

# **Risk Identification and Assessment Methodologies for Securities Regulators**



**OICU-IOSCO**

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## ABOUT THIS REPORT

### **Background**

Following the Global Financial Crisis (GFC), international authorities concluded under the auspices of the G-20 that greater emphasis must be placed on the early identification of systemic risk. Since Bear Stearns and Lehman Brothers were both broker-dealers, it was agreed that not only banking regulators but also securities regulators have a significant role to play in systemic risk identification.

Against this backdrop, in 2009 the International Monetary Fund (IMF), the Financial Stability Board (FSB) and the Bank of International Settlements (BIS) set out an approach to assess the systemic importance of financial institutions, markets and instruments<sup>1</sup> and in 2010 the Board of the International Organization of Securities Commissions (IOSCO) adopted the two following new principles:<sup>2</sup>

▪ **Principle 6:**

The Regulator should have or contribute to a process to monitor, mitigate and manage systemic risk, appropriate to its mandate.

▪ **Principle 7:**

The Regulator should have or contribute to a process to review the perimeter of regulation regularly.

Principles 6 and 7 guide securities regulators to implement methods, approaches and tools to identify risks that are relevant to securities regulators, including risks that are at the time of identification outside the regulatory perimeter. The methods, approaches and tools can be adjusted to fit the mandate of the securities regulator.

Shortly after adopting Principles 6 and 7, IOSCO published Discussion Paper IOSCO OR01/11 entitled “*Mitigating Systemic Risk: A Role for Securities Regulators.*”<sup>3</sup>

This was followed by the formation of the “*IOSCO Standing Committee on Risk and Research*”, since renamed in 2013 the “*IOSCO Committee on Emerging Risk*” (“CER”).

A key objective of the CER is to further build on Principles 6 and 7 and on IOSCO Discussion Paper OR01/11 to develop and maintain a detailed research methodology for the identification, monitoring and mitigation of systemic risk that can be used by securities regulators around the globe.

The CER in conjunction with the IOSCO Research Department committed to:

- *Conduct a review of literature, indicators and methods used for the identification and measurement of systemic risks in the securities markets:*
  - To achieve this, the IOSCO Research Department conducted a research and in July 2012 published a staff working paper entitled “*Systemic Risk Identification in Securities Markets*”.<sup>4</sup>

<sup>1</sup> “*Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations*”, International Monetary Fund, Bank for International Settlements and Financial Stability Board, October 2009  
<http://www.bis.org/publ/othp07.pdf>

<sup>2</sup> “*Objectives and Principles of Securities Regulation*” Principles 6 and 7, IOSCO, June 2010.  
<https://www.iosco.org/library/pubdocs/pdf/IOSCOPD323.pdf>

<sup>3</sup> “*Mitigating Systemic Risk: A Role for Securities Regulators*”, IOSCO, February 2011  
<http://www.iosco.org/library/pubdocs/pdf/IOSCOPD347.pdf>

It outlines a systematic approach that can be used by researchers and securities regulators for the identification and monitoring of systemic risks and risk build-up in entities, market infrastructures, products and activities. The approach presented in the staff working paper relies on a list of practical and concrete indicators and offers a flexible and coherent process for using them (Chapter 4 below).

- Building further on the July 2012 IOSCO staff working paper, the present paper provides a practical overview of methods, approaches and tools that the IOSCO Research Department and CER members have implemented to identify and assess new risks (Chapter 2 and 3 below). Securities regulators from around the globe can use this paper as a point of reference as they decide which methods, approaches and tools are more suitable to their jurisdiction, remit and regulatory context.
- *Provide concrete examples of indicators that can be incorporated into a regular systemic-risk dashboard, along with a preliminary estimation of the future data needs:*
  - To achieve this, the IOSCO Research Department in close collaboration with the CER implemented and automated in 2013 the “*IOSCO Risk Dashboard*”. It includes a sizable list of indicators and data that are used for monitoring trends, vulnerabilities and risks in global securities markets. The IOSCO Risk Dashboard complements other risk identification and assessment methods deployed by the IOSCO Research Department and the CER.
  - While creating the IOSCO Risk Dashboard, it became apparent that there are data gaps that can only be filled through greater global regulatory cooperation and exchange. To achieve the long-term goal of reducing data gaps through greater global regulatory cooperation, the CER obtained approval from the IOSCO Board in 2014 to create a dedicated CER working group that will focus on detailing data gaps and on proposing methods to reduce such gaps.<sup>5</sup>
- *Create systemic risk research that can form the basis for a global discussion on emerging and existing risks:*
  - The CER meetings, the CER Risk Roundtable and the IOSCO Securities Market Risk Outlook are the principal methods used by the IOCO Research Department and CER to achieve this (Chapter 2 below).
  - In addition, as and when new risks are identified, such risks are escalated to the IOSCO Board depending on severity, probability and urgency.

## **Objectives of this Paper**

The objective of this paper is to provide a practical overview of the methods, approaches and tools (jointly referred to as “methods”) that IOSCO and securities regulators have developed and implemented to identify and assess new risks. By doing so, this paper aims to lay the foundation for continued implementation, development and improvement of such methods by securities regulators.

Underlying this paper is the realization that, because securities markets are complex and involve a wide range of different intermediaries, behaviors, products, investors, geographies, stages of financial development, macro-economic context, etc., there is at present no “one-size-fits-all” method for the

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<sup>4</sup> “*Systemic Risk Identification in Securities Markets, Staff Working Paper*”, Werner Bijkerk, Rohini Tendulkar, Samad Uddin and Shane Worner, July 2012,  
<http://www.iosco.org/research/pdf/swp/Option%20for%20Systemic%20Risk%20Identification%20System.pdf?v=1>

<sup>5</sup> The “*IOSCO Data Gap Working Group*” or “*IDG*”

identification of all trends, vulnerabilities and risks in securities markets. Instead, it is concluded that securities regulators benefit from combining a series of methods. Taken together a series of methods constitute a methodology.<sup>6</sup>

The paper provides concrete examples of how the different methods are already in use at the various securities regulators who are members of the CER. It also takes into account the recommendations of the IOSCO Assessment Committee as published in September 2013 in the “*Thematic Review of Principles 6 and 7 of the IOSCO Objectives and Principles of Securities Regulation*”.<sup>7</sup>

This paper is organized as follows:

- **Chapter 1: Definition of Risk:** This Chapter sets out commonly used definitions of systemic risk. Since Principle 7 is broader than systemic risk, it also provides a practical definition of risk that casts the net wider than systemic risk to capture new and emerging risks as well as risks to the objectives of the securities regulator.
  - *Section 1: IMF/BIS/FSB Systemic Risk Definition*
  - *Section 2: IAIS Systemic Risk Definition*
  - *Section 3: IOSCO Systemic Risk Definition*
  - *Section 4: Definition of Risk aligned to Regulatory Objectives*
- **Chapter 2: IOSCO Risk Identification Methods:** This Chapter sets out the methods implemented by the IOSCO Research Department in conjunction with the CER to identify new risks of global significance:
  - *Method 1: IOSCO Committee on Emerging Risks*
  - *Method 2: IOSCO Emerging Risk Survey*
  - *Method 3: IOSCO Risk Dashboard*
  - *Method 4: IOSCO Securities Markets Risk Outlook*
- **Chapter 3: Risk Identification Methods used by Securities Regulators:** This Chapter sets out the methods implemented on national levels by CER members to identify new risks relevant to the specific jurisdiction/ market/ securities regulator:
  - *Method 1: Risk Committee*
  - *Method 2: Risk Register*
  - *Method 3: Regulatory Collaboration*
  - *Method 4: Risk-focussed Meetings*
  - *Method 5: Risk Surveys*
  - *Method 6: Risk Dashboard*
  - *Method 7: Research and Publications*
  - *Method 8: Data Analytics and Econometrics*

Whether each of these methods are relevant or appropriate for a given jurisdiction depends on several factors, including the size and complexity of its financial markets, the mandate and scope of the securities regulatory authority and the broader financial regulatory structure of the jurisdiction. Therefore, Chapter 3 does not prescribe which methods should be used, but instead

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<sup>6</sup> Definition of “methodology” in the Oxford dictionaries: “A system of methods used in a particular area of study or activity”.  
<http://www.oxforddictionaries.com/definition/english/methodology>

<sup>7</sup> “*Thematic Review of Principles 6 and 7 of the IOSCO Objectives and Principles of Securities Regulation*”, IOSCO, September 2013. This Review was based on a survey of 34 IOSCO members from 31 jurisdictions indicating and provides an overview of the tools which those members noted they are using to implement IOSCO Principles 6 and 7. The recommendations from this review are included in Annex 1. <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD424.pdf>

provides a range of options that securities regulators can consider using as part of their risk identification framework.

- **Chapter 4: An Analytical Framework for Assessing Systemic Risks:** This Chapter offers guidance on assessing whether or not a risk, trend, or vulnerability is systemic, regardless of the method used to originally identify the risk.
  - *Section 1: Macro and Micro-level Indicators*
  - *Section 2: Factors to assess whether a Risk is Systemic*

### **Continued Evolution**

Identifying, analyzing, and monitoring systemic risk remain a new discipline for securities regulators. Therefore this paper should be viewed as another step in the evolutionary work performed by securities regulators in this area. By the same token, the methods described in this document will continue to evolve and, consequently, this paper will need to be updated or supplemented from time to time.

For example, a working group of the CER is seeking to identify the data that global securities require on financial market entities, infrastructures, products and activities, in order to implement effectively IOSCO Principle 6. The outcomes of the group's work will be incorporated into a future follow-up of this paper. Also, the CER will continue to serve as a forum for active dialogue on new or improved methods and models that facilitate the early identification and analysis of risk in securities markets.

### **Contact Persons**

This paper is the work product of the IOSCO Committee on Emerging Risks (CER).

Any comments or suggestions can be addressed to [research@iosco.org](mailto:research@iosco.org) or to any of the below members of the CER:

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## Chapter 1: Definition of Risk

### Introduction

This Chapter sets out commonly used definitions of systemic risk. Since IOSCO Principle 7 is broader than systemic risk, it also provides a practical definition of risk that casts the net wider than systemic risk to capture new and emerging risks as well as risks to the mandate of the securities regulator.

#### *Section 1: IMF/BIS/FSB Systemic Risk Definition*

The IMF/BIS/FSB describes systemic risk as:<sup>8</sup>

*“Systemic risk is the risk of disruption to financial services that is (i) caused by an impairment of all or parts of the financial system and (ii) has the potential to have serious negative consequences for the real economy.”*

The definition reflects certain key features of systemic risk: negative externalities of actions by financial institutions which cause disruption to financial services and negative impact on the real economy.

#### *Section 2: IAIS Systemic Risk Definition*

The International Association of Insurance Supervisors (IAIS) added two additional elements to the IMF/BIS/FSB definition:<sup>9</sup>

*“An impairment or disruption to the flow of financial services would include situations where certain financial services are temporarily unavailable, as well as situations where the cost of obtaining the financial services is sharply increased.”*

*“The definition requires significant spill-overs to the real economy, without which an impairment of financial services would not be considered systemic. The real economy impact could be either through an effect on supply or through an effect on demand for other goods and services.”*

#### *Section 3: IOSCO Systemic Risk Definition*

In 2011, IOSCO published a definition of systemic risk in IOSCO OR01/11 entitled “*Mitigating Systemic Risk: A Role for Securities Regulators*”:<sup>10</sup>

*“Systemic risk refers to the potential that an event, action, or series of events or actions will have a widespread adverse effect on the financial system and, in consequence, on the economy.”*

While the IOSCO definition is largely consistent with the IMF/BIS/FSB definition, it also recognized that:

<sup>8</sup> “Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations”, International Monetary Fund, Bank for International Settlements and Financial Stability Board, October 2009.

<http://www.iosco.org/library/pubdocs/pdf/IOSCOPD347.pdf>

<sup>9</sup> “Systemic Risk and the Insurance Sector”, International Association of Insurance Supervisors, October 2009.

[http://iaisweb.org/temp/Note\\_on\\_systemic\\_risk\\_and\\_the\\_insurance\\_sector.pdf](http://iaisweb.org/temp/Note_on_systemic_risk_and_the_insurance_sector.pdf)

<sup>10</sup> “Mitigating Systemic Risk: A Role for Securities Regulators”, IOSCO, February 2011.

<http://www.iosco.org/library/pubdocs/pdf/IOSCOPD347.pdf>

*“Systemic risk, in the context of securities markets is not limited to sudden catastrophic events; it may also take the form of a more gradual erosion of market trust.”*

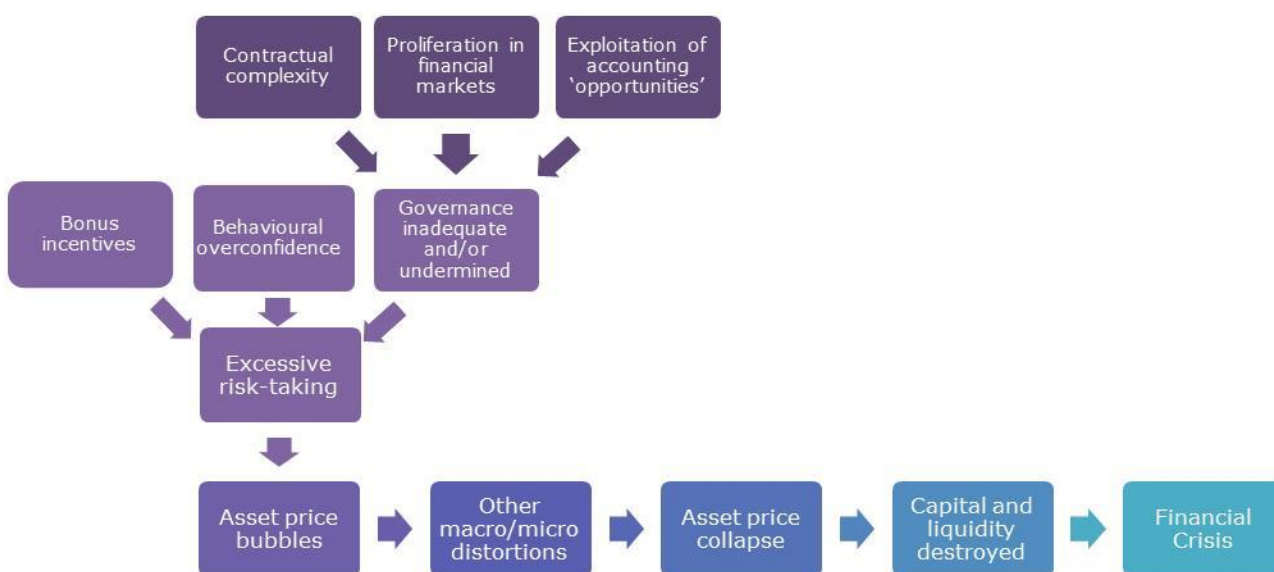
This refinement is necessary because focussing on a narrow definition of systemic risk may interfere with early foresight, especially in securities markets where often new trends, vulnerabilities and risks are not systemic by nature or from the onset, but rather become systemic due to size or a specific confluence of other conditions and circumstances.

In particular, securities products may lead to “a gradual erosion of market trust” in instances where other elements of the regulatory mandate were not complied with, for example risk governance was not solid (weak risk governance is often seen as the main cause of the collapse of Lehman Brothers)<sup>11</sup> or where risk culture failed (for example in the context of material conduct lapses or mis-selling).

Furthermore, in accordance with IOSCO objectives, other significant considerations in the assessment of systemic risk include: (i) the effect of a risk on the cost or availability of capital; and (ii) the effect of a risk on investor confidence in the fairness of a market.

The existence of many complexities and factors that may contribute to the emergence of new risks that are relevant to securities regulators is visualized in Exhibit 1 below.<sup>12</sup>

**Exhibit 1: Complexities and factors that may contribute to the emergence of new risks**



**Section 4: Definition of Risk aligned to Regulatory Objectives**

The “Thematic review of the implementation of Principles 6 and 7 of the IOSCO Objectives and Principles of Securities Regulation” noted that less than 20% of securities regulators surveyed have a legally-imposed definition of system risk and that most securities regulators base their implementation of the IOSCO Objectives and Principles of Securities Regulation, including Principles 6 and 7 on a

<sup>11</sup> “Principles for effective risk data aggregation and risk reporting”, Basel Committee on Banking Supervision, January 2013, <http://www.bis.org/publ/bcbs239.pdf> It states: “One of the most significant lessons learned from the global financial crisis that began in 2007 was that banks’ information technology (IT) and data architectures were inadequate to support the broad management of financial risks.”

<sup>12</sup> Source: United Kingdom Financial Conduct Authority (FCA).



“working definition” of systemic risk appropriate to their mandate and to the domestic market, rather than on a statutory definition.<sup>13</sup>

The thematic review proceeds to recommend that securities regulators consider adopting a more specific definition of systemic risk because a definition allows a securities regulator to have a clearer idea of the necessary thresholds and scope to identify a systemic risk that is relevant to the markets it regulates and that doing so will also support securities regulators more directly fulfilling the *IOSCO Objectives and Principles of Securities Regulation*, while also supporting broader financial stability.<sup>14</sup>

Since IOSCO Principle 7 is broader than systemic risk, we insert below a practical definition of risk that casts the net wider than systemic risk to capture new and emerging risks as well as risks to the mandate of the securities regulator:

*“Risks, including potential emerging and systemic risks, in financial market, entities, infrastructures, products and activities<sup>15</sup> which may impact the ability of the securities regulator to meet its regulatory objectives as set out in [relevant rules and regulations/regulatory objectives].”*

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<sup>13</sup> “*Thematic Review of Principles 6 and 7 of the IOSCO Objectives and Principles of Securities Regulation*”, IOSCO, September 2013. This Review was based on a survey of 34 IOSCO members from 31 jurisdictions indicating and provides an overview of the tools which those members noted they are using to implement IOSCO Principles 6 and 7.

<http://www.iosco.org/library/pubdocs/pdf/IOSCOPD424.pdf>. The recommendations from this review are included in Annex 1.

<sup>14</sup> “*Objective and Principles of Securities Regulation*” *Principles 6 and 7*, IOSCO, June 2010.

<https://www.iosco.org/library/pubdocs/pdf/IOSCOPD323.pdf>

<sup>15</sup> Language taken from the “*IOSCO Methodology for Assessing Implementation of the IOSCO Objectives and Principles of Securities Regulation, Principle 6*”, IOSCO, September 2011, available at <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD359.pdf>

## Chapter 2: IOSCO Risk Identification Methods

### Introduction

In this Chapter 2, we list the methods implemented by the IOSCO Research Department in conjunction with the CER to identify, research and assess risks that may be of global or multi-jurisdictional significance, typically emerging or systemic risks. CER members may use the outcomes of these methods to supplement their regional and national perspective of risk (Chapter 3).

#### **Method 1: IOSCO Committee on Emerging Risks**

The IOSCO Committee on Emerging Risks (CER) meets three or four times annually. A key target of the CER meetings is to foster an active and open dialogue on risk among CER members who represent a large number of jurisdictions. To this effect, the CER meetings include various sections focussed on risk sharing and assessment, including:

- (i) **The Risk Roundtable** – before the CER meetings take place, members are asked to provide risk themes which they would like to table at or present at the CER. For example, in the January 2014 CER, members from emerging markets each presented on the risks as they perceive them from the perspective of their markets.
- (ii) **Industry Experts** – the risk roundtable is supplemented by presentations by industry experts. For example, in the January 2014 CER, industry experts were invited to share their views on risks in emerging markets. Furthermore, industry experts were invited to provide their latest perspective and research on other topics set out in the *IOSCO Securities Markets Risk Outlook 2013-2014*.<sup>16</sup>
- (iii) **Research Sharing** – in addition to the above, CER members share research which they are in advanced stages on and which they believe is of relevance to other markets. Examples of this include sharing of the latest research on topics such as crowd-funding and virtual currencies.
- (iv) **Sharing of Risk Identification Methods** – CER members also share improvements they make in their risk identification methods. Examples of this include sharing of developments in the use of data analytics and econometric models to complement supervisory prioritization. Other examples include sharing of product specific risk analysis or research on investor behaviour and market structure.

#### **Method 2: IOSCO Risk Outlook Survey**

Annually the IOSCO Research Department surveys IOSCO members and experts from the market, academic and regulatory community about emerging risks.

The *IOSCO Risk Outlook Survey*<sup>17</sup> sets out a number of areas where risks could be building up based on market intelligence meetings and roundtables with the industry, regulators, international organizations and academics. The results of the survey are used as input to the IOSCO Securities Markets Risk Outlook.

<sup>16</sup> IOSCO Research Department, *IOSCO Securities Markets Risk Outlook 2013-2014*, October 2013, <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD426.pdf>

<sup>17</sup> See Shane Worner, *A Survey of Securities Markets Risk Trends 2014: Methodology and Detailed Results*. IOSCO Staff Working Paper, June 2014. <http://www.iosco.org/research/pdf/swp/SWP5.pdf>

### **Method 3: IOSCO Risk Dashboard**

The IOSCO Research Department has developed in close collaboration with the CER an automated *IOSCO Risk Dashboard* that is updated and shared before every IOSCO Board Meeting.

Monitoring of longer time series of data allows for the identification of changes in patterns and trends, which in turn may point towards the emergence of new area of risk or vulnerability. By including a sizable series of indicators, the *IOSCO Risk Dashboard* complements other risk identification and assessment methods deployed by the IOSCO Research Department and the CER.

Annex 2 shows the indicators that are currently tracked. The *IOSCO Risk Dashboard* is expected to continue to evolve. For example, indicators may be added in due course based on market evolution, availability of data and further work of the CER and its working groups.

### **Method 4: IOSCO Securities Markets Risk Outlook**

This *IOSCO Securities Market Risk Outlook 2013-14* (the Outlook)<sup>18</sup> is the first external publication of an annual series of Outlooks that aim to identify and assess potential systemic risks from securities markets. The Outlook is a forward-looking report focusing on issues relevant to the securities markets and whether they are, or could become, a threat to the financial system as a whole.

The Outlook is written by the IOSCO Research Department in close collaboration with the CER. It is based on a number of inputs including: risk topics derived from the CER meetings (Method 1 above), risk topics derived from the *IOSCO Risk Outlook Survey* (Method 2 above), developments of quantitative indicators contained in the *IOSCO Risk Dashboard* (Method 3 above). These methods are further supplemented by independent research, data collection and analysis by the IOSCO Research Department, as well as by the outcomes derived from a series of market intelligence meetings, interviews and risk roundtables in major financial centers and involving prominent members of the industry and regulators.

The purpose of the annual Risk Outlook series is three fold:

- It is intended to inform the IOSCO Board and other IOSCO members about potential systemic risks to securities markets. As such, the Outlook constitutes one data point to assist national regulators in implementing IOSCO's two new principles on identifying, assessing and mitigating systemic risk (Principle 6), and on reviewing the regulatory perimeter (Principle 7);
- It aims to support the global risk identification and mitigation efforts by the Group of Twenty (G20), the Financial Stability Board (FSB), the IMF and other global organizations that are tackling similar issues; and
- In the interest of public disclosure, it synthesizes and presents in a single, accessible document key issues and potential systemic risks currently being discussed by market participants, securities experts and regulators around the globe.

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<sup>18</sup> IOSCO Research Department , *IOSCO Securities Markets Risk Outlook 2013-2014*, October 2013, <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD426.pdf>

## Chapter 3: Risk Identification Methods used by Securities Regulators

### Introduction

CER members complement the IOSCO Risk Identification methods (which are primarily focussed on identifying risks of global or multi-jurisdictional significance), with their own national risk identification, assessment and mitigation frameworks (which are focussed on identifying risks directly relevant to the jurisdiction in which the CER member operates.) Chapter 3 provides an overview of various methods for the identification, monitoring and assessment of trends, vulnerabilities and risks that are already in use by CER members.

### *Multiple methods to identify risk*

In complex systems, no single risk identification method can realistically identify all risks. Instead, risk identification frameworks consist of various risk identification methods that are appropriate for the subject matter under surveillance, which can then be combined into an overall approach for the identification and monitoring of risk. To put it more simply and as also noted in the “*Thematic review of the implementation of Principles 6 and 7 of the IOSCO Objectives and Principles of Securities Regulation*”,<sup>19</sup> there is at present no “one-size-fits-all” method for the identification of all trends, vulnerabilities and risks in securities markets. Instead, regulators benefit from using multiple methods.

This is illustrated in Exhibit 2 below, which is based on a survey conducted among CER members in 2014.<sup>20</sup> It lists the methods elaborated upon in this Chapter 3 and shows which methods the various CER members already have in use, compared to those methods which they do not yet have in use. It confirms that while no authority uses each of the methods (no vertical column is all light blue), each of the methods is currently in use by one or more authorities (no horizontal line is all dark blue).

### Exhibit 2: Methods as currently in use by CER Members

Risk Method Used? Y/N	Country/Territory															
	Brazil	Canada	European Union	France	Germany	Hong Kong	Italy	Japan	Mexico	Netherlands	Portugal	Singapore	Spain	Turkey	United Kingdom	United States
Method 1: Risk Committee	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Method 2: Risk Register	Y	Y	N	N	Y	Y	N	Y	N	Y	N	Y	WP	N	Y	Y
Method 3: Regulatory Cooperation	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Method 4: Risk-focused meetings	N	Y	N	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	N	Y
Method 5: Risk Surveys	N	N	Y	Y	N	N	Y	Y	N	N	N	Y	N	Y	N	Y
Method 6: Risk Dashboard	Y	Y	Y	Y	Y	Y	Y	WP	N	Y	WP	Y	Y	N	Y	Y
Method 7: Research and Publications	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y
Method 8: Data Analytics and Econometrics	N	N	Y	WP	N	N	Y	N	N	N	Y	N	Y	N	N	Y

<sup>19</sup> “*Thematic Review of Principles 6 and 7 of the IOSCO Objectives and Principles of Securities Regulation*”, IOSCO, September 2013. <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD424.pdf>.

<sup>20</sup> WIP stands for “work in progress.” This exhibit will be subject to change as CER members implement new methods.

### ***Non-prescriptive approach***

Since the identification and measurement of emerging and systemic risks, including risks that may interfere with the regulatory authority meeting its statutory objectives (see Chapter 2, Section 4 above for a definition of risk that is aligned to regulatory objectives), is still an evolving matter for securities regulators and since the factors that may contribute to the emergence of new risks are varied in nature, this paper does not impose any single or any combination of methods, but rather provides an overview of the main methods currently in use by securities regulators. This in turn enables each securities regulator to consider which methods best suit its regulatory context.

### ***Risk, research and strategy functions***

Increasingly, there is a trend for the methods listed in Chapter 3 to be deployed within the agency by a centralized function. While the title of this type of function differs among the various regulatory authorities, most commonly it is called the Risk and Strategy function, the Risk and Research function, the Research and Strategy function, or a combination of the foregoing labels. Members of this function typically act as the representative of the regulatory authority on the IOSCO CER.

### ***Continued assessment***

Once a new risk has been identified through the use of one or more of these methods, these same methods may also be used to monitor developments and risk mitigation steps relevant to specific risks. Furthermore, the approach described in Chapter 4 can be used to assess whether the risk identified is systemic or not.

### **Executive Summary**

Several regulatory authorities view the establishment and operation of a risk committee and related processes as a key component to their risk identification and assessment framework.

The risk committee focuses on ensuring that it brings together information from across the organizational structure.

It involves the most senior executives of the regulatory authority sharing observations on risks in a formalized fashion and based on a systematic approach.

The preparation for the risk committee involves a periodic process to identify new risks and to regularly monitor the status of previously identified risks.

The risk committee and related processes may also help to create and/or improve the risk identification and risk mitigation frameworks within the regulatory authority.

The risk, research and strategy function of the regulatory authority typically provides input to the risk committee and in some authorities coordinates the overall process.

As an alternative approach to the creation of a risk committee, certain regulatory authorities have implemented periodic risk reporting at standing Board committees.

## ***Approach***

Based on a comparative review of what is currently in place at different regulatory authorities, we set out in more detail below the typical features of a regulatory risk committee.<sup>21</sup> As an alternative approach to the creation of a risk committee, certain regulatory authorities have implemented periodic risk reporting at standing Board committees. Both approaches are viewed to be workable and are therefore referred to for simplicity purposes as the “risk committee”.

## ***Structure***

The risk committee is typically composed of senior executives of the regulatory authority and includes representatives from the risk, research and strategy function. Board level committees also involve non-executive directors.

## ***Mandate***

The risk committee typically:

- (i) Provides oversight and guidance on the management of risks faced by the regulatory authority;
- (ii) Oversees the risk management framework of the regulatory authority; and
- (iii) Reviews the risk management policies and processes for the reporting of risks.

## ***Objectives***

The objectives of the risk committees typically are:

- (i) To identify, assess and where appropriate measure potential risks based on a combination internal and external information;
- (ii) To leverage institutional knowledge and foster internal collaboration and consensus on risk identification, assessment and mitigation;
- (iii) To feed the above into the corporate planning and strategic prioritization of the regulatory authority; and
- (iv) To continuously improve methods, approaches and tools for the identification and assessment of risk.

## ***Operational Procedure***

While there is variation across regulatory authorities, the risk committee typically reviews different parts of the capital markets (i.e., products, participants, activities, etc.). In view of IOSCO Principle 7 which requires ongoing assessment of the regulatory perimeter, this includes the review of regulated and unregulated activities.

To achieve this, the risk committee typically uses inputs generated by the various operating divisions and combines it with market intelligence, data and research analysis performed by a centralized risk, research and strategy function.

Risks identified as part of the risk committee process are typically evaluated through a systematic risk assessment methodology, so that the risks can be rated, catalogued and subjected to follow-up mitigation steps (if any) and to periodic reassessment (see Method 2 below on “*Risk Register*”).

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<sup>21</sup> The IMF has recognized the importance of risk committees and equivalent processes in recent FSAP assessments. See FSAP assessment of Australia, 2013.

Appropriate mitigation actions may include:

- (i) Policy action, including circulars, statements of regulatory expectations or changes rules and regulations;
- (ii) Changes to the strategic prioritization of regulatory authority, including resource allocation and supervisory or enforcement prioritization;
- (iii) Communication and coordination with other global and local regulatory and financial stability authorities; and
- (iv) Other forms of regulatory perimeter extension or action.

## **Examples**

### **1. Australia – ASIC Risk Committee**

As per the public website, the functions and responsibilities of the ASIC Risk Committee include.<sup>22</sup>

- (i) The annual review of the Risk Management Framework;
- (ii) Ensuring compliance with the Risk Management Strategy and providing a forum for the escalation of risk matters;
- (iii) Oversight of the coordination of risk management activities, including compliance, and the review of internal policy documents;
- (iv) Monitoring any emerging material risks, consequences, issues and incidents including key projects and reporting to the Commission key operational and strategic risks being reported and acted upon within the business;
- (v) The review of reports on key operational and strategic risks prior to their submission to Commission meetings.

### **2. Netherlands – AFM Risk Cycle**

The Dutch AFM has fully internalized into its organizational structure a process for identifying and mitigating systemic risks. The process includes the use of a Risk Panel (risk experts/ Head of Risk) and Risk Steering Committee (relevant heads of unit/board member). The process is illustrated in Appendix 3.

### **3. Singapore – MAS Risk Committee**

As the integrated financial regulator and central bank in Singapore, MAS monitors and manages systemic and emerging risks to the financial system, and provides oversight and guidance on macro prudential and financial stability issues through designated management committees.<sup>23</sup>

### **4. United Kingdom – FCA Risk Committee**

As per the public website, the FCA Risk Committee is responsible for the review and oversight of the external risks to the FCA's statutory objectives; making recommendations to the Board in relation to such risks; the suitability of the scope and coverage of the mitigation used to reduce the

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<sup>22</sup> ASIC Risk Committee [http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/Risk-Committee--Purpose-governance-and-practices--March-2012.pdf/\\$file/Risk-Committee--Purpose-governance-and-practices--March-2012.pdf](http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/Risk-Committee--Purpose-governance-and-practices--March-2012.pdf/$file/Risk-Committee--Purpose-governance-and-practices--March-2012.pdf)

<sup>23</sup> IMF Country Report No. 13/344 <http://www.imf.org/external/pubs/cat/longres.aspx?sk=41052.0>



potential impact of such risks; and the effective operation of the Regulatory Decisions Committee and the Listing Authority Review Committee.<sup>24</sup>

## **Method 2: Risk Register**

### **Executive Summary**

To ensure that once a potential emerging or systemic risk is identified it is properly categorized and subjected to follow-up risk mitigation steps, several regulatory authorities make use of systematic risk register methodologies that list and assign a risk score to identified risks.

### **Approach**

Risk assessment or categorization consists of the assignment of a quantitative or qualitative value to the risks identified.

While the approach may vary across regulatory authorities, the initial phase of the risk assessment process often consists of applying a *risk heat map* process to the risks collected in a risk register.

Heat maps typically apply risk levels (high/medium/low) or colors (red/amber/green) to indicate the severity of the risk. More detailed risk heat maps may have additional risk levels or colors.

In the initial phase, the rating is often assigned on a qualitative level, while taking into consideration whether the risk could become systemic.

For risks or risk categories that have been assigned a rating of high/red and medium/amber, potential supplemental steps could include:

- (i) Determination of the risk response, including potential mitigation steps and timelines;
- (ii) Linkage to the corporate planning and strategic prioritization process of the regulatory authority; and
- (iii) More in-depth analysis and fundamental research in order to assign a quantitative value.

### **Examples**

#### **1. Australia – ASIC Risk Register and Heat Map Methodology**

ASIC has developed a risk assessment framework to assess emerging and systemic risks and to determine appropriate responses to identified risks. It is illustrated in Annex 3.<sup>25</sup>

#### **2. Hong Kong – SFC Risk Register and Heat Map Methodology**

The SFC also has developed a risk register methodology targeted at providing the Executive Committee and Board with an integrated overview of risks. It is illustrated in Annex 3.

The approach involves the various SFC divisions sharing their perspective on risks, including potential emerging and systemic risks, and risks in financial market entities, infrastructures,

<sup>24</sup> FCA Risk Committee <http://www.fca.org.uk/about/structure/committees>

<sup>25</sup> See also: “Australia: IOSCO Objectives and Principles of Securities Regulation—Detailed Assessment of Implementation”, IMF, November 2012 <http://www.imf.org/external/pubs/ft/scr/2012/cr12314.pdf>

products and activities which may affect the ability of the SFC to meet its regulatory objectives as set out in the Securities and Futures Ordinance.

Once identified, a heat map methodology is applied, leading to risk scoring of the individual risk items. This in turn allows for a methodological approach to assessing the severity of risks and to the mitigation of such risks.

### **3. *Netherlands – AFM Risk Cycle***

The AFM Risk Cycle described in Method 1 above and set out in further detail in appendix 3 includes the maintenance of a register (or longlist) of the most important systemic risks that the AFM currently sees. The register consists of all relevant risks to financial stability described in a consistent manner that facilitates comparison and prioritization of risks for follow-up mitigating action. This prioritization results in a short list, which demands further follow-up action.

Follow-up action can take the form of:

- (i) A separate financial stability project,
- (ii) An add-on to existing relevant projects within other supervisory divisions, or
- (iii) Submission to the national Financial Stability Committee for coordination with the Dutch Central bank (prudential supervisor) and the ministry.
- (iv) Relevant international work streams are considered as well.

## ***Method 3: Regulatory Collaboration***

### **Executive Summary**

Most regulatory authorities view involvement and participation in macro-prudential forums, via formal working groups or otherwise, both at the domestic and international levels, as an important part of their risk identification framework.

### ***Approach***

In most countries, there is a domestic financial stability or equivalent committee. These committees are typically tasked with (i) macro-prudential oversight, (ii) evaluation and analysis of systemic risks and (iii) coordination among the financial regulatory authorities within the jurisdiction on these topics. In certain jurisdictions these committees are established through legislation, whereas in others they are less formal in structure.

In some countries, additional regular communication channels (formal and informal) have been established between domestic regulatory authorities to facilitate the collaboration and sharing of information on risk matters with a view towards establishing an effective regulatory response to systemic risk.

In addition to domestic committees and communication channels, many regulatory authorities view participation in international forums as a key component to their risk identification framework.

## ***Domestic Financial Stability Committee***

Many securities regulators are part of a domestic Financial Stability Committee, which typically brings together members of different regulatory authorities and the government in the jurisdiction in order to:

- (i) Pursue financial stability through the timely identification of risks to the financial system;
- (ii) Be prepared for, and ensure coordinated regulatory action, when shocks to the financial system occur; and
- (iii) Reduce the risk of regulatory arbitrage and inter-agency silos, especially in markets with fragmented regulatory frameworks.

Issues that affect the financial system, regulatory framework, regulatory perimeter as well as constraints on supervisory and enforcement powers are typically discussed in these committees.

These committees are often supported by dedicated working groups. For example, in certain jurisdictions there are working groups focused on defining data and risk indicators which the domestic regulatory authorities could exchange to further improve early identification of systemic risk.

## ***Domestic regulatory communication***

In addition to formal settings such as a Financial Stability Committee, many securities regulators have established more informal channels of communication with other regulatory authorities in their jurisdiction through which they exchange views on trends, vulnerabilities and risks. Through these channels, they may also exchange ongoing research and analysis on trends, vulnerabilities and risks, as well as improvements in their respective risk identification approaches and methods.

## ***International regulatory forums***

Most regulatory authorities are part of one or more international regulatory forums. Participation in such forums contributes to informing the domestic regulatory thinking by placing it in a global context.

## ***Examples***

### ***1. Globally:***

- **Financial Stability Board (FSB):**<sup>26</sup> The FSB main committee that assesses potential systemic risk is the “*Standing Committee on the Assessment of Vulnerabilities*” (“SCAV”). Its working committee is the “*Assessment Group on Vulnerabilities*” (“AGV”). The Chair of the CER is a member of the SCAV and the Head of the IOSCO Research Department is a member of the AGV. The committees analyse cross-sectoral risks to the financial system, taking into account the views of the banking regulators, insurance regulators and securities regulators. The SCAV and AGV are also connected to the so-called “Early Warning Exercise” of the IMF. Regulatory authorities who are a member of the FSB may participate in one or more working groups concerned with matters of potential systemic risk, such as shadow banking.
- **International Organization of Securities Commissions (IOSCO):**<sup>27</sup> Regulatory authorities who are a member of IOSCO may be represented on the IOSCO Committee on Emerging

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<sup>26</sup> FSB: <https://www.financialstabilityboard.org/>

<sup>27</sup> IOSCO: <http://www.iosco.org/>

Risks (CER; see also Chapter 2 above). A key target of CER is to foster an active and open dialogue on risk and risk data among CER members who represent a large number of jurisdictions. The dialogue also extends to market participants.

## 2. *In the U.S.:*

- **The Financial Stability Oversight Committee (FSOC):**<sup>28</sup> FSOC was established under the Dodd-Frank Wall Street Reform and Consumer Protection Act. The Council provides comprehensive monitoring of the stability of our nation's financial system. The Council is charged with identifying risks to the financial stability of the United States; promoting market discipline; and responding to emerging risks to the stability of the United States' financial system. The Council brings together the expertise of federal financial regulators, state regulators, and an independent insurance expert appointed by the President;
- **The Office of Financial Research (OFR):**<sup>29</sup> The OFR is an Office within Treasury established by Congress to serve the Financial Stability Oversight Council, its member agencies, and the public by improving the quality, transparency, and accessibility of financial data and information; by conducting and sponsoring research related to financial stability; and by promoting best practices in risk management.

## 3. *In Europe:*

- **European Systemic Risk Board (ESRB):**<sup>30</sup> The ESRB is responsible for the macro-prudential oversight of the financial system within the European Union in order to contribute to the prevention or mitigation of systemic risks to financial stability in the Union that arise from developments within the financial system and taking into account macro-economic developments, so as to avoid periods of widespread financial distress. It is expected to contribute to the smooth functioning of the internal market and thereby ensure a sustainable contribution of the financial sector to economic growth;

### **Method 4: Risk-focussed Meetings**

#### **Executive summary**

Most regulatory authorities maintain an active dialogue with market practitioners, researchers, academics and other experts, through formal and informal means.

#### **Approach**

Subject to the rules and regulations of the relevant jurisdiction, regulatory authorities increasingly maintain a regular and pro-active dialogue with key market participants focussed on:

- (i) Staying abreast of the evolution of financial markets, market structure and product innovation;
- (ii) Identifying new and emerging risks that result from the above; and
- (iii) Identifying steps that need to be taken to mitigate such risks.

<sup>28</sup> FSOC: <http://www.treasury.gov/initiatives/fsoc/Pages/home.aspx>

<sup>29</sup> OFR: <http://www.treasury.gov/initiatives/ofr/Pages/default.aspx>

<sup>30</sup> ESRB: <http://www.esrb.europa.eu/home/html/index.en.html>

An active dialogue with market practitioners, researchers, academics and other experts may point towards certain area of risk that cannot be readily identified through other methods, for example due to the absence of readily available data.

### **Examples**

#### **1. Canada – CSA Systemic Risk Committee**

The Systemic Risk Committee (SRC) of the Canadian Securities Administrators (CSA) is conducting regular consultations on emerging risks with market participants.

#### **2. Hong Kong – SFC Risk-focused Industry Meetings**

In January 2013, the SFC launched a new initiative to establish a series of risk-focused industry meetings with a wide range of financial institutions and market participants. The objective of these meetings is for the SFC to actively stay informed and to better understand the evolution of financial markets, market structure, product innovation and risk governance, as well as to identify new risks and emerging risk trends.

In December 2013, the SFC issued a report entitled “*Risk-focused Industry Meeting Series: G-SIFI Trends in Risk and Risk Mitigation*”.<sup>31</sup> It provides a summary of key risk and risk mitigation trends identified from meetings with a representative sample of G-SIFIs and highlighted aspects of best practices by G-SIFIs in risk identification and mitigation.

## **Method 5: Risk Surveys**

### **Executive Summary**

Certain regulatory authorities conduct periodic risk surveys with market participants to identify potential risks.

### **Approach**

Surveys can be a useful and formalized method to enable regulatory authorities to stay abreast of evolving risks, potentially reaching a diverse range of market participants.

### **Examples**

#### **1. International – IOSCO**

Annually the IOSCO Research Department surveys IOSCO members and experts from the market, academic and regulatory community about emerging risks. The results of the survey are used as input to the IOSCO Securities Markets Risk Outlook. See Chapter 2 above for more detail on the IOSCO Risk Outlook Survey.

<sup>31</sup> “*Risk-focused Industry Meeting Series: G-SIFI Trends in Risk and risk Mitigation*”, SFC, December 2013, [http://www.sfc.hk/web/EN/files/ER/Reports/20131218\\_RIM\(EN\).pdf](http://www.sfc.hk/web/EN/files/ER/Reports/20131218_RIM(EN).pdf)

## **2. Turkey – Capital Markets Board (CMB)**

The Capital Markets Board (CMB) of Turkey conducts a monthly “expectation survey” with a view to monitoring perceptions and expectations of senior managers on macroeconomic variables and capital markets, and subsequently announces the results to the public. The survey questions are addressed to senior managers of publicly-traded companies and financial institutions so as to understand their monthly, semiannual, and annual expectations and perceptions on variables such as interest rates, market indices, market volume, and foreign portfolio investment. Participants can declare their expectations on each variable under five categories: “significant decrease”, “decrease”, “stable”, “increase”, “significant increase”. After collecting data, the CMB publishes a monthly report, including future expectations of the market and a comparison of previous survey results with realizations. The CMB feels that the expectation survey enables the CMB to reach a diverse range of market participants, and thus significantly supplements the market consultation process.

### **Method 6: Risk Dashboard**

#### **Executive Summary**

For regulatory authorities that utilize a risk dashboard, the risk and research divisions of such securities authorities typically are in charge of tracking risk indicators for incorporation into a Risk Dashboard.

These regulatory authorities may also make use of international risk dashboards or of other types of research, including research from other regulators or academics, inter-governmental and supra-national bodies and/or industry participants and associations.

#### **Approach**

Monitoring of time series of data allows for the identification of changes in trends and patterns which may indicate the emergence of new area of risk.

The range of risk indicators that securities regulators can use to monitor and identify systemic risk is vast. Chapter 4 lists the macro and micro level indicators which securities regulators can track to identify trends, vulnerability and risks. Chapter 4 also lists the factors that can be used to assess whether the risk is systemic or not.

#### **Examples**

##### **1. Germany – Bafin**

Bafin has an automated Risk Dashboard that tracks a series of risk indicators relevant to the German economy and financial markets.

##### **2. International – IOSCO**

The IOSCO Research Department has developed in close collaboration with the CER an automated IOSCO Risk Dashboard that is updated and shared before every IOSCO Board Meeting. See Chapter 2 above for more detail on the IOSCO Risk Dashboard.

### Executive Summary

Many regulatory authorities publish a risk outlook, a financial stability report, an annual report or alternatively contribute to a national or international publication on financial stability and risk. Some regulatory authorities also publish more frequent information on risks through bulletins, newsletters and other reports on specific topics.

### Approach

Many regulatory authorities have staff dedicated to research and analysis, including the analysis of potential emerging and systemic risks. This includes focus on markets and products that fall under the scope of regulation of the agency. It also includes analysis of unregulated products and markets to monitor the regulatory perimeter in accordance with IOSCO Principle 7.

### Examples

#### 1. Europe – ESMA

ESMA publishes a “*Risk, Trends and Vulnerabilities in Financial Markets*” report on a quarterly basis.<sup>32</sup> It focuses on risk indicators of the securities market, including equities, sovereign bonds, corporate bonds, credit ratings, structured retail products, money markets, commodities, derivatives, shadow banking, and supply of collateral. It also describes risks in the fund industry, money market funds, alternative funds, exchange-traded funds, retail investors, trading venues, and central counterparties. Other key risk indicators analyzed are related to liquidity, market, contagion, and credit risk.

#### 2. France – AMF

The AMF publishes a “*Risk and Trend Mapping for Financial Markets and Savings*” on a yearly basis.<sup>33</sup> It examines the main risks affecting financial markets. The publication analyses the trends in markets and the financing of economic activity, and also looks at market organisation and intermediation, household savings and collective investment. It describes the actions taken by the AMF in each of these areas.

#### 3. Portugal – CMVM

The CMVM regularly releases two reports that include an outlook of securities markets:

- *The CMVM Risk Outlook*:<sup>34</sup> The Risk Outlook comprises analysis of risks affecting among others the stock and bond markets, commodities, derivatives and asset management. Analysis of the interconnectedness with the banking and insurance sector is also within the scope of this Risk Outlook:

<sup>32</sup> “*Risk, Trends and Vulnerabilities in Financial Markets*”, ESMA, <http://www.esma.europa.eu/page/Trends-risks-and-vulnerabilities-financial-markets>

<sup>33</sup> “*Risk and Trend Mapping for Financial Markets and Savings*”, AMF, [http://www.amf-france.org/technique/multimedia?docId=workspace://SpacesStore/58faa921-5034-4ef3-90ab-747e881261cf\\_en\\_1.1\\_rendition](http://www.amf-france.org/technique/multimedia?docId=workspace://SpacesStore/58faa921-5034-4ef3-90ab-747e881261cf_en_1.1_rendition)

<sup>34</sup> “*Risk Outlook*”, CMVM, <http://www.cmvm.pt/pt/EstatisticasEstudosEPublicacoes/EstudosEWorkingPapers/Estudos/Pages/20130926.aspx>

- *The CMVM's Activities Annual Report*: Chapters 1 and 2 of the Annual report includes a description of the previous year, in both international and local terms and identifying evolution, patterns and risks.

In addition to the above, the three Portuguese financial markets authorities (Securities - CMVM, Insurance - ISP and Banking – Banco de Portugal) produce a quarterly report for internal use only on financial stability and systemic risk that is accompanied by a Risk Dashboard.

#### 4. Spain – CNMV

The CNMV publishes the following reports on the topic of financial stability and systemic risk:

- *A report entitled “The Securities markets and their agents: situation and outlook”*:<sup>35</sup> This report is published in the Quarterly Bulletin of the CNMV and provides an overview of the Spanish securities markets and their participants. It takes into account the international context and focuses on the relevant risks factors affecting prices and volumes in the main trading venues, the performance of securities markets intermediaries and of investment vehicles (mutual funds, SICAV, hedge funds and venture capital):
- *The Annual Report*: Chapter 1 of the annual report analyses the main macro-financial developments of the preceding year and identifies the most important risks within the international and domestic context;
- *Topical Working Papers*: the CNMV carries out “ad hoc” studies on particular areas of interest that are published as CNMV working papers.

#### 5. United Kingdom – FCA

The FCA issues an annual risk outlook.<sup>36</sup> The FCA risk outlook focuses on risks to the statutory objectives of the FCA and formulates forward-looking themes the FCA intends to focus on to reduce such risks.

### Method 8: Data Analytics and Econometrics

#### Executive Summary

Certain securities regulators have a long history of requiring systematic risk data filings by the parties they regulate, including exchanges, clearing houses, brokers and funds.

The risk and research divisions of securities regulators with long established risk data filing requirements are increasingly making use of quantitative methods, including data analytics and econometric models, to analyze the large data sets that result from these filing requirements.

The goal of such data analytics and econometric models is typically twofold: (i) to identify patterns which could signal potential emerging and systemic risks, and (ii) to assist the securities regulators in planning risk-based reviews and investigations.

<sup>35</sup> “*The Securities markets and their agents: situation and outlook*”, CNMV, <http://www.cnmv.es/portal/Publicaciones/Mercados.aspx>

<sup>36</sup> “*The FCA Risk Outlook*”, FCA, <http://www.fca.org.uk/your-fca/documents/corporate/fca-risk-outlook-2014>



## ***Approach***

Quantitative analysis, including data analytics and econometrics, can be used in order to discover patterns and relationships in large data sets.

The extent to which data analytics and econometrics is used by securities regulators is largely dependent on:

- (i) The availability of long time series of data and the ability to do cross-sectional analysis. This in turn hinges, in part, on the history, nature and scope of regulatory risk data filing requirements in the jurisdiction; and
- (ii) Human resources, as data analytics and econometrics require specialized skill-sets.

Consequently, securities regulators with long standing history of regulatory risk data filing requirements are best positioned to develop and implement new data analytics and econometric models and there is evidence of them doing so.

Notwithstanding the fact that securities regulators without a long history of regulatory risk data filing requirements may not have the same immediate opportunity to apply risk data analytics and econometrics, increasingly there is a trend for securities regulators to re-assess their long-term data strategy with a view towards improving risk data availability and analysis.

Overall, this area is still subject to substantial evolution on national levels. Also, on international levels, the CER recommended the creation of a working group dedicated to defining data on financial market entities, infrastructures, products and activities which global securities regulators should have or exchange to more effectively implement IOSCO Principle 6.

## ***Examples***

### ***1. United States – SEC***

The SEC has extensive regulatory data filing requirements that have been in place for a long time. Consequently, the SEC has long time-series of data, based on which it can implement new data analytics and econometric models. The models are intended to help the SEC plan risk-based reviews and investigations.

For example, the SEC Division of Economic and Risk Analysis (DERA) developed the Accounting Quality Model (AQM).<sup>37</sup> The AQM creates a consistent methodology for quantifying earnings management by modelling factors associated with discretionary and non-discretionary accruals.

DERA and SEC staff are also developing hedge fund performance models (Aberational Performance Inquiry or API models). These analytical models use performance data to identify hedge fund advisers that may warrant further review. For example, the models compare hedge funds to similar funds over a period of years, and identify instances where funds consistently outperform their peers or exhibit suspiciously consistent positive results.<sup>38</sup>

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<sup>37</sup> “AQM”, SEC, Craig Lewis, <http://www.sec.gov/News/Speech/Detail/Speech/1365171491988>. See also: [http://www.forbes.com/fdc/welcome\\_mjx.shtml](http://www.forbes.com/fdc/welcome_mjx.shtml) and [http://www.morvillolaw.com/AM\\_SEC\\_AQM.pdf](http://www.morvillolaw.com/AM_SEC_AQM.pdf).

<sup>38</sup> “*Harnessing Tomorrow’s Technology for Today’s Investors and Markets*”, SEC, Elisse Walter, <http://www.sec.gov/News/Speech/Detail/Speech/1365171492300>.

## **2. Portugal – CMVM**

The CMVM developed and regularly updates risk models adjusted to the main areas of supervision: asset management and mutual funds, market infrastructures and securities issuers. The risk models are updated using several mandatory reports from market participants, information gathered from the public financial statements of financial intermediaries, data from issuers and market platforms, and also data from commercial data bases and other information sources.

## **3. Spain – CNMV**

The CNMV carries out regular financial stability analyses based on information gathered from the regular supervisory process (periodic financial reporting of financial institutions, supervisory off-site analysis reports and supervisory on-site inspection reports) and information provided by external entities (commercial data bases and other information sources).

## **4. United Kingdom – FCA**

The Financial Conduct Authority (FCA) published its data strategy in September 2013.<sup>39</sup> The strategy sets out why data is important to FCA as a new regulator, how data will be collected and used in the future, the approach to delivering this vision for data and, aware of the size of the task ahead, the plan for implementation.

The FCA notes that as a forward looking risk-based regulator, good quality data and information, handled well and available quickly, will give FCA deeper insight into markets and allow greater efficiency in identifying and tackling risks.

The expectation is that FCA data will be actionable, integrated and fully accessible across the organisation. This will mean data is effectively:

- governed and controlled
- clearly specified
- fit for purpose
- strong and rich at a baseline level
- collected appropriately
- managed and stored in appropriate technology solutions.

The FCA believes that the data strategy will enable the FCA to further its regulatory objectives, including to secure an appropriate degree of protection for consumers, to protect and enhance the integrity of the UK financial system, and to promote effective competition in the interests of consumers.

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<sup>39</sup> “FCA Data Strategy”, FCA, <http://www.fca.org.uk/static/documents/corporate/fca-data-strategy.pdf>

## Chapter 4: An Analytical Framework for Assessing Systemic Risks

### Introduction

In July 2012, the IOSCO Research Department published a staff working paper outlining a systematic approach to the analysis of whether risks in the securities markets can pose a threat to the system.<sup>40</sup> In accordance with the methodologies of other global institutions, such as the FSB, it uses impact factors refined into practical and concrete indicators.

The indicators are divided first into macro level and micro level indicators. The macro level indicators help to provide signaling on emerging risks stemming from the broader environment, such as the macro-economy, the political and regulatory environment, technology and socio-economic trends. The micro indicators signal risks emanating from securities markets themselves, which could have systemic implications. Macro level indicators include indicators on financial stress, market imbalances, macro-economic issues, fiscal debt sustainability and asset prices/spreads and can provide indications of risks developing in the financial system.

### Section 1: Macro and Micro-level Indicators

The staff working paper categorized the types of risk indicators that securities regulators could track to identify new emerging and systemic risks as follows:

#### Macro-Level indicators

Macro level indicators	
<b>Financial Stress</b>	Financial stress indexes Deviations from long-term value of assets
<b>Market Imbalance</b>	Market significantly above long-term average Strong inflows into an asset class Levels of leverage at historical highs
<b>Macro-economic data</b>	Interest-rate fluctuation Negative real-interest rates connected to size of country - liquidity abundant, risk pricing will be blurred. Credit-bubble indicator. Price/earnings indicator of global markets Inflation Economic growth rates Flows of funds Changes in the money supply and credit growth Interbank lending Asset purchase programs by central banks
<b>Fiscal debt sustainability</b>	Sovereign debt Overall indebtedness of market participants, issuers or individuals in aggregate
<b>Asset prices and spreads</b>	Asset prices and spreads (credit, equity and commodity markets)
<b>Other</b>	Movement of international capital flow Geopolitical environment

<sup>40</sup> Werner Bijkerk, Rohini Tendulkar, Samad Uddin and Shane Worner, "Systemic Risk Identification in Securities Markets", *Staff Working Paper*, July 2012.

<http://www.iosco.org/research/pdf/swp/Option%20for%20Systemic%20Risk%20Identification%20System.pdf?v=1>

## Micro-Level Indicators

Systemic Risk Factors	Consolidated Indicators for Securities Markets (Thematic)
Size	Market-size indicators (Value, growth, footprint)
	Asset and flow of money indicators
Liquidity	Liquidity in market indicators and dependence of specific liquidity on global/market liquidity (e.g. LIBOR spreads)
	Credit market/bond market stability indicator
	Securitization and collateral indicators (e.g. level of collateralization)
Cross Jurisdictional	Cross-jurisdictional claims and liabilities indicators
Transparency	Consumer confidence on financial advisors and markets
	Change in proportion of activity on non-transparent markets (year on year) indicator
Interconnectedness	Correlation between markets, products and institutions Indicator (e.g. IMF network analysis of banks)
	Intra-financial system assets and liabilities indicators (e.g. for non-bank SIFIS and G-SIB)
	Counterparty concentration/exposure and collateralization indicators
Substitutability and institution structure	Scale of exposure to individual assets, markets and institutions indicators
	Risk-neutral probability of default for each institution indicator
	Qualitative assessments of availability of alternatives/substitutes
Market Integrity and Efficiency	Market manipulation indicator
	Broker/client conflict indicators
	Insider-trading indicator
Concentration	Scale of exposure to individual assets, markets and institutions indicators
	Risk-neutral probability of default for each institution indicator
Behaviour	Herding/flow of funds (e.g. top 5 biggest products invested into, top 5 most aggressive firms and their most beneficial activities)
	Trends in selling practices (e.g. surveys, regulatory compliance)
Incentive Structure	Margining schedule/haircuts (e.g. for Repo markets)
	Trends in remuneration practices
Leverage	Leverage and speed of money indicators
Regulation	Proportion of unregulated transactions indicator (alternative trading schemes, dark trading, non-listed exchange traded funds etc.)
	Existence and nature of under-regulated areas of markets
Complexity	Complexity indicator (Number/value of complex product)
	Portfolio penetration (pp) indicator (e.g. % of avg. household pp)
	Qualitative assessment of investor/market participant understanding of products in markets (e.g. surveys)

Source: Werner Bijkerk, Rohini Tendulkar, Samad Uddin and Shane Worner, 2012

## *Section 2: Factors to assess whether the Risk identified is Systemic*

The staff working paper identifies the following factors as critical regardless of the assessment approach used by a regulator:

- **Size:** the relative size or importance of the parts of the market that would be impacted by a risk. Size may be in terms of monetary value or transaction volume and may be more significant when considered in aggregate.
- **Interconnectedness:** the degree of interconnectedness or interdependence among market participants that would be impacted by a risk, particularly through counterparty relationships or other contractual obligations.
- **Lack of substitutes/concentration:** concentration risk can arise when only one or a few market participants provide a product or activity. The potential impact is heightened when there are no effective or potential substitutes.

The staff working paper notes that these three factors are of such importance that without at least one of them it would be difficult and unlikely for a risk to become systemic. It also says that there are a number of factors that may augment one or more of the critical factors, or they themselves may become critical in combination. These factors include:

- **Leverage:** a risk can become systemic through the simple effect of leverage. Leveraging can occur directly using borrowed funds or indirectly via derivatives or other products that have embedded leverage. Leverage can make a smaller firm, or a collection of small firms, a significant player in an asset class and a potential systemic risk. Risks arising from leverage can be addressed directly through regulatory requirements which limit the amount of leverage taken on by an entity, or indirectly via disclosure, imposition of obligations or other incentives.
- **Typology and structure of assets and liabilities:** held in the balance sheet or off the balance sheet: some low quality assets (downgraded or non-investment grade assets, unprofitable loans) or highly concentrated or immediately redeemable liabilities may endanger the profitability of the financial institution concerned.
- **Contagion:** the potential for risk transmission across sectors, markets or market participants, domestically or internationally.
- **Liquidity:** one form of liquidity risk is the risk of not being able to sell a security at its fair value, as a result either of a liquidity discount or the complete absence of a market or buyers. Another form of liquidity risk is the risk of being unable to obtain funding. In addition, market liquidity risk and funding liquidity risk can exacerbate each other.
- **Transparency (or opacity):** greater transparency about interconnections can help regulators and market participants to understand how systemic risk may spread. In addition, market participants need complete and accurate information about markets or products to assess the market price, potential return, and risk exposure.
- **Behavior:** the behavior of participants can result in mispricing of assets and an accumulation of risk in the financial system, for example, through herding, which can lead to excessive risk taking.

- **Quality (level, gaps):** of existing regulation and coordination/consistency in implementing the regulation among authorities: market participants may have incentives to move their activities to less regulated and more opaque segments of the system.
- **Complexity:** the level of complexity can lead to a lack of understanding of the risks inherent to an investment or strategy.

The use of these factors in combination allows for a thorough assessment of a potential risk, regardless of how a securities regulator becomes aware of it through its risk monitoring tools.

In addition, considering data or qualitative information for each of these factors ensures that a broad perspective is taken in the assessment. In this way, internal and external risk factors (within and outside of securities markets) can be taken into account by securities regulators.

The IOSCO Research Department has (back-) tested the analytic framework on an entity for the global financial system, Long Term Capital Management (LTCM), and a product for a national financial system of the Netherlands, unit-linked products. Both cases are described in the staff working paper and indicated that the systematic approach could be useful.

The IOSCO Research Department is also using the framework in its ongoing systemic risk analysis, such as the annual IOSCO Securities Markets Risk Outlook and in the Staff Working Paper series.<sup>41</sup>

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<sup>41</sup> “Cyber-crime, Securities Markets and Systemic Risk, Staff Working Paper jointly with the World Federation of Exchanges”, R. Tendulkar, July 2013; “Crowdfunding: an Infant Industry Growing Fast, Staff Working Paper”, E. Kirby and S. Worner, February 2014 and “Corporate Bond Markets: A Global Perspective Volume 1, Staff Working Paper”, R. Tendulkar and G. Hancock, April 2014.

## Conclusion and Future Evolution

As noted from the onset, there is at current no “one-size-fits-all” method for the identification of all emerging and systemic risks in securities markets. This is because securities markets are complex and involve a large range of different intermediaries, behaviors, products, investors, geographies, stages of financial development, macro-economic context, etc. Notwithstanding this diversity, as this paper demonstrates, securities regulators have made substantial progress since the Global Financial Crisis on institutionalizing methods for the identification and analysis of risks in securities markets.

We listed in this paper a wide range of methods that are now more routinely adopted at the IOSCO Research Department as well as within securities regulators. They demonstrate that increasingly securities regulators are pairing qualitative risk analysis with quantitative tools, including risk dashboards that systematically track quantitative risk indicators, as well as data analytics, econometrics and research that is focused not only on risk analysis of product, firms and markets, but also of behaviors and incentives.

Nevertheless, there is more work to be done, especially in the context of defining which risk data securities regulators should obtain or exchange in order to contribute to the analysis of global systemic risk. Within this context the CER recommended the creation of a working group dedicated to defining data on financial market entities, infrastructures, products and activities which global securities regulators should have to more effectively implement IOSCO Principle 6. This initiative can form the basis for fostering greater regulatory consistency and sharing of risk data.

Also, because risk is an evolving matter and because risk identification and assessment methods are poised to improve, the CER will continue to serve as a forum for active dialogue on risk and risk mitigation among securities regulators and market participants.

## ANNEX 1: IOSCO Assessment Committee Thematic Review

In September 2013, the IOSCO Assessment Committee issued its conclusions of the “*Thematic Review of Principles 6 and 7 of the IOSCO Objectives and Principles of Securities Regulation*”. We insert below the recommendations:<sup>42</sup>

### **Recommendations**

The recommendations which follow are intended to provide further guidance to IOSCO Members as they develop and implement relevant processes in relation to Principles 6 and 7. They are also intended to provide a basis for possible revisions to the IOSCO Methodology for these Principles.

The recommendations draw from what are increasingly common practices among participating IOSCO Members in implementing these Principles.

The Review Team was challenged in making recommendations based on the effectiveness of processes observed through the Thematic Review. These reasons include the following:

- The relative novelty of processes meant that there has been limited opportunity or time to test their effectiveness. Consequently, it was difficult to make firm and concrete assessments about the differences they had made; and
- Specific criteria for assessing effectiveness are difficult to devise. As noted, Principle 6 seeks to ensure that securities regulators have in place processes that promote and allow for the effective management of systemic risk. Principle 7 focuses on risks outside the regulatory perimeter. Arguably, the effectiveness of measures and processes need to be assessed according to a counterfactual – that is, whether they have prevented further (systemic) crises or have contributed to a reduction of the impact of such crises beyond what would have occurred had the measures and processes not been in place. At this juncture, therefore, effectiveness assessments by necessity have to be based on institutional, organizational and cultural changes; in particular, increased awareness and appreciation of the benefits of systemic risk processes and processes to review the regulatory perimeter.

The recommendations are also at a high level – and necessarily so. The IOSCO Assessment Committee believes there cannot be a one size fits all approach to processes to give effect to Principles 6 and 7 given differences in legal frameworks, regulatory structures, regulatory perimeter, and local market circumstances (for example the complexity and/or size of the securities market).

The recommendations not only reflect the interrelated nature of Principles 6 and 7 but also their separate and distinct scope. Principle 6, as crafted, has a particular focus on systemic risk (and is limited to the regulator’s mandate). Principle 7 is broader in scope (including systemic risks and other risks) and does not limit itself to the regulator’s mandate. Survey responses pointed to similar processes being applied to the implementation of both Principles. To reflect this, the high level recommendations outlined below apply to the implementation of both Principles. Where recommendations apply to the implementation of only one of these Principles, this is clearly indicated.

This Report makes recommendations about:

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<sup>42</sup> This Review was based on a survey of 34 IOSCO members from 31 jurisdictions indicating and provides an overview of the tools which those members noted they are using to implement IOSCO Principles 6 and 7.  
<http://www.iosco.org/library/pubdocs/pdf/IOSCOPD424.pdf>.



- The structure within which processes are conducted and the processes themselves;
- How regulators should co-operate with other agencies in their own jurisdiction and with regulators in other jurisdictions; and
- The resourcing and culture which the Thematic Review highlighted as necessary to support the processes and co-operation arrangements.

## *Structure*

### **1. Integration into Existing Risk Management Framework**

The identification, monitoring, mitigation, and appropriate management of systemic risk emerging from securities markets or affecting securities markets and the review of the regulatory perimeter should be integrated into securities regulators' risk management frameworks through formalization of processes and arrangements including support by formal committee structures.

### **2. Clear Responsibilities in relation to Systemic Risk**

Securities regulators should have a clear understanding of their responsibilities in:

- Identifying, monitoring, mitigating and appropriately managing systemic risks related to securities markets; and
- Contributing to processes in relation to other financial markets.

This understanding should be based on a clear definition of systemic risk. It should also entail an understanding of securities regulators' responsibilities in relation to macro- prudential risks which may require consideration of and contributing to the identification and management of those risks.

### **3. Clear Responsibilities in relation to Reviewing the Regulatory Perimeter**

The responsibilities of the securities regulator in jurisdictional arrangements to review the regulatory perimeter should be clear. These arrangements should allow for identification of risks posed by unregulated products, markets, market participants and activities.

Arrangements should consider the potential for regulatory arbitrage, which might emerge outside the securities regulators' mandate but may affect the discharge of its statutory functions (even where the securities regulator does not have the explicit power to intervene). In such instances, securities regulators should be able to raise awareness of issues or to pass them on to other relevant authorities within its jurisdiction to act. This action may include seeking to introduce requirements under its rulemaking powers or seeking changes in legislation.

## *Systems/Processes*

### **1. General Arrangements**

Arrangements to identify, monitor, mitigate and manage systemic risk and review the perimeter of regulation should:

- (i) Entail a holistic and systematic analysis of entities, products, markets, market infrastructures and activities across securities markets that could be the source of systemic risk or that could raise concerns about the regulatory perimeter. The analysis should use a combination of quantitative and qualitative tools;
- (ii) Involve the systematic and robust analysis of accessible, reliable and good quality data (including micro- and macro-economic data and market intelligence) either collected by the securities regulator or sourced from other agencies or parties (including prudential supervisors);
- (iii) Include mechanisms to assist in understanding the evolving functioning of securities markets;
- (iv) Involve engagement with market participants to better understand emerging risks, systemic and otherwise. This engagement may take the form of surveys, formal consultations, informal roundtables, individual meetings, etc.;
- (v) Include documentation about the work performed in assessing potential systemic risks at each stage of the assessment process, and documentation about the status of steps taken to mitigate identified risks;
- (vi) Allow for periodic reassessment of procedures and outcomes; and
- (vii) Provide for policy and/or regulatory actions, where appropriate in the context of the regulatory mandate, based on the assessments conducted.

## **2. Systemic Risk Arrangements**

These arrangements should, in addition to the general arrangements set out above:

- (i) Provide a broad understanding of the financial markets environment in which securities regulators operate and on which assessments of systemic risk can be made. The understanding should have a global focus. It should also take into account the interconnections between different products, markets, market infrastructures and activities across securities markets;
- (ii) Complement reviews undertaken by prudential regulators, where appropriate, by incorporating analysis of the operation of securities markets and the interplay between various markets and participants; and
- (iii) Include the development and use of indicators to calibrate systemic risk emerging from (or affecting) securities markets. The indicators should contain specific qualitative and quantitative criteria.

## **3. Regulatory Perimeter Arrangements**

These arrangements should, in addition to the general arrangements set out above:

- (i) Involve securities regulators systematically identifying, prioritizing and determining the scale and scope of emerging risks from different entities, activities, markets and products in financial markets that could serve as the basis for deciding whether and what type of regulatory action or intervention is warranted;

- (ii) Build on existing risk identification frameworks by requiring securities regulators to proactively go beyond existing regulatory boundaries to identify potential risks; and
- (iii) Recognize that different approaches may be required to discern and assess different types of risks; just as having a single perspective may not prove effective, having only one risk approach similarly may not suffice. For example, a different approach may be warranted for known risks that are being re-evaluated, as opposed to emerging risks being considered for the first time, particularly if they are emerging outside of the regulatory perimeter.

### ***Cooperation and Coordination***

- ***Intra-Jurisdictional Cooperation*** Systemic risk is a relevant concern to all financial regulators in a given jurisdiction. A strong information sharing framework should be in place between relevant regulators and supervisors. This information sharing framework should cover the identification, monitoring, mitigating and appropriate management of systemic risks. The framework should be supported by formal co-operation or institutional arrangements. Regulators should ensure they understand the specific mandate, role and powers of other regulators in their jurisdiction to facilitate the effectiveness of the framework.
- ***Cross Border Cooperation and Coordination*** Securities regulators should communicate information and data about identified systemic risk(s) with regulators in other jurisdictions, under established procedures or arrangements and/or supported by bilateral and/or multilateral MoUs. IOSCO should consider developing multilateral arrangements on how such information and data could be shared. IOSCO should also explore how the identification, mitigation, monitoring and appropriate management of systemic risk and reviews of the regulatory perimeter could be coordinated among its Members.

### ***Culture and Resourcing***

- ***Culture*** Securities regulators should seek to build an organizational culture that supports and serves as a foundation to processes in relation to systemic risk and reviewing of the regulatory perimeter. Securities regulators should seek to ensure awareness of their systemic risk and regulatory perimeter review arrangements and commitment to the effective and meaningful operation of such arrangements (including promotion of *professional scepticism*) as key elements of their organizational culture.
- ***Resourcing*** To support the effectiveness of the risk arrangements outlined in these recommendations, the securities regulator should have appropriately skilled and adequate human and technical resources.

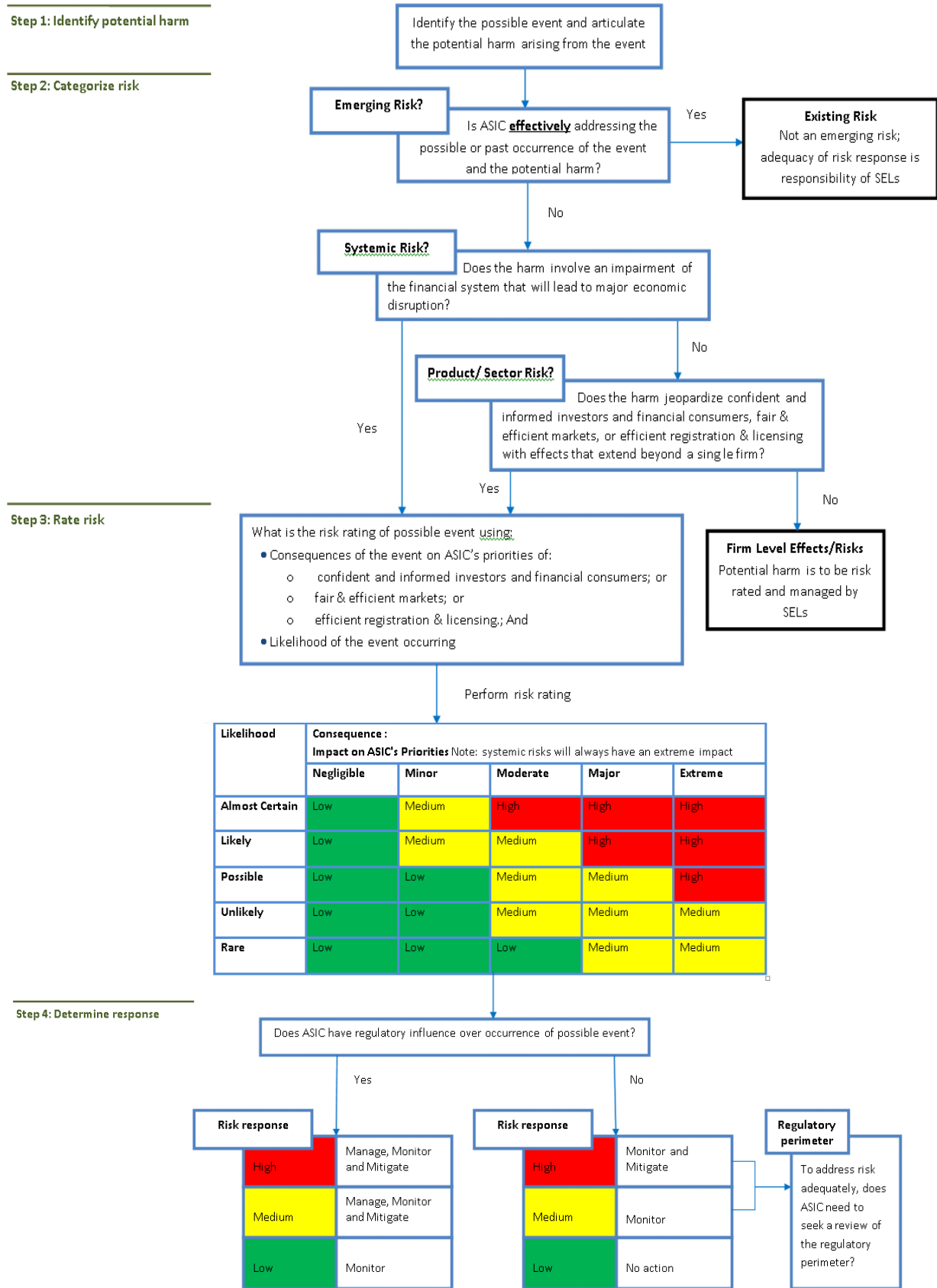
## ANNEX 2: IOSCO Risk Dashboard

<b>Market Indicators</b>	
1.	<ul style="list-style-type: none"> <li>▪ CDS Markets Sovereigns</li> </ul>
2.	<ul style="list-style-type: none"> <li>▪ Equity markets of selected countries</li> <li>▪ Equity market indices</li> <li>▪ Equity market volatility indices of selected countries</li> <li>▪ Global Equity market IPOs and follow-on offering</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ Commodity markets</li> <li>▪ Commodity price indices</li> </ul>
4.	<ul style="list-style-type: none"> <li>▪ Commodity and equity markets</li> <li>▪ Correlation between commodity (UBS Commodity Index) and equity markets (SP500 10)</li> </ul>
5.	<ul style="list-style-type: none"> <li>▪ Real estate markets</li> <li>▪ Real estate price indices - selected countries</li> <li>▪ Real estate price indices</li> </ul>
6.	<ul style="list-style-type: none"> <li>▪ Interest rates</li> <li>▪ Real interest rates</li> <li>▪ Interest rate spreads in bond market</li> </ul>
<b>Statistics</b>	
1.	<ul style="list-style-type: none"> <li>▪ Money market statistics</li> <li>▪ US MMF Assets under management</li> </ul>
2.	<ul style="list-style-type: none"> <li>▪ Bond market statistics</li> <li>▪ Covered bond issuances by region</li> <li>▪ High yield issuances - US Europe</li> <li>▪ US bond market composition</li> <li>▪ Global high yield corporate bond issuances - by region</li> <li>▪ Global securitised products issuances</li> <li>▪ Global Islamic bond issuances</li> <li>▪ Payment-in-Kind (PIK) bond issuances - by region</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ Loan market statistics</li> <li>▪ Global Syndicated Loan issuance</li> <li>▪ Covenant-Lite Loan issuance - by region</li> </ul>
4.	<ul style="list-style-type: none"> <li>▪ Investment Fund statistics</li> </ul>
5.	<ul style="list-style-type: none"> <li>▪ Mutual Funds</li> <li>▪ Net Assets under management - by region</li> <li>▪ Number of new funds - by region</li> <li>▪ Net new cash flows - by fund strategy</li> <li>▪ Net new cash flows - ETFs - by strategy</li> </ul>
6.	<ul style="list-style-type: none"> <li>▪ Hedge Fund statistics</li> <li>▪ Assets under Management - Hedge Funds</li> <li>▪ Net cash flows - Hedge Funds</li> <li>▪ Leverage - Hedge Funds</li> </ul>
7.	<ul style="list-style-type: none"> <li>▪ Macroeconomic Outlook</li> <li>▪ Economic growth - by selected regions</li> <li>▪ Economic growth - Eurozone periphery</li> <li>▪ Government Debt as a percent of GDP - selected regions</li> <li>▪ General Government Net Debt Advanced economies</li> <li>▪ Total credit (bank and private sector) to GDP</li> <li>▪ "Total Debt" Govt plus private sector</li> </ul>

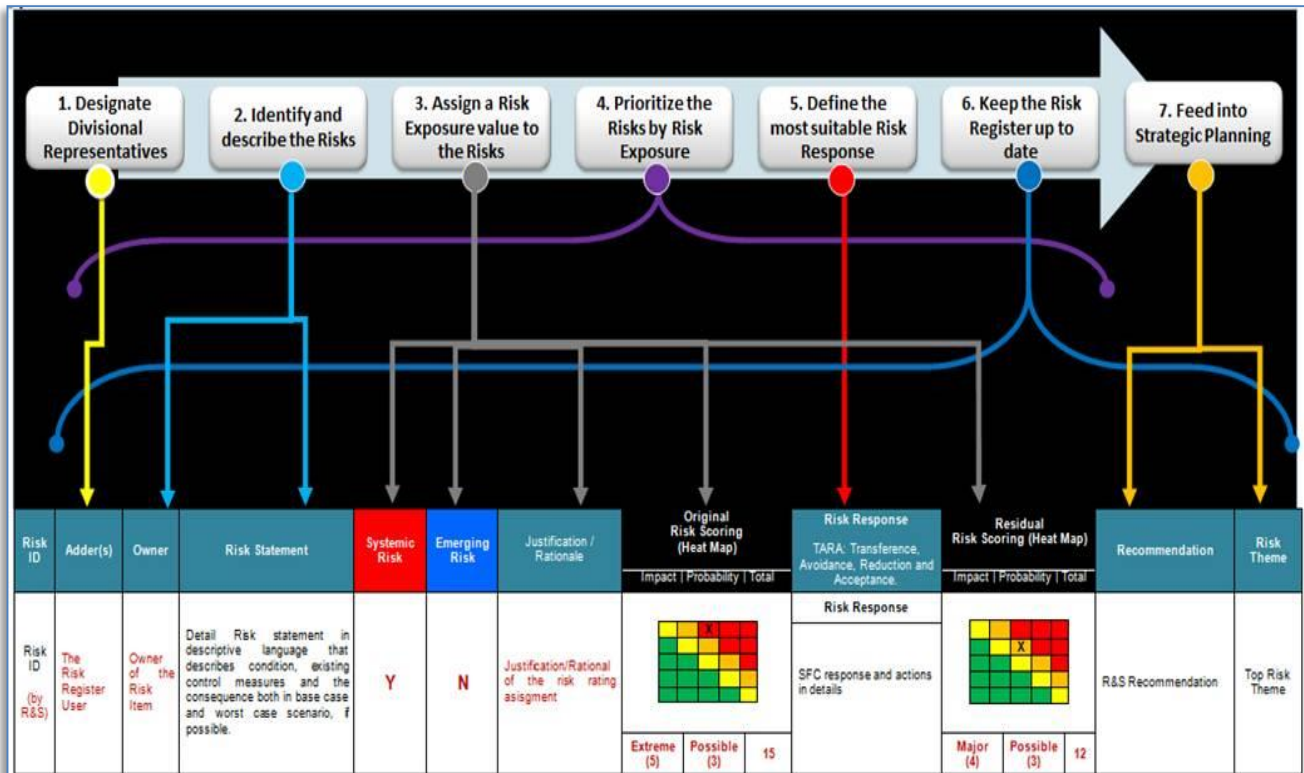
8.	<ul style="list-style-type: none"> <li>▪ Credit market development</li> <li>▪ Domestic credit to private sector</li> </ul>
<b>Modelled Statistics</b>	
1.	<ul style="list-style-type: none"> <li>▪ Measures of Valuation</li> <li>▪ CAPE and Tobins q - US</li> <li>▪ Europe CAPE</li> </ul>
2.	<ul style="list-style-type: none"> <li>▪ Financial stress</li> <li>▪ Financial stress indices - selected countries</li> </ul>
3.	<ul style="list-style-type: none"> <li>▪ Vlab Systemic risk indicator</li> <li>▪ Vlab Capital shortfall indicator - by region</li> </ul>
4.	<ul style="list-style-type: none"> <li>▪ Accuracy of market news</li> <li>▪ Economic surprise index</li> </ul>
5.	<ul style="list-style-type: none"> <li>▪ Macroeconomic outlook</li> <li>▪ Household debt to GDP</li> <li>▪ Non-performing loans</li> <li>▪ Residential Loans</li> <li>▪ OECD composite leading indices</li> <li>▪ Economic growth expectation indices</li> <li>▪ Investor confidence</li> </ul>

# ANNEX 3: Examples of Risk Register and Heat Map Methodologies

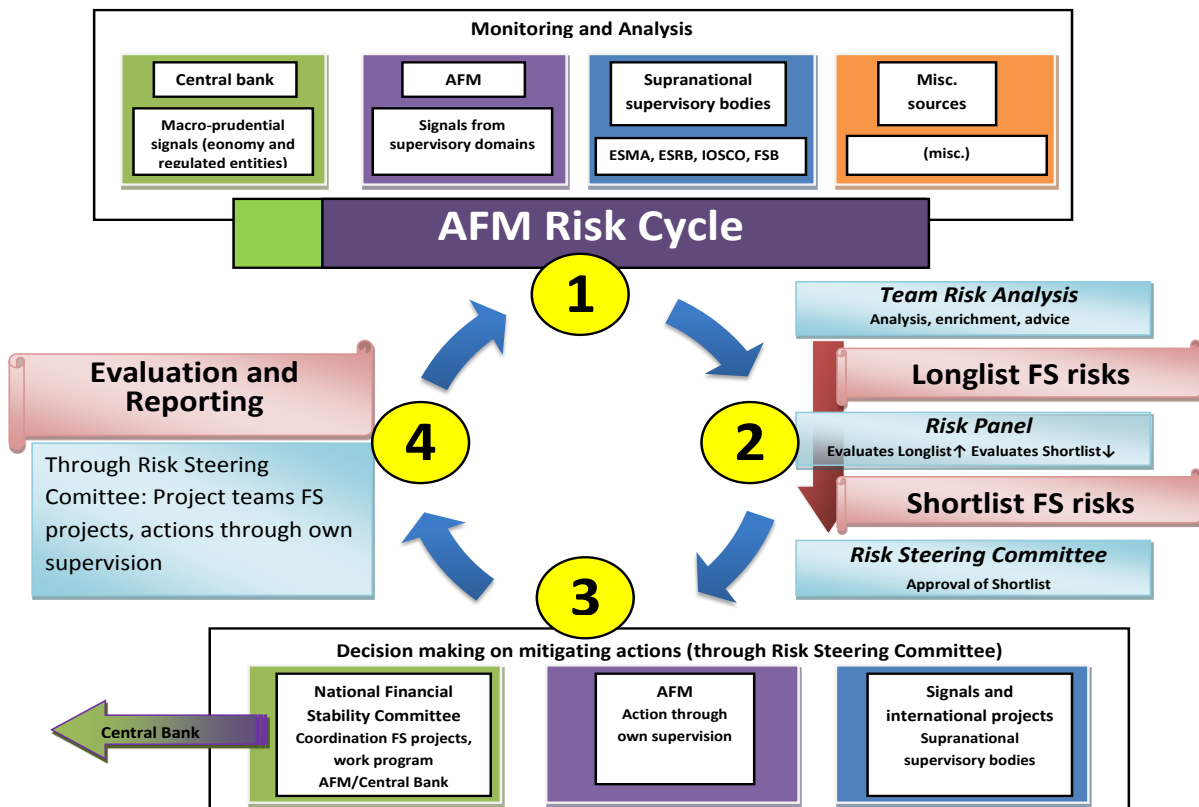
## Australia – ASIC Risk Register and Heat Map Methodology



## Hong Kong – SFC Risk Register and Heat Map Methodology



## Netherlands – AFM Risk Cycle



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