New approaches for an evolving threat landscape*, 2014.

155 UK 2015 Cyber Risk Survey Report, June 2015.

156 PWC, *Cyber security incidents more frequent and costly, but budgets shrink*, October 2014.

157 Booz Allen, *Financial Services Cyber Trends for 2015*, November 2014.

Cloud computing suppliers

The potential for a third-party vendor to be a systemic threat is elevated when there is a high concentration of suppliers for a particular service.¹⁵⁸ In these cases, a breach of a major provider is likely to have ramifications for many upstream firms, heightening disruption and cost.

The adoption of cloud services has grown strongly in recent years. There are increased risks from using cloud services to store confidential information, particularly public clouds or services located in foreign jurisdiction, rather than using in-house data storage. A breach of a large cloud provider is more likely to have systemic consequences than an in-house breach.

Public and social media

The increasing reliance of financial services firms, and their employees, on social media to communicate to customers and the public in general, has made social media vulnerable to cyber threats. A recent example from 2015 is described below in Box 3.

For example, in 2013, the Associated Press Wire's twitter account was hacked to announce a bombing of the White House, even though no event had taken place. This "tweet" had both a material and negative impact on the stock market.¹⁵⁹ Another example involves Whitehaven Coal and ANZ Bank, where perpetrators spread false rumours, under the guise of an ANZ bank official notice, which caused Whitehaven Coal's value to drop in the marketplace.¹⁶⁰

Other areas of vulnerability include the propagation of false market information through online, anonymous chat rooms dedicated to trading activity and the distortion of information on a firm's public-facing website. The potential for more hackers to breach "trusted" sources, for example, company announcement platforms (see next section and text box below), could have the potential to increase volatility in markets and even cause widespread market dislocation.

Box 3: Example – public media and the cyber threat

On August 11, 2015, the U.S. Securities and Exchange Commission announced fraud charges against 32 defendants for taking part in a scheme to profit from stolen nonpublic information about corporate earnings announcements. Those charged included two Ukrainian men who allegedly hacked into newswire services to obtain the information and thirty other defendants in and outside the United States who allegedly traded on it, generating more than \$100 million in illegal profits. The SEC charged that over a 5-year period, the two defendants spearheaded the scheme, using advanced techniques to hack into two or more newswire services and steal hundreds of corporate earnings announcements before the newswires released them publicly.¹⁶¹

158 Examples include: The provision of market data and trading software in Australia is heavily concentrated with one provider. Similarly, the largest provider of cloud services had 30 percent of the market at the end of 2014, and the largest four providers had 50 percent of it (Synergy research group).

159 U.S. equity markets fell by 1 percent after the tweet, although they quickly recovered.

160 The perpetrator received a one-year, eight-month suspended jail sentence.

161 <https://www.sec.gov/news/pressrelease/2015-163.html>. There was also a subsequent press release that announced a settlement. <http://www.sec.gov/news/pressrelease/2015-191.html>

Privacy and publication of price-sensitive information

Related to the previous vulnerability, the privacy of price-sensitive, proprietary company information, as well as its orderly dissemination to investors when necessary, is a key precondition for the integrity of capital markets. This is dependent on the ability of firms to contain this information and, when necessary, to disseminate it to the public in a non-discriminatory way. When this precondition is no longer satisfied, investor confidence in the fair and orderly functioning of capital markets could be impacted.

In August 2011 seven listed companies on the Hong Kong Exchange were suspended as a distributed denial of service attack interrupted the operation of the HKExnews website from transmitting company information just prior to their announcements of interim results.¹⁶²

System patching and misconfiguration

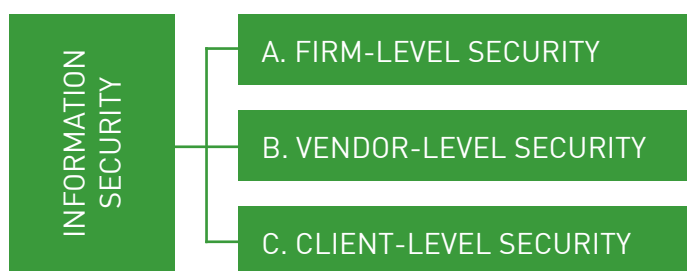
Some of the key vulnerabilities in financial markets do not stem from new developments but from issues that are well known but have not yet been addressed. According to the Hewlett-Packard (HP) Cyber Risk Report 2015, 44 % of known breaches came from unpatched vulnerabilities, at least 2-4 years old, and server misconfigurations were the number one vulnerability.¹⁶³

In fact, the JP Morgan data breach of almost 76 million households and 7 million business records in 2014 was reported to be the result of failing to upgrade one of its servers with two-factor authentication.¹⁶⁴ This is seen as a particular challenge when businesses expand through acquisitions and do not adequately maintain peripheral parts of the business.

Client/Customer interface and awareness

Many firms offer various connectivity options to their clients and customers for products and services such as internet access to accounts and payment with mobile devices. In many cases, the firm views the client as part of the cyber- security chain. To date, firms seem to vary in the degree to which they hold their clients accountable when issues of cybersecurity arise.

Figure 26. Levels of information security



Source: IOSCO

This raises the question of how the firm is communicating to its clients to make them aware of their degree of responsibility in this area (see Box 4 for example). For example, retail clients using the online and mobile payment

¹⁶² Financial Times, *Hong Kong exchange hacked again*, 11 August, 2011

¹⁶³ Hewlett-Packard, *Cyber Risk Report 2014*, February 2015

¹⁶⁴ M. Goldstein, N. Perloth and M. Corkery, "Neglected Server Provided Entry for JPMorgan Hackers", *New York Times*, December 22 2014

services that their banks offer need to know about the vulnerabilities of the combination of their systems (PC, smartphone, etc.) and their behaviour. Many banks endorse the use of mobile apps for online banking. These mobile apps are running on smartphones that have an operating system that is vulnerable to malware.

A 2013 report by Kaspersky¹⁶⁵ suggests that, while 38 % of mobile users report having experienced cybercrime on their mobile platform, more than 50 % of users are unaware of the existence of software for mobile security. The Australian Securities & Investments Commission (ASIC) 2015 report on cyber resilience pays attention to risks for consumers, highlights the importance of consumer awareness, and provides them with an online guide on protection from online scams¹⁶⁶.

All stakeholders carry a responsibility for cybersecurity of their information. In some cases, cybersecurity needs may be above what can be ensured through the capabilities of clients and customers of a firm. When it comes to a firm's clients cybersecurity, currently there do not seem to be any internationally or regionally recognised standards (industry or regulatory) for client treatment, in terms of protecting client assets in the case of a cyber-attack.

Box 4: Netherlands – bank account holder obligations

In the Netherlands, holders of bank accounts have several obligations when making use of internet banking facilities. These obligations have been developed and implemented in a uniform way through the Dutch Banking Association. For example, clients need to ensure that the software installed on the machine that is used to access the account is up to date and that no illegal software is installed on it. Also, clients have the obligation to check their account balance for unwarranted withdrawals at least every two weeks. If a client does not adhere to these obligations, the client can be held responsible for any misappropriation of their account funds, even if it was the result of cybercrime.

Looking forward

While experts and regulators are unable to determine how cyberattacks will evolve, the global focus on the impact of cyberattacks is expected to accelerate as these things occur:

- > The role of technology in the provision of financial services deepens (for example, the rising adoption of web, mobile, cloud, and social media technologies);
- > financial systems become increasingly interdependent and interconnected; and
- > the motivations behind cyber threats (for example, the hacking environment includes “hacktivists” seeking to disrupt financial activity; cybercriminals motivated by financial gain; terrorists aiming to cause political and financial instability; and nation state-related entities with varying motivations and interests¹⁶⁷

¹⁶⁵ <http://media.kaspersky.com/en/Kaspersky-Lab-KSN-report-Financial-cyber-threats-in-2013-eng-final.pdf>

¹⁶⁶ ASIC, “Protecting yourself from online scams”, *Money Smart Financial Guide*

¹⁶⁷ CPMI, *Cyber Resilience in Financial Market Infrastructures*, November 2014.

The developments identified earlier in this chapter suggest that increased vulnerability in financial markets to the cyber-threat may arise through certain key channels, which are listed below.

1. third party vendors;
2. information and communication platforms;
3. patching and misconfiguration;
4. threats to exchanges; and
5. uncertainty around client/customer responsibility

Regulators around the world are focusing on increasing the cyber resilience of financial systems. In general, the response of regulators to the increasing cyber risk in the financial sector can be categorized as including one or more of the following mitigation factors:

- > **General awareness raising**
- > **Increase focus on cybersecurity** as part of within broader governance, business continuity and operational management requirements
- > **Performing examinations and requiring self-assessments**
- > **Conducting surveys** of their regulated population to better understand how they are managing cyber challenges **and reporting to the industry**
- > **Providing guidance** to firms around reducing their risks, identifying opportunities to improve cyber resilience like increase collaboration between industry and government and current legal and compliance obligations
- > **Preparing consumer guides** to help individuals protect against online scams and cyber risks
- > **Establishing real-time cyber-incident network among regulators and law-enforcement bodies**
- > **Participating in periodic industry-led crisis management and cross-border cyberattack drills**

Annex 2 describes in more detail some of the approaches of a selection of market regulators¹⁶⁸ to the cyber risk.

¹⁶⁸ It is a selection and not meant as an exhaustive treatment of all regulatory activities

7. DISCUSSION ON ASSET MANAGEMENT

As economies recover from the 2008 crisis, financial markets are facing a period of transformation that may change the way they operate and thus how risks and issues of market efficiency and investor protection take shape. There are three major factors that contribute to this transformation:

- > spillovers from monetary policy and the spectre of unwinding liquidity (see Chapter 2, section a.);
- > continuing globalisation of financial markets (see Chapter 2, section b.); and
- > the digitalisation of the economy (see Chapter 2, section c).

IOSCO is addressing a number of these issues.¹⁶⁹ IOSCO is also working alongside other standard setters, namely the Basel Committee for Banking Supervision (BCBS), the Committee for Payment and Market Infrastructures (CPMI) and the International Association of Insurance Supervisors (IAIS). Furthermore, IOSCO is contributing to the work of the Financial Stability Board (FSB), as well as doing work on behalf of the G20, to address these emerging issues. One issue that has also received wide attention is potential risks from asset management.

The expert's responses to the IOSCO Risk Survey neither mentioned potential systemic risks stemming from the asset management industry, nor has it come up in the risk lists of the experts of the CER.¹⁷⁰ However, many commentators and other international organisations have raised concerns about the interactions of the asset management industry with a number of asset classes, including less-liquid bond market segments. Given the increased focus on a core group of IOSCO members, we decided to use this edition of the Outlook to comment on this subject. This is in addition to the work that the CER has already undertaken (it developed a number of case studies to assess potential liquidity vulnerabilities associated with asset managers) and the report that IOSCO's Committee 5 on Collective Investment Schemes published recently on the liquidity management tools available to regulators and funds globally.^{171 172}

Concerns relating to potential systemic risks associated with the activities of asset managers have been at the fore of financial stability discussions in recent years.¹⁷³ Assets under management have grown since the crisis of 2008. Although growth has broadly been across all fund assets classes, in an environment of low interest rates and yield

169 For example, IOSCO is doing work on cyber risk, corporate bond market liquidity, asset management, and cross-border regulation.

170 S. Worner, *op.cit.*

171 The participating jurisdictions in the CER case studies included Australia, Brazil, Hong Kong, Japan, the Netherlands, Spain, Turkey, and the United States, with stress periods ranging from 2003 to 2014. While the selection of specific fund cases was at the individual member's discretion, guided by data availability and knowledge, the case studies were carried out using a common template for information-gathering purposes.

172 IOSCO, *Liquidity Management Tools in Collective Investment Schemes*, 2015.

173 For example, please see the following: OFR, *Asset Management and Financial Stability*, 2013; IMF, *Global Financial stability report*, April 2015; and IOSCO and FSB consultations on NBNI G-SIFs. (<http://www.iosco.org/library/pubdocs/pdf/IOSCOPD479.pdf> and <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD435.pdf>); comment letter from SEC Commissioner Gallagher (<http://www.sec.gov/comments/am-1/am1-52.pdf>); and Speech by Andrew Haldane (<http://www.bankofengland.co.uk/publications/Documents/speeches/2014/speech723.pdf>)

search, many investment strategies that are focused on less liquid asset classes, such as emerging market debt funds and funds with alternative strategies, have seen particularly significant increases in assets under management. Many funds—including those with less liquid strategies—offer daily (or T+2 or T+3) redemption, which could create a timing mismatch between when a fund is required to pay redeeming shareholders and when any asset sales that the fund executes in order to pay redemptions will settle. Coupled with this, some metrics indicate that bond market liquidity in these market segments has also declined since the 2008 crisis. Consequently, many commentators have expressed concern that in an environment of interest rate reversal from the record lows currently seen, holders of funds could divest their holdings as the capital component of their bonds decreases in value. Perceiving some so-called “first mover advantage,” unit holders could try to redeem, en masse, potentially forcing funds to liquidate their holdings in illiquid markets, amplifying price falls and thereby creating a price decline spiral.

Although this is just one of many other plausible scenarios, there are, however, important questions left unanswered because of data gaps and the diversity of industry practices with respect to funds’ liquidity risks and risk management practices. The debate about a lack of secondary market liquidity in corporate bond markets and the role of funds’ interaction in this market has not been resolved. We discuss this in Chapter 4 of this Outlook. Existing fund liquidity risk management practices, as well as regulatory tools to aid fund managers in bridging any timing mismatch between when a fund is required to pay redeeming shareholders and when asset sales executed in order to pay redemptions will settle, influence the extent to which market liquidity concerns could create incentives for early redemptions.

What follows is a discussion, from a securities markets perspective, on the asset management industry, the current debate on asset management interactions with perceived less-liquid markets, and why more work is needed to fill the knowledge gap. This chapter summarises the trends in the industry and relevant research and assesses whether there may be areas of potential risks associated with the management of assets.

Trends in asset management

Global net assets and growth rates

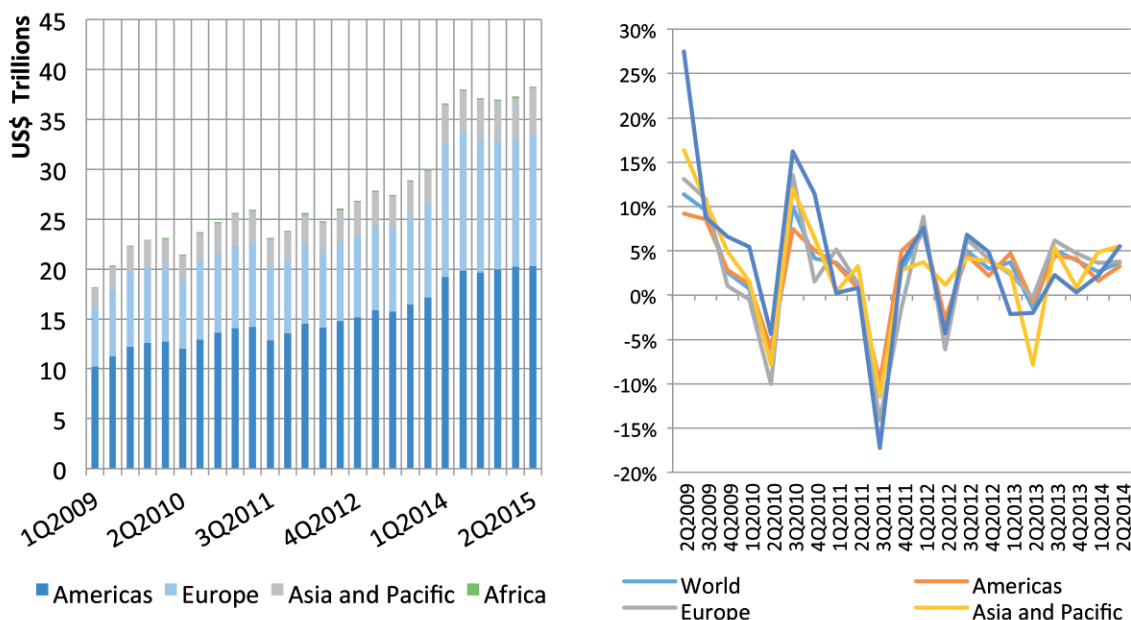
Overall, global net assets under management (AuM) increased from \$18.1 trillion to \$38 trillion by Q2 2015 (see Figure 25). The increase stems partly from net-inflows of capital and the price increase of the assets in the funds.

The majority of the increase has been the Americas’ market with AuM \$20 trillion, up from \$10.2 trillion.¹⁷⁴ Europe increased from \$5.8 trillion to \$13 trillion over the same time period. Asia also saw similar growth, with AuM at \$4.6 trillion in Q2 2015.

In parallel to this rise in AuM globally and regionally, the global volume of bond market issuances, since the crisis, has averaged \$5 trillion annually. Overall, the total amount of bonds issued totals \$70 trillion. Equities markets, at the height of the crisis, had a market capitalisation of \$27 trillion. By March 2015, this was \$70 trillion, a 1.6-fold increase.

174 “Americas” includes North, Central and South American asset management markets.

Figure 26: Global total AuM (LHS) and growth rates of AuM (RHS) broken down by region

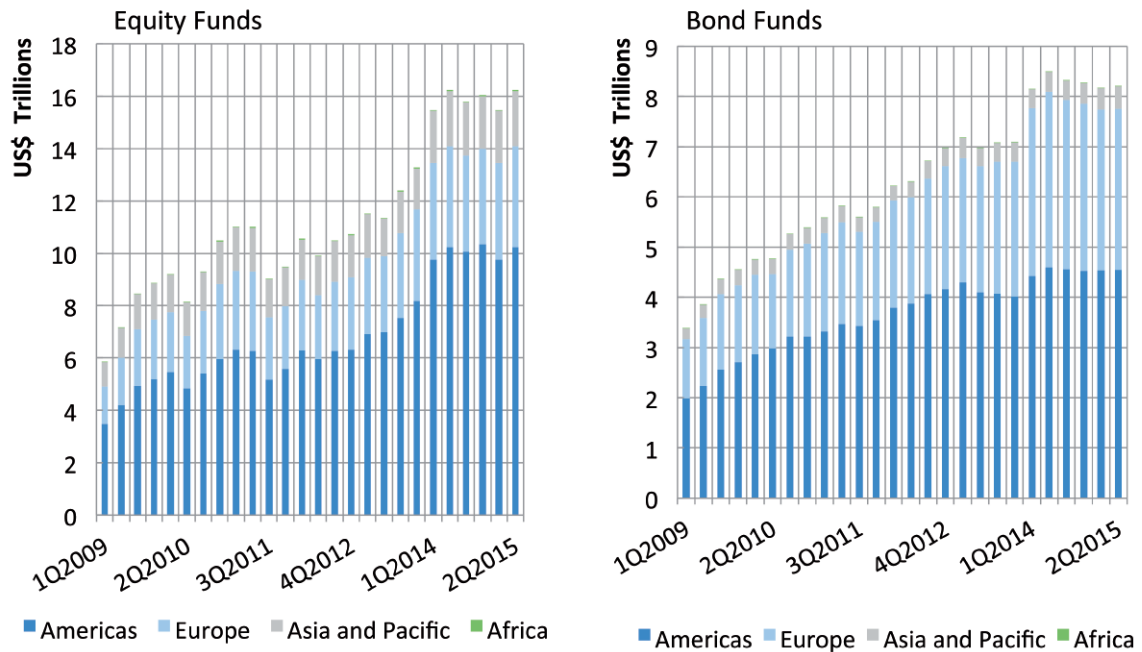


Source: IIFA, IOSCO
Data as at Q2 2015

A fund strategy view

Separated by fund strategy type, Figure 26 highlights that the greatest proportion of assets are equity fund allocations, followed by bond fund allocations. This is true across all geographic regions. In terms of growth, equity funds have seen their assets under management increase almost 1.5 times; equity funds’ collective AuM currently stand at \$16.7 trillion. Bond funds, on the other hand, have current net AuM of \$8.2 trillion (almost half that of equity funds) and have grown since 2009 by a factor of 1.8 times. Other fund types, in terms of their growth, have seen more marked increases. For example, balanced funds and funds-of-funds have seen a respective 2.2-fold and 3-fold increase in AuM from 2009 to Q2 2015.

In summary, although bond funds have been growing since 2009, the growth rates of bond funds’ collective AuM has not been as substantial as that of other assets strategies. Additionally, the amount of AuM allocated to bonds funds is far less than other asset strategies, namely equity. Some of this can be explained by the large growth of the equities markets since the crisis, but a more in-depth look at the net that flows into funds will provide an insight into new asset flows and, more importantly, where new money is invested. This is covered in the next section.

Figure 27: Net assets by region broken down by fund type Q1 2009 - Q2 2015

Source: IIFA, IOSCO

Flow into and out of investment funds

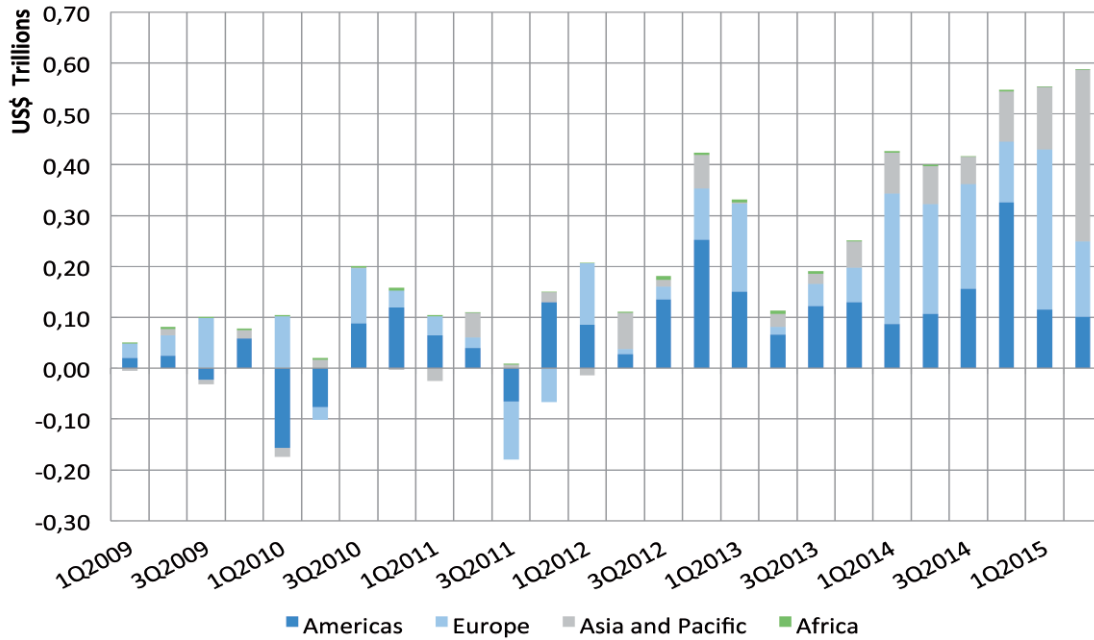
Figure 28 presents the global level of net sales into and out of investment funds. For all but three calendar quarters, net flows into funds globally have been positive. Average quarterly inflows have been \$154 billion; however, inflows have been much larger since Q4 2012. Since the end of 2013, average quarterly inflows have been \$300 billion. Much of the inflow has been to funds in the Americas and Europe. Both regions have experienced average net sales of over \$60 billion per quarter. Consequently, funds registered in the Americas and Europe, together, captured 82% of flows in aggregate.

It is, however, interesting to see which strategies have been receiving much of the new flows. Figure 29 below highlights net sales by fund strategy. The figures highlights a few interesting trends:

- > most new investment happens through either equity or bond strategies; and
- > bond funds, especially America-based funds, capture the largest proportion of new flows into funds.

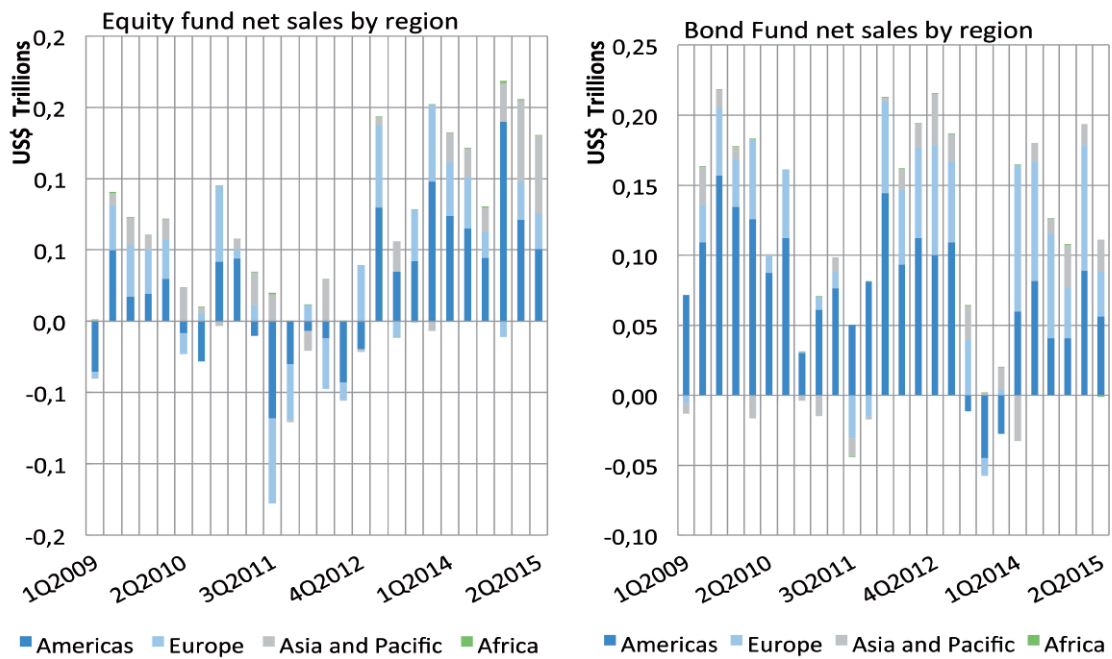
Appetite for non-traditional types of investments continued to grow. Inflows into fund-of-fund strategies have remained positive for the past 5 years, representing average quarterly net inflows of \$50 billion. However, equity and bond funds have seen the largest net inflows by volume. Equity funds saw average quarterly net inflows of \$35 billion; bonds funds experienced \$113 billion, over 3 times as much. Putting this into context, global bond issuances (not including short term debt and money market issuances) averaged quarterly at \$1.55 trillion. In total, bond funds have received inflows of \$2.7 trillion while primary market issuances totalled \$49.5 trillion. As such, new bond fund purchases represent 7.2% of all new issuances. Figure 30 shows a more granular depiction of the portion of net bond fund sales to global bond issuance.

Figure 28: Total net sales by region Q1 2009 – Q2 2015



Source: IIFA, IOSCO

Figure 29: Net sales by fund type Q1 2009 – Q4 2014

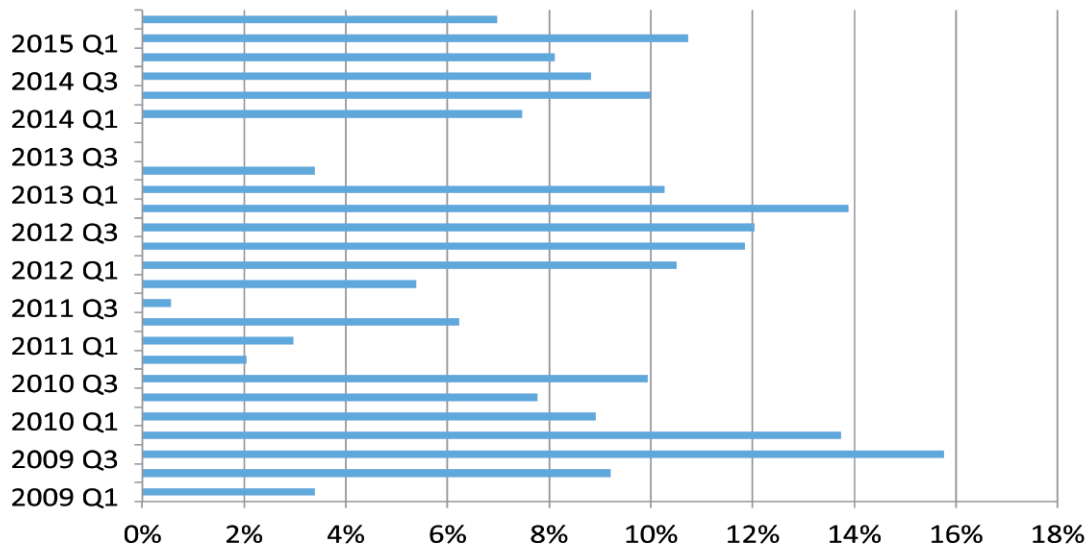


Source: IIFA, IOSCO

Footprint of industry

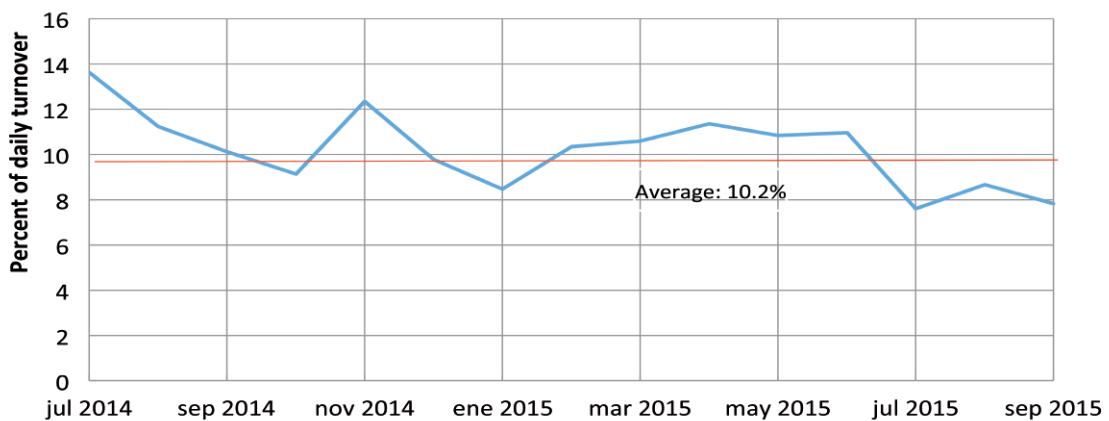
As mutual funds grow, in terms of AuM, the underlying markets they invest in have also grown, coupled with the composition of fund investors. Blackrock reported that both onshore and offshore institutional investors directly held around 60 % of U.S. high-yield debt, whereas mutual funds held only 28 %.¹⁷⁵

Figure 30: Proportion of net bond fund sales to global bond issuances Q1 2009 – Q4 2014



Source: IIFA; Dealogic; analysis by IOSCO Research

Figure 31: High yield bond funds’ share of high-yield trading volume; monthly, July 2014–September 2015



Source: Investment Company Institute and FINRA TRACE

Note: Data exclude high-yield funds designated as floating rate funds. Aggregate data for high-yield transactions, including 144a transactions, are only publicly available starting in July 2014.

175 Blackrock, *Viewpoint: Who owns the assets? A closer look at bank loans, high yield bonds and emerging debt*, 2014.

But the changing investor composition base also could have an effect on asset flows into and out of funds. Figure 30 and Figure 31 highlight two metrics on the potential market footprint of high yield bond funds. The first compares high yield bond funds sales as a proportion of primary market issuances, while the second measure highlights high yield bond funds share of) daily turnover in U.S. high-yield trading.¹⁷⁶ Overall, net sales that flow into bond funds represent less than 6 %, on average, of the quarterly primary issuance market. Similarly, when compared to secondary market turnover (in a U.S. context), high-yield bond fund trading represents, on average, 10 % of market trading.

Lessons learned from case studies

With the goal of finding empirical evidence of fund dynamics in times of stress, including the effects of market stress on investor behaviour, fund manager actions, regulatory responses, contagion across funds, and post-stress outcomes, the CER produced a set of case studies on the basis of information that a number of countries had provided. Reviewing episodes of severe market stress and taking stock of actual “incidents” at the fund level assists in gauging the scope of possible vulnerabilities and also informs as to how fund outflows may manifest themselves in the future.

As to open-end mutual funds, jurisdictions reported very few incidents, over the past decade, of funds having insufficient capacity to meet redemptions. This finding is important if one takes into account that the period of inquiry covers instants of several sharp market corrections.¹⁷⁷ For example, funds in the United States did experience an increase in redemption requests following a stress event, but these were not large enough to halt redemptions altogether or lead to systemic events. Of the funds that did face problems meeting redemptions, all had invested in assets with limited liquidity, across a wide range of asset classes.

A similar conclusion can be drawn from case studies for Australia, the Netherlands, and Spain. The common denominator in these case studies was real estate, an illiquid asset class. Even in the absence of a housing market downturn, the open-end investment funds in these countries holding substantial real estate investments ran into liquidity problems during periods of high redemptions. In these cases, problems with meeting redemption demands were addressed with a suspension of redemptions and required coordination with the supervising regulator. There was no sign of spillovers or any other symptoms that could indicate systemic risk.

In the case of Brazil, the stress event was not related to redemptions. The problems with the fund mostly stemmed from a high concentration in a single company’s assets through equity holdings or long-forward contracts. This was followed by deterioration of the underlying company’s stock amidst general market relapses that forced the fund to post an increasing amount of collateral on derivative contracts and, subsequently, it ran out of liquid assets. The case was isolated and did not have repercussions in the broader financial market.

For redemption-induced asset sales to be disruptive (i.e., depress market prices beyond what would occur otherwise), the volume of the sales has to be large relative to the overall size of the asset’s market. However, the case studies showed that the typical fund size, regardless of asset strategy, tended to be small, and even the largest funds in a particular segment typically hold a relatively small fraction of market share in a portfolio asset. Nonetheless, larger funds that experience problems with meeting redemption requests do not automatically trigger a systemic event.

One notable way funds could adversely impact financial stability is through the mismatch between portfolio asset liquidity and investor redemption rights. For example, the 2008 global financial crisis, along with the introduc-

¹⁷⁶ The discussion focuses on high-yield bond funds, since much of the commentary has been on the relative illiquid nature of the high-yield bond market and its interaction with bond funds that offer daily redemptions.

¹⁷⁷ Post-crisis investment strategies show significant difference from the previous ones, as highlighted previously. This might make it more difficult to predict mutual funds’ capacity to meet redemptions from their past data.

tion of bank deposit guarantees by the government, resulted in heavy investor outflows from mortgage funds to lower-risk guaranteed bank deposits in Australia. Several mortgage funds experienced issues with fulfilling the increased number of redemption requests, given the mismatch between the very illiquid underlying investments and the redemption terms offered to fund investors, occasionally resulting in a suspension of redemptions. However, no systemic event resulted from the fund incidents analysed in the case studies for Australia or other countries, which suggests that the sector is generally resilient. Other ways that funds could potentially impact financial stability, separate from a funding or liquidity mismatch, is through the use of leverage and their level of interconnectedness with banks or systemically important infrastructure. While the use of leverage and derivatives in the sector is generally constrained by regulation and therefore low, the use of derivatives can lead to knock-on effects via collateral and margin requirements, as seen in the case studies for Brazil.¹⁷⁸

After this review, the U.S. Securities and Exchange Commission's Division of Economic and Risk Analysis published a staff paper that examined the U.S. mutual fund industry with particular attention to fund flows, the liquidity of fund portfolios, and the interaction of those characteristics.¹⁷⁹ The SEC staff noted that mutual funds in investment categories that hold potentially less liquid assets are growing quickly and face more volatile flows compared to more traditional funds. Alternative strategies have both the highest average net flows and the highest average net flow volatility of any investment category. Among many other empirical results, the analysis showed that the liquidity of the equity portfolio of U.S. equity fund is greater when flow volatility is greater and that the liquidity of those same portfolios decreases after large outflows. While the SEC staff analysis of the U.S. fund industry provides significant insight into recent experience with equity portfolios, gaps in the understanding regarding vulnerabilities associated with asset managers remain.

Looking forward

Data show that mutual funds generally experience greater net inflows than outflows, and in aggregate benefit from a stable investor base. Additionally, funds' investments in portfolio assets do not currently represent a large portion of the market for these assets as a whole. The historical case study examination did not produce evidence of contagion or systemic events following fund liquidity stress events outside the money market fund space.

However, it is important to take a holistic approach to the markets, considering all actors and the substantial changes in the market environment related to unprecedented monetary policy, a significant wave of reforms, and heightened innovation. To enhance our understanding of the fund industry, there is a need for further work to which IOSCO and its members are actively contributing. Further empirical examination of the fund sector landscape is warranted, as well as identifying critical data gaps and developing testable hypotheses to provide much needed quantitative estimates of potential impacts. While the case studies focused on liquidity risks, or front-end exposures, the back-end or settlement risks merit further study as well; an examination of these risks could take stock of securities lending activities, use of synthetic leverage, bank lending, and settlement structures.

178 At the time of this writing, the U.S. SEC had proposed a new rule and amendments to certain proposed forms related to the use of derivatives by registered investment companies and business development companies on December 11, 2015. The white paper is posted at http://www.sec.gov/dera/staff-papers/white-papers/11dec15_derivatives.html

179 SEC, "Liquidity and Flows of U.S. Mutual Funds," *DERA White Paper*, 2015.

ANNEX 1. LONG LIST OF RISKS

The *short list of risks* described in Chapter 1 is derived from a *long list of risks*. Table 7 below presents the long list. The Table is based on responses for each risk category in the IOSCO Risk Survey. Colour-coding is used to differentiate the frequency of responses into distinct bands, according to of the level of responses from IOSCO members and market experts and is not intended to cast judgement on the likelihood or severity of a risk manifesting. Each risk category is further divided by the IOSCO objective it threatens: (1) financial stability; (2) investor protection; and (3) market efficiency.

Risks marked in red indicate that the risk had a high frequency of responses in the IOSCO Risk Survey, from both external experts and IOSCO members; risks marked in amber indicate high frequency of responses from either external experts or IOSCO members and medium frequency of responses from the other group; yellow indicates medium frequency of responses from both IOSCO members and external experts; and green indicates a low frequency of responses from both groups.

Table 7: Long list of risks to financial stability, investor protection, and market efficiency

Financial Stability	Investor Protection	Market Efficiency
Cyber security	Retail financial products and services	Market liquidity
Search for yield	Financial risks disclosure	High frequency and algo trading
Corporate governance	Search for yield	Regulation
Regulation	Harmful conduct	Corporate governance
Sec lending, repo and collateral transactions	Cyber security	Harmful conduct
CCPs	Corporate governance	Fragmentation
Capital inflows	Regulation	Cyber security
Exit strategies of central banks	Financial literacy	Shadow banking
Shadow banking	Structured products	CCPs
Harmful conduct	Retail FX trading platforms	Sec lending, repo & collateral transactions
Financial risks disclosure	Crowdfunding	Benchmarks
Leverage	Crypto-currencies (e.g., Bitcoin)	Financial risks disclosure
Over the counter derivatives	Leverage	Technology
Fragmentation	Technology	Audit quality
Technology	High frequency and algo trading	Securitisation
High frequency and algo trading		Search for yield
Structured products		Over the counter derivatives
Retail financial products and services		Exit strategies
Securitisation		

Source: IOSCO Research Department, taken from S. Worner, "A Survey of Securities Market Risk Trends 2015: Methodology and detailed results." December 2015.

In total, the IOSCO Risk Survey generated 24 distinct potential risk categories. Below follows a brief description of some of the risks that did not make it to the short list.

Risks related to the search for yield. In a relatively low interest rate environment, investors may be driven to “search for yield” by increasing their risk-taking. Some responses in the IOSCO Risk Survey noted that this search for higher yielding products may be driving prices of some assets to levels that are not fully reflective of the risk of the product, i.e., accommodative monetary policy in some jurisdictions may be distorting the pricing mechanism in financial markets. Furthermore, survey respondents noted some concern that investors globally may be taking on “too much” risk as risked might not be fully priced in. Looking forward, a sudden reversal of interest rates could lead to rapid repricing in some asset classes, resulting in losses for groups of investors. This could be an investor protection issue if investors that take on increasing risk are unaware of this possible scenario. The *IOSCO Securities Markets Risk Outlook 2014-15*¹⁸⁰ analysed this risk in depth.

Corporate Governance. Corporate governance failures in financial institutions have resulted in a series of scandals (such as manipulation of Euribor, Libor and Tibor rates and foreign exchange prices). Governance failures have also been pointed to as one of the underlying causes of the global financial crisis. In the IOSCO Risk Survey, some respondents again expressed concern that governance in firms, including systemically important firms, has not improved sufficiently.¹⁸¹ From an investor protection perspective, weak corporate governance may result in firms providing products, services, and advice that are not in the best interests of their clients, resulting in, for example, misselling. From a market efficiency perspective, weak corporate governance within financial institutions can undermine the fair, efficient, and transparent functioning of markets.

Regulation. In the IOSCO Risk Survey, some respondents noted issues such as “the unintended consequences of regulation aimed at mitigating the causes of the most recent financial crisis”; “active regulatory arbitrage”; and the “volume of standards, laws, and rules coming into force around the world” as areas for further consideration from a risk perspective. Some respondents also noted that in some cases, regulation designed to prevent systemic risk can conflict with the objective of investor protection, and vice versa. Lastly, a point was made about the interaction between regulation and market efficiency, especially in terms of the costs of doing business.

Central Counter Parties. New regulations place CCPs at the centre of the mitigation of counterparty risk in derivatives transactions to enhance financial stability, and CCPs perform an important role in mitigating that risk. Nevertheless, some respondents to the IOSCO Risk Survey highlight that while CCPs indeed mitigate counterparty risk, they also concentrate risk into a small number of nodes. If these nodes are not properly capitalised, managed, and overseen, resulting in a failure of a CCP, there may be systemic implications. Previous volumes of the Outlook have analysed this development in depth.

Capital flows to emerging markets. The low interest rate environment and the search for yield by investors in advanced economies has led to ample inflows of investments in securities of EM because they offer relatively high yields. This has stimulated the economies of these countries by providing abundant capital, but a return to higher interest rates in advanced economies could result in a reversal of these flows, which could affect the economies of emerging markets. For example, EM may be faced with even more expensive capital, which may hinder their ability to service and roll over their debt. This risk area has also been analysed in previous volumes of the Outlook.

Exit strategies of central banks. Central banks have accumulated large positions of securities in exchange for providing liquidity to banks, and more generally, to the financial system. This policy has allowed banks to use this liquidity to lend to firms in the real economy and so stimulate the economic recovery. However, respondents to the IOSCO Risk Survey note that this additional central bank demand for financial assets is distorting price formation

180 IOSCO, *Securities Market Risk Outlook 2014-2015*, October 2015

181 Last year’s Outlook analysed governance issues.

in financial markets. When the central banks start selling these assets, the artificial supply could again distort the price formation. From a market efficiency perspective, central banks, having absorbed a large number of securities, valued in the trillions, to provide liquidity to the financial system, will have to liquidate these securities at a certain point in time. There is a risk that these liquidations will distort price forming in the markets, just as they did when the central banks were buying the securities. This would hamper the efficient functioning of markets.

Shadow banking.¹⁸² The crisis of 2008 was caused, in part, by excessive risk taking by less regulated institutions and transactions, involving liquidity transformation, maturity mismatches, and leverage, done in the “shadow” of banks. The concern is that if these activities are comparatively less regulated or get a less suitable (bank centric) regulatory framework, risks to the system may emerge again. In a similar way, excessive *leverage* by firms or in financial products or transactions, can pose potential risk to financial stability. From a market efficiency perspective, if not well managed, regulated, and transparent, such activities could pose a risk that price formation is not efficient and transparent, and therefore undermine market functioning.

Financial risk disclosure. Unanticipated or deficient disclosure of financial risk can cause unexpected sudden losses, bankruptcies, and market turmoil. The disclosure of financial risk varies both in quality and by the methods firms use. From a market efficiency perspective, such variation may hamper the ability of investors to compare financial products and thus could undermine the fairness, efficiency, and transparency of markets, posing a risk to the financial system.

Leverage. From a financial stability perspective, high levels of leverage leave small amounts of capital, which can be depleted quickly and may leave large counterparty exposures that are not covered by adequate levels of collateral. From an investor protection perspective, these are the areas of concern for such risks: investors purchasing financial products with implicit leverage; and investors taking on too much leverage, which could cause unexpected losses in case of depreciation of the prices of the investments.

Over the counter (OTC) derivatives. Some respondents to the IOSCO Risk Survey note concern that the extensive global reform for OTC derivatives falls short of its goals. Transparency has improved but is still not optimal as data are scattered among many different trade repositories and is not easily aggregated. Risks are still hard to identify and monitor.

Structured products and securitisation. Despite sweeping reforms of this sector, respondents to the IOSCO Risk Survey express concern that reforms have led to underuse of relatively simple and transparent forms of securitisation. Therefore, this may be a potential risk to the functioning of the financial system that may hamper economic recovery. Respondents note this as a risk area in terms of market efficiency for two reasons: (1) certain structures could be too complex and disclosure does not provide enough insight into the functioning of the products; and (2) the new rules on securitised products hamper the production of securitised products that can have the effect of hampering the recapitalisation of financial institutions and deprive investors of relatively attractive investment opportunities.

Fragmentation. Fragmentation in financial markets, such as competition among trading platforms, was made possible by regulation and technology which has brought the costs of trading down sharply. However, some respondents are concerned that fragmentation has gone too far and poses a risk to the financial system. From a market efficiency perspective, fragmentation of markets has benefits and costs. It can enhance competition between platforms, which tends to drive prices down, but it can also hamper price formation, especially in less liquid securities. According to some respondents, high frequency trading should be viewed in conjunction with the fragmentation of markets.

¹⁸² Some authorities and market participants prefer to use other terms such as “market-based financing” instead of “shadow banking.” In this report, IOSCO is using the term “shadow banking,” because it is the most commonly employed term and has been used in previous G20 communications. IOSCO is not using this term pejoratively to describe this system of credit intermediation.

Technology. Financial markets are relying more and more on technological innovations. These innovations are improving the speed, accuracy, and efficiency of financial markets in many ways. However, at the same time, issues related to technological dependency, such as cybercrime, technological glitches, fat finger errors and other deficiencies and failures in existing systems, could pose new risks to the financial system. From an investor protection perspective, speed, complexity, digitalisation, dependency on and fragility of technology are features that (1) firms do not manage well; (2) are new and partly unknown to investors; and (3) pose potential challenges to regulation. From a market efficiency perspective, technology is entering the financial markets in all segments, as innovation occurs. However, not all market participants do or are able to implement technology at the same pace. This could pose the risk of unequal situations in the markets, leading to undue and a concentration of market power.

High frequency trading (HFT). Respondents to the IOSCO Risk Survey have concerns that high frequency trading could contribute to more volatility in markets and aggravated sudden market crashes. Therefore, this could be seen as a risk to the financial system. From a market efficiency perspective, HFT is a risk that continues to concern respondents as a potential threat to fair, efficient, and transparent markets. Although major events such as the flash crash¹⁸³ have not occurred recently, regulators continue to assess whether price formation is fair and the market is sufficiently protected against glitches.

Retail financial services and product. Respondents to the IOSCO Risk Survey note the misselling cases in various jurisdictions, involving millions of investors and billions of dollars, as a threat to the financial system. On the one hand, the cost for the involved firms ascends billions and could affect their stability (and, aggregated, the economies of the affected jurisdictions). On the other hand, confidence of investors could fall and lead to underuse of the financial system, which also affects the efficient deployment of savings and future wealth creation – even more important given the current aging population problem facing many advanced economies. In terms of investor protection, respondents to the IOSCO Risk Survey note a number of issues in this space. In general, the concern is that risks associated with investment services and products may not fit the risk profile of the class of investors investing in them. Specifically, products might perform differently than investors expect; might be inefficient for the investment needs of investors; might be too risky; or might be too complex for investors to understand. The number of severe scandals give rise to the concern that this is a persistent risk to the objective of investor protection.

Financial literacy. The lack of financial literacy is creating problems in the market, in cases where investors do not understand the risk profile of a product. This risk area is also relevant in terms of complex structured products, whose mechanics and underlying risk are poorly understood by investors.

FX trading platforms. The foreign currency trading platforms (FX platforms) advertise aggressively and attract many investors into trading of currencies on their online platforms, often employing high leverage. Respondents also mentioned the risk of investors entering into transactions and investments they do not fully understand, which might potentially cause unexpected losses. Further, the regulatory protection is not equal in all jurisdictions and could aggravate this risk.

Crowdfunding. Crowdfunding through online platforms offering investors equity and debt securities is a relatively recent innovation which is taking off globally. From an investor protection perspective, these risks are similar to risks from other securities. However, additional risks are present. Disclosure is usually less than for publicly listed firms, as is the regulatory oversight. There are also risks associated with the platforms, including cyber risks. The IOSCO Research Department staff has previously analysed, in depth, the risks of crowdfunding,¹⁸⁴ and IOSCO Policy Committee 3 a survey report on the regulatory approaches to crowdfunding.¹⁸⁵

183 On 6 May 2010, securities markets in the U.S. collapsed and recovered in the timespan of a few minutes

184 E. Kirby and S. Worner, "Crowd-funding: An infant industry growing fast," *IOSCO Research Department Staff Working Paper*, February 2014.

185 IOSCO, *Crowdfunding Survey Responses Report*, December 2015

Crypto-currencies. Respondents see risks with the use of crypto-currencies, such as Bitcoin. From an investor protection perspective, they are concerned with the current level of regulation of crypto-currencies and the lack of investor information about this innovation.

Benchmarks. Respondents to the IOSCO Risk Survey continue to be concerned about benchmarks after the scandals around the Euribor, Libor, and Tibor benchmarks. From a market efficiency perspective, the concerns are about the integrity and transparency of benchmarks.

Audit quality. Various respondents pointed to the deficient quality of the audit reports, reflected in financial statements that might not reflect the real financial situation of the firms. The conflict of interest of auditors who are getting paid by the firms they audit is, according to the respondents, insufficiently resolved and regulation is not strict enough. Therefore, audit quality is considered to be a risk for the fair and efficient functioning of markets.

ANNEX 2. SELECTION OF RESPONSES OF REGULATORS TO THE CYBER RISK

Increasing attention for cybersecurity within broader governance and operational management requirements

In several jurisdictions, cybersecurity is seen as part a firm's governance and/or operational management. Legal requirements for the latter thus provide a legal basis for supervision of more specific cybersecurity requirements. While the relatively recent increased attention on cybersecurity requirements does not often necessitate development of new legislation, it will in many cases require different skills and expertise of the designated staff.

Commodity Futures Trading Commission (CFTC)

The CFTC requires Designated Market Operators (DMOs), Swap Execution Facilities (SEFs), Swap Data Repositories (SDRs) and Derivative Clearing Organisations (DCOs) to have these features:

- > a program of risk analysis and oversight to identify and minimize sources of operational risk, through the development of appropriate controls and procedures (this program must specifically address information security, among other things);
- > automated systems that are reliable, secure, and have adequate scalable capacity;
- > emergency procedures, backup facilities, and a plan for disaster recovery that allow for the timely recovery and resumption of operations.; and
- > periodic testing to verify that backup resources are sufficient to ensure continuity of operations.

To monitor firms' compliance with these requirements, the CFTC has a multiple-level system of compliance oversight, comprised, for example, of regular system safeguards examinations by CFTC staff, both for existing firms and for applicants. Furthermore, DMOs, SEFs, SDRs and DCOs are required to notify the regulator of all cybersecurity incidents or related interruptions to its systems' operations and also of any major planned changes to these systems.

Performing examinations and requiring self-assessment

U. S. Securities and Exchange Commission (SEC)

Following the SEC's announcement of its Cybersecurity Examination Initiative on April 15, 2014, staff from the SEC OCIE¹⁸⁶ National Examination Program (NEP) examined broker-dealers and registered investment advisers to better understand how those entities address the legal, regulatory, and compliance issues associated with cybersecurity. Namely, the SEC examined the practices of 57 registered broker-dealers and 49 registered investment advisers in identifying risks related to cybersecurity; establishing cybersecurity governance, including policies, procedures, and oversight processes; protecting firm networks and information; identifying and addressing risks associated with remote access to client information and funds transfer requests; identifying and addressing risks associated with vendors and other third parties; and detecting unauthorised activity. In addition to reviewing the firms' documents, NEP staff held interviews with key personnel at each firm on its business and operations; detection and impact of cyber threats; preparedness for cyber threats; training and policies on cybersecurity; and protocol for reporting cyber breaches.

186 "OCIE" is the SEC Office of Compliance Inspections and Examinations.

Conducting surveys and providing public information

United Kingdom (UK) Financial Conduct Authority (FCA)

As early as April 2008, the Financial Services Authority (FSA)—the predecessor of the FCA—published a report on the protection of customer data within the financial services industry.¹⁸⁷ It is based on a large survey of financial institutions and gives an overview of the current status of data security in firms. Specifically, it highlights how data loss occurs; how lost data are used for identity fraud, firms’ responsibilities, and current attitudes to data security and identity fraud. It then presents the findings of the survey and concludes with a set of both good and poor practices.

U. S. Securities and Exchange Commission (SEC)

The SEC OCIE reported the results of its examination described above in a “Risk Alert.” The “Risk Alert” was published on February 3, 2015, and included a summary of examination observations.¹⁸⁸ In March 2014, the SEC staff also held its first Cybersecurity Roundtable where cybersecurity risk management practices were identified and discussed.

Providing guidance

The Australian Securities & Investments Commission (ASIC)

In March 2015, ASIC published a report¹⁸⁹ on cyber resilience. The purpose of the report is to assist the Australian-regulated population in improving its cyber resilience by increasing awareness of cyber risks; encouraging collaboration between industry and government and identifying opportunities for its regulated population to improve its cyber resilience; and identifying how cyber risks should be addressed as part of current legal and compliance obligations that are relevant to ASIC’s jurisdiction. This report also highlights The (U.S.) National Institute for Standards and Technology (NIST) Framework for Improving Critical Infrastructure Cybersecurity (NIST Cybersecurity Framework) as a potentially useful cyber resilience resource for the Australian-regulated population.

United Kingdom (UK) Financial Conduct Authority (FCA)

In April 2015, the FCA published a guide on financial crime that has a specific chapter on data security.¹⁹⁰ That chapter guides firms in steps they can take to reduce their financial crime risk. It aims to enhance understanding of firms’ FCA expectations and helps them to assess the adequacy of their financial crime systems and controls and to remedy deficiencies. It does this through a set of nonexhaustive, self-assessment questions and tips on both good and poor practices. The guide consolidates FCA guidance on financial crime; it does not contain rules and its contents are not binding.

U. S. Securities and Exchange Commission (SEC)

The SEC Division of Investment Management (IM) issued a guidance document on cybersecurity in April 2015, aimed specifically at investment funds and investment fund advisers. The document points out the fact that funds and advisers increasingly use technology for their business activities. It states that the SEC staff believes that those funds and advisers need to protect confidential and sensitive information from third parties, including information about fund investors and advisory clients. It highlights the importance of those issues and discusses a number of measures that funds and advisers may wish to consider when addressing cybersecurity risks.¹⁹¹ More specifically, the staff guidance document sets out the importance of the following measures:

187 http://www.fsa.gov.uk/pubs/other/data_security.pdf

188 <https://www.sec.gov/about/offices/ocie/cybersecurity-examination-sweep-summary.pdf>

189 <http://download.asic.gov.au/media/3062900/rep429-published-19-march-2015-1.pdf>

190 http://media.fshandbook.info/Handbook/FC1_Full_20150427.pdf

191 <http://www.sec.gov/investment/im-guidance-2015-02.pdf>

- > periodically assessing the types and location of information in possession and the technology systems used; internal external security threats; current security controls and processes in place; impact of compromise; and effectiveness of governance structure;
- > creating a strategy designed to prevent, detect, and respond to cybersecurity threats; and
- > implementing the strategy through written policies and procedures and training, as well as educating investors and clients.

Preparing consumer guides

The Australian Securities & Investments Commission (ASIC)

ASIC's report on cyber resilience also contains a section focusing on risks to consumers. It highlights the importance of consumer awareness and provides consumers with an online guide on protection from online scams.¹⁹²

International coordination

Domestic approaches to enhancing the cyber resilience of the financial system are well established in most major jurisdictions. In the IOSCO Research Department Staff's view, one key challenge that remains is promotion of international coordination. The cyber threat recognizes no jurisdictional boundaries.

IOSCO has held roundtables with cyber experts and regulators to discuss the threat environment; conducted in-depth research on the topic; and is now continuing with policy work in this area. For example, IOSCO is working with the Committee on Payments and Market Infrastructures (CPMI) to assist Financial Market Infrastructures in enhancing cyber resilience.¹⁹³ IOSCO is also, through a dedicated IOSCO Cyber Coordinator, working in different policy areas on cyber resilience and information sharing. The IOSCO AMCC has also established a work stream to continue investigation into the cyber-threat environment for different sectors of financial markets.¹⁹⁴

¹⁹² <https://www.moneysmart.gov.au/scams/avoiding-scams/protecting-yourself-from-online-scams>

¹⁹³ See, "CPMI-IOSCO consultative paper, "Guidance on cyber resilience for financial market infrastructures", 24 November 2015

¹⁹⁴ IOSCO, "Report from the Chair of the Affiliate members Consultative Committee", *Annual Report*, 2014



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