



eiopa

EUROPEAN INSURANCE
AND OCCUPATIONAL PENSIONS AUTHORITY

Systemic risk and macroprudential policy in insurance

Neither EIOPA nor any person acting on behalf of EIOPA is responsible for the use that might be made of the following information.

Luxembourg: Publications Office of the European Union, 2017

Print	EI-04-17-868-EN-C	ISBN 978-92-95214-30-9	doi:10.2854/832394
PDF	EI-04-17-868-EN-N	ISSN 2467-3706 ISBN 978-92-95214-31-6	doi:10.2854/744690

© EIOPA, 2017

Photos: © EIOPA

Reuse is authorised provided the source is acknowledged.

For any use or reproduction of photos or other material that is not under the EIOPA copyright, permission must be sought directly from the copyright holders.

Contents

Executive summary	2
1. Introduction, review of the literature and lessons learned for insurance	6
1.1. Introduction	7
1.2. Definitions	7
1.3. Relevant lessons learned from the financial crisis and the banking sector	8
1.4. Current status of discussions in insurance	11
2. The social dimension of macroprudential policy and financial stability	16
3. Systemic risk in insurance	22
3.1. A macroprudential approach to systemic risk in insurance	25
3.2. Entity-based related sources of systemic risk - Direct sources	32
3.2.1. Description	32
3.2.2. Systemic risk drivers	37
3.2.3. Transmission channels	40
3.3. Activity-based related sources of systemic risk – Indirect sources (i)	43
3.3.1. Description	43
3.3.2. Systemic risk drivers	44
3.3.3. Transmission channels	49
3.4. Behaviour-based related sources of systemic risk – Indirect sources (ii)	50
3.4.1. Description	50
3.4.2. Systemic risk drivers	51
3.4.3. Transmission channels	58
4. A macro-prudential framework for insurance	60
4.1. The framework	61
4.1.1. The ultimate and intermediate objectives	63
4.1.2. Operational objectives	64
4.1.3. Instruments	66
4.2. Operationalisation of the framework. Some possible indications for insurance	67
References	70
Annex 1 – Triggering events, risk profile, systemic risk drivers and transmission channels	76



Executive summary

The financial crisis has shown the **need to further consider the way in which systemic risk is created and/or amplified**, as well as the need to have proper policies in place to address those risks. So far, most of the discussions on macroprudential policy have focused on the banking sector due to its prominent role in the recent financial crisis. Given the relevance of the topic, EIOPA has initiated the publication of a series of papers on systemic risk and macroprudential policy in insurance with the aim of contributing to the debate and ensuring that any extension of this debate to the insurance sector reflects the specific nature of the insurance business. This document is the first in this series. It worth noting that:

- This paper aims at identifying and analysing the sources of systemic risk in insurance from a conceptual point of view. Its content shall not prejudice or establish any link with

any kind of policy measures developed by the IAIS.

- EIOPA developed its own view building on the available sources produced by academia, standard setting bodies, national authorities and the industry. In particular, EIOPA elaborates several of the concepts that are also used in other fora such as the IAIS. Although EIOPA's approach and position might not always be fully adherent to the IAIS approach (see IAIS, 2017b), the outcomes presented in this paper is broadly consistent with it.

EIOPA devotes the first part of this paper to providing an overview of the status of the discussion on the systemic risk and macroprudential policies in insurance and by depicting the most **relevant lessons learned** from the financial crisis and the banking sector. The approach aims at laying the foundation for further elaboration and leads to the conclusions summarised in Box 1.

Box 1: Main lessons learned from the crisis and status of discussions in insurance

Relevant lessons learned from the financial crisis and the banking sector.

- Microprudential policy should be supplemented with a macroprudential approach. Potential conflicts between the two approaches should be avoided to the extent possible.
- Sources of systemic risk need to be identified.
- A sound macroprudential strategy that links objectives and instruments should be in place. Sufficient macroprudential tools need to be available.
- New macroprudential tools have been introduced to properly address systemic risk.
- The entity-based approach initially developed should be supplemented with an activity-based approach.
- Macroprudential policy may require supranational coordination.
- Macroprudential policies pose several challenges that need due consideration. Overall, macroprudential policy seems to contribute effectively to the mitigation of systemic risk.

Current status of discussions in insurance.

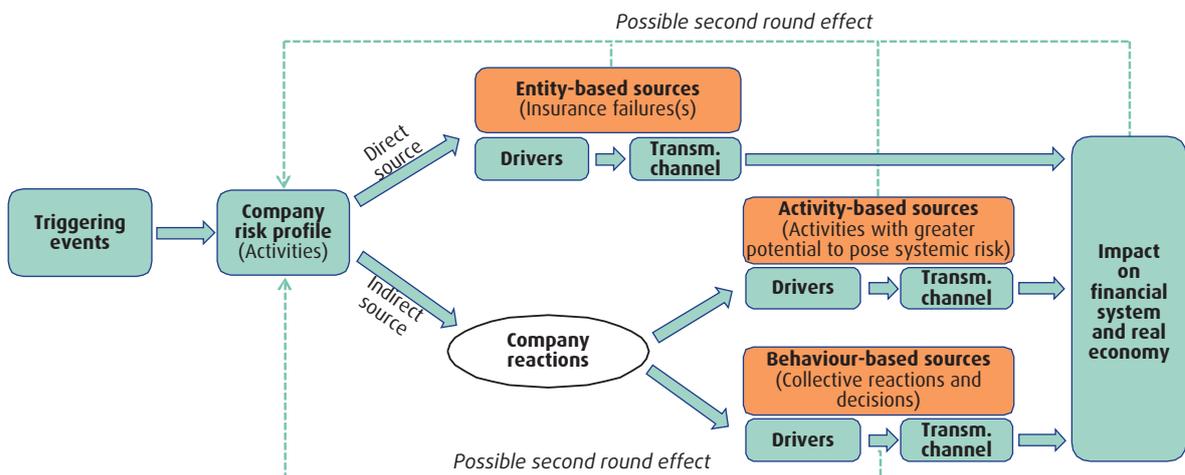
- It is widely acknowledged that the traditional insurance activities are generally less systemically important than banking.
- However, insurance can also potentially create or amplify systemic risk. Therefore, a macroprudential approach seems justified beyond banking, including insurance.
- Macroprudential policies for insurance could also have the benefit of crisis prevention. They should, however, be tailored to insurance.
- A balance between the entity-based and activity-based approaches also needs to be struck in insurance. Special attention should be devoted to the systemic risk arising from certain activities or products.
- Sufficient tools need to be in place to address the sources of systemic risk.
- There could be a risk of regulatory arbitrage if insurance is not included within the wider macroprudential framework.

The second section of this paper is devoted to explaining the social dimension of macroprudential policy and financial stability. It is pointed out that, to the extent that this objective is achieved, macroprudential policies will also be providing a **decisive contribution to minimise the social costs of financial crises** in terms of output losses, rising unemployment and declining living conditions.

The third part of the paper illustrates **dynamics in which systemic risk in insurance can be created or amplified** (Figure 1). While a com-

mon understanding of the systemic relevance of the banking sector has been reached, the issue is still debated in the case of the insurance sector. In essence, the approach developed considers that a 'triggering event' initially has an impact at entity level, affecting one or more insurers through their 'risk profile'. Potential individual or collective distresses may generate systemic implications, the relevance of which is driven by the presence of different 'systemic risk drivers' embedded in the insurance companies.

Figure 1: An approach to systemic risk in insurance



In EIOPA's view, systemic events could be generated in two ways.

- i. The 'direct' effect, originated by the failure of a systemically relevant insurer or the collective failure of several insurers generating a cascade effect. This systemic source is defined as '*entity-based*'.
- ii. The 'indirect' effect, in which possible externalities are enhanced by engagement in potentially systemic activities (*activity-based sources*)¹

¹ The idea is not to label specific products or activities as intrinsically systemic. Instead, the focus is put on the design and management by insurance undertakings.

or the widespread common reactions of insurers to exogenous shocks (*behaviour-based source*).

Potential externalities generated via **direct and indirect sources are transferred to the rest of the financial system and to the real economy** via specific channels (i.e. the transmission channel) and could induce changes in the risk profile of insurers, eventually generating potential second-round effects.

In the fourth part, EIOPA has developed a flexible **macroprudential framework specifically designed for the insurance sector**. A macropru-

dential framework should lay down the essential elements of the macroprudential strategy, allowing for a coherent decision-making process. The main elements of EIOPA's framework are the following.

- The consideration of three **layers of objectives**: (1) the ultimate objective, i.e. to ensure financial stability; (2) the intermediate objective in which the ultimate objective is split, i.e. mitigating the *likelihood* and the *impact* of systemic crises; and (3) the operational objectives, which should be pursued by authorities.
- A **set of instruments** to be used by macroprudential authorities to achieve the operational objective.

EIOPA, in subsequent publications, will split the discussion on tools in two parts, i.e. the existing tools in Solvency II that have a macroprudential impact and the identification and analysis of potential new tools.

- **Other relevant elements** that complete the framework, such as risk indicators and the need to leave room for expert judgement.

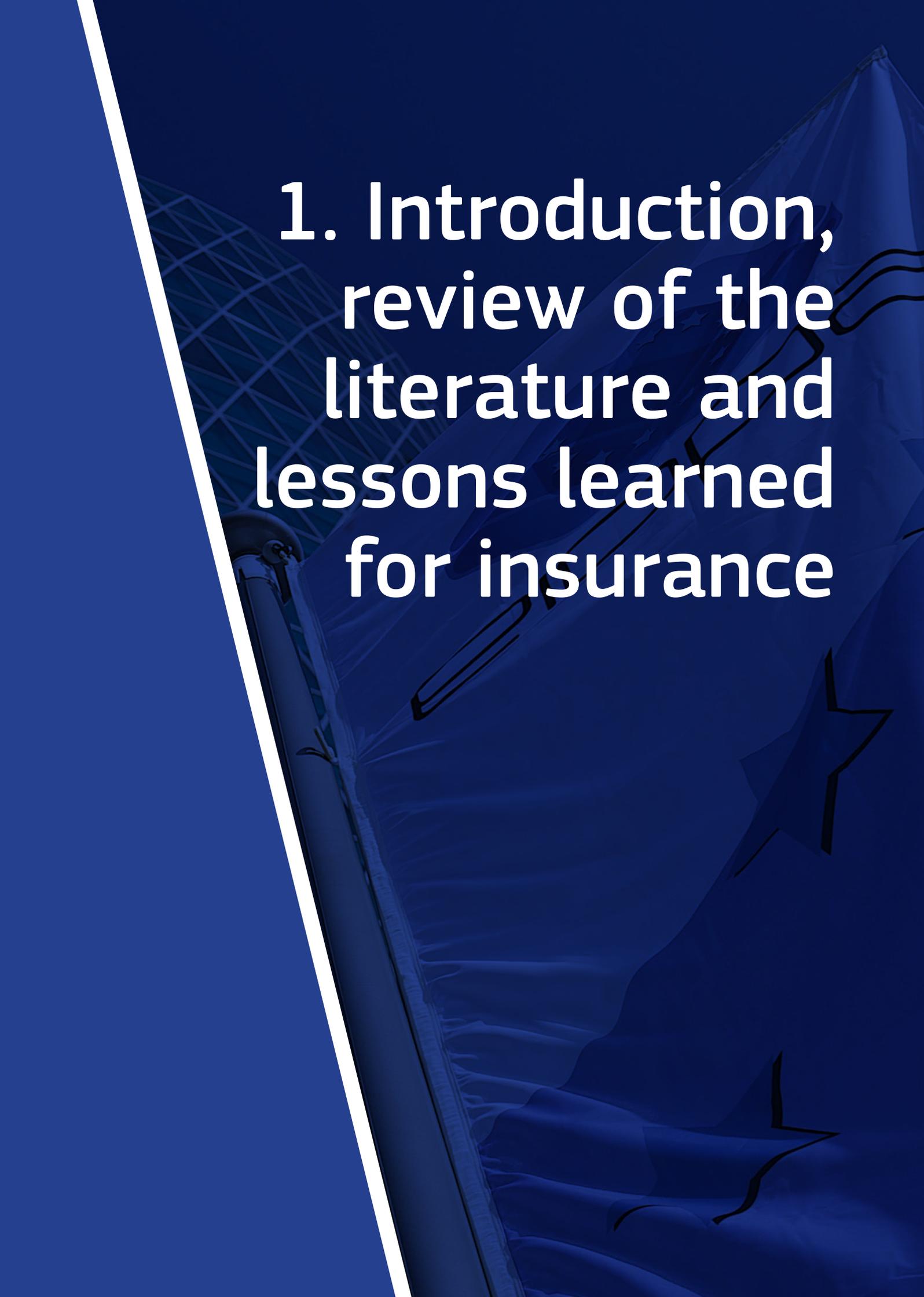
The operational objectives – a cornerstone of the framework – should be defined to specifically address the sources of systemic risk in insurance that have been previously identified. Table 1 below provides an overview of the sources of systemic risk and the operational objectives proposed.

Table 1: Sources of systemic risk and operational objectives

Sources of systemic risk	Operational objectives
Entity-based related sources – Direct sources	<ul style="list-style-type: none"> ➤ Ensure sufficient loss-absorbency capacity and reserving ➤ Discourage excessive involvement in certain products and activities ➤ Discourage excessive levels of direct and indirect exposure concentrations ➤ Limit procyclicality ➤ Discourage risky behaviour
<ul style="list-style-type: none"> • Deterioration of the solvency position leading to insurance failure(s) of G-SII, D-SII or collective failures, the latter as a result of exposures to common shocks 	
Activity-based related sources – Indirect sources (i)	
<ul style="list-style-type: none"> • Involvement in certain activities or products with greater potential to pose systemic risk 	
<ul style="list-style-type: none"> • Potentially dangerous interconnections 	
Behaviour-based related sources – Indirect sources (ii)	
<ul style="list-style-type: none"> • Collective behaviour by insurers that may exacerbate market price movements (e.g. fire-sales or herding behaviour) 	
<ul style="list-style-type: none"> • Excessive risk-taking by insurance companies (e.g. 'search for yield' and the 'too-big-too fail' problem) 	
<ul style="list-style-type: none"> • Excessive concentrations 	
<ul style="list-style-type: none"> • Inappropriate exposures on the liabilities side (e.g. as a result of competitive dynamics) 	

Once the theoretical framework has been adequately identified, there is a need to consider those **elements that make it operational**, such as the need to develop the capacity to as-

sess and monitor systemic risk, the identification of data needs or how to better communicate with the public and markets.



1. Introduction, review of the literature and lessons learned for insurance

1.1. Introduction

The recent financial crisis exposed certain shortcomings in financial regulation and supervision, in particular concerning supervision and oversight of the financial system as a whole. Both academia and the supervisory community have therefore explored various macroprudential policies which address system-wide build-up of risk.

So far, most of the discussions on macroprudential policy have focused on the banking sector due to its prominent role in the recent financial crisis (see, for example, ESRB, 2014a,b). However, the approach and policies explored for that sector are also influencing the debate in other parts of the financial system with the risk of transferring solutions tailored on banks specificities to other financial sectors. It is therefore of paramount importance that any extension of this debate to the insurance sector reflects the specific nature of the insurance business.

EIOPA has also contributed to this debate with different publications. For example, the paper 'A potential macroprudential approach to the low interest rate environment in the Solvency II context' (EIOPA, 2016a) explicitly considered the macroprudential objectives in light of the current low interest rate environment.

Aside from the theoretical basis laid down in the material produced, EIOPA and the NSAs have also intensified their supervision through an analysis of the ongoing risks and through continuously monitoring the impact derived from the implementation of Solvency II.

1.2. Definitions

In order to ensure a common understanding, the basic concepts used throughout the paper are explained in this section. It has to be noted, however, that there is usually no unique or universal definition for all these con-

cepts. This paper does not seek to fill this gap. Instead, working definitions are put forward in order to set the scene and should therefore be considered in the context of this paper only.

- *Financial stability* and systemic risk are two strongly related concepts. Financial stability can be defined as a state whereby the build-up of systemic risk is prevented.²
- *Systemic risk* means a risk of disruption in the financial system with the potential to have serious negative consequences for the internal market and the real economy.³
- *Macroprudential policy* should be understood as a framework that aims at mitigating systemic risk (or the build-up thereof), thereby contributing to the ultimate objective of the stability of the financial system and, as a result, the broader implications for economic growth.
- *Macroprudential instruments* are qualitative or quantitative tools or measures with system-wide impact that relevant competent authorities (i.e. authorities in charge of preserving the stability of the financial system) put in place with the aim of achieving financial stability. In the context of this paper, these concepts (i.e. tools, instruments and measures) are used as synonyms.

The macroprudential policy approach contributes to the stability of the financial system – together with other policies (e.g. monetary and fiscal) as well as with microprudential policies. Whereas microprudential policies primarily focus on individual entities, the macroprudential approach focuses on the financial system as a whole. Table 2 explains the main differences between both approaches.

² <https://www.ecb.europa.eu/ecb/tasks/stability/html/index.en.html>

³ Article 22 of EIOPA Regulation defines 'systemic risk' by reference to Article 2(c) Regulation (EU) No 1092/2010.

Table 2: The macro- and microprudential approaches compared

	Macroprudential	Microprudential
Proximate objective	Limit financial system-wide distress	Limit distress of individual institutions
Ultimate objective	Financial stability	Policyholder protection
Correlations and common exposures across institutions	Important	Irrelevant
Calibration of prudential controls	In terms of system-wide distress; top-down	In terms of risks of individual institutions; bottom-up

Source: Based on the approach developed by Borio (2003).

It should be taken into account that, in some cases, the borders between microprudential policies and macroprudential consequences are blurring. That means, for example, that instruments that may have been designed as microprudential instrument may also have macroprudential consequences.

1.3. Relevant lessons learned from the financial crisis and the banking sector

The 2007-2008 financial crisis highlighted the need of a new set of policies aimed at avoiding contagion and contributing to financial stability. Most of the initiatives developed in the aftermath of this crisis are targeted to the banking sector, which was at the epicentre of the financial crisis. Although the insurance sector differs substantially from the banking sector, some of the lessons from the banking experience could also be useful for insurance. This section seeks to provide an overview of the main lessons learned.

Microprudential policy should be supplemented with a macroprudential approach. The recent financial crisis revealed that financial regulation and supervision based on microprudential perspective is not always sufficient and cannot work in isolation in order to safeguard financial stability. Therefore, a macroprudential

framework is needed to supplement the microprudential one. For example, according to Crocket (2000), financial stability can be most productively achieved if a better ‘marriage between the microprudential and the macroprudential dimensions’ is achieved. Along these lines, the thesis of Borio (2003) is that the prevention of financial instability can only be improved if the macroprudential approach of the regulatory and supervisory frameworks is strengthened. Many other economists and policymakers have also supported these views.⁴

Indeed, financial stability does not depend solely on the soundness of the individual components that make up the financial system; it also depends on complex interactions and interdependencies between these components, with the possibility for individually sound financial institutions to create imbalances within the economy through their collective activities in some circumstances (for example, rapid lending to certain sectors of the economy could be a source of price bubbles). Therefore, it became obvious that there can be risks that are not necessarily covered by microprudential policy measures.

Contradictions between the micro and the macro spheres should be avoided to the extent possible and convergence should be sought. Mi-

⁴ See, for example, Noyer (2014).

croprudential and macroprudential policies may use similar tools, but with different aims. As a result of this, a potential contradiction may arise.⁵ As explained by Osiński *et al.* (2013), microprudential and macroprudential policies need to cohabit and conflicts need to be reduced. If not properly addressed, tensions between both approaches will arise, reducing their effectiveness. It follows that there is a risk of diverging interests between the micro and macro approaches that will have to be reconciled.

The sources of systemic risk need to be identified. Macroprudential policies aim to address both the evolution of system-wide risk over time ('time dimension') as well as the distribution of risk in the financial system at a given point in time ('cross-sectional dimension') (BIS, FSB, IMF, 2011). Examples of it are significant concentrations in certain banking activities (for example concentrations in lending to real estate sector in certain countries), substantial leverages, very rapid lending growth, overreliance on external ratings, high sovereign exposures or mismatching of assets and liabilities. All these risks and any other potential new challenges need to be timely identified and monitored, and respective mitigating tools and instruments should be implemented both on respective macro and microprudential levels.

A sound macroprudential strategy that links objectives and instruments should be in place. For example, for the banking sector, the ESRB (2014a,b) has developed a comprehensive approach which links intermediate objectives, indicators and instruments that should achieve the ultimate objective of financial stability. The four relevant intermediate objectives aim at preventing/ mitigat-

ing systemic risks to financial stability arising from (i) an excessive credit growth and leverage, (ii) an excessive maturity mismatch and market liquidity, (iii) direct and indirect exposure concentrations and (iv) misaligned incentives and moral hazard.

Sufficient macroprudential tools need to be available. In 1952, Jan Tinbergen formulated his famous rule, stressing that in order to achieve the economic policy objectives, authorities needed to have instruments that equal in number the objectives. The financial crisis revealed that either no appropriate tools existed or microprudential measures were used for addressing identified system-wide risks, which were not successful or sufficient. Lim *et al.* (2011) consider that tackling one specific risk by combining multiple instruments has the advantages of addressing it from different angles, reduces the scope for circumvention and increases the effectiveness.

New macroprudential tools were introduced to properly address systemic risk. The financial crisis has shown the previous 'soft communication mechanism' of macroprudential policy occurring mainly through publications of Financial Stability Reports to be inadequate. Therefore, new or revised macroprudential instruments were introduced in several countries such as capital surcharges on excessive risk concentrations or countercyclical risks, and/or for systemically important financial institutions at both country and global level.⁶ Other tools include, for example, liquidity ratios, loan-to-value/loan-to-income limits (largely implemented in mortgage lending), leverage ratio, revised, structural measures (e.g. Volcker rule in the US), or recovery and resolution planning. All

⁵ Wehrhahn (2014) provide several examples of microprudential actions that could affect the main objectives of macroprudential surveillance.

⁶ An example in Europe is the introduction of instruments by means of the Capital Requirements Regulation (CRR) and the Capital Requirements Directive (CRD IV).

such measures have different objectives, with some of them aimed, for instance, at addressing cyclical systemic risks (excessive credit growth) and others at structural systemic risks (exposures concentrations).

The entity-based approach initially developed should be supplemented with an activity-based approach.

In recent years, the concept of systemically important financial institution became an important element of macroprudential supervision and regulation in order to address the systemic risk arising from the failure of such relevant institutions (FSB, 2010). The concept includes measures like additional capital buffers for systemically important financial institutions due to potential contagion effect distress in these institutions have on the wider sector/ economy. Given the commonly recognised importance of the interconnections among entities from a systemic risk standpoint, there is an increased concern on externalities potentially generated by the common behaviours of several non-systemically important institutions stemming from their activities. Therefore, the need to supplement the 'entity-based' approach with an 'activity-based approach' that also captures systemic risk arising from potentially systemic activities or behaviours by a number of entities or within the financial sector emerged (IMF, 2016). Macroprudential policies should combine the activity-based approach with an entity-based approach to mitigate systemic risks.

Macroprudential policy may require supranational coordination. Given the high degree of interconnectedness in the financial system and possible spill-over effects, a proper coordination at supranational level seems necessary. As mentioned by Angeloni (2014), there is a certain risk that national authorities, despite pursuing the overall goal of financial stability, could introduce the domestic dimen-

sion in a way that the outcome of the macroprudential policies is not efficient from a European or international perspective. This would call for European or international coordination and cooperation of the macroprudential policies where this is necessary for its efficient outcome.

As explained by the European Commission (2016), in the EU, this has been addressed by the set-up of the European Systemic Risk Board (ESRB), whose main task is the EU-wide macroprudential oversight and the facilitation of cross-border policy coordination. The need for coordination at EU level should, however, not compromise the necessary flexibility to tackle national specific features and risks, given that some shocks could be purely country-specific and may not have a cross-border impact.

Macroprudential policies pose several challenges that need due consideration. As any other economic policy, the macroprudential approach is not free of challenges. These can be summarised as follows:

- *Time dimension.* Macroprudential policies shall (also) operate in tranquil periods in order to pre-empt potential contagion effects. Counter-cyclical policy measures might appear as unnecessary during calm periods and, as a result, face a strong opposition in these periods.
- *Spillovers.* The development of macroprudential measures should ideally identify and take into account the potential spillover effects. Indeed, as highlighted by the ECB (2015), 'macroprudential policy may generate unintended negative cross-border or cross-sectoral spillovers in the short term, owing to regulatory arbitrage by financial institutions'. This should be properly considered when designing policy instruments.
- *Implementation.* As explained by the IMF (2013), a clear under-

standing of the transmission channels is both a fundamental element of the macroprudential policy and one of its main challenges. This is also related to the lack of proper data, which has an impact on the identification of the different risks, the implementation of the macroprudential policies and the follow-up and assessment of their effects.

- *Policy design.* Macroprudential policies should be viewed in conjunction with any other relevant macroeconomic policies (e.g. monetary policy) that also pursue financial stability. The previous crisis has revealed that ‘the pursuit of price stability (via monetary policy) and sound financial institutions (via microprudential policy) was insufficient to safeguard the stability of financial system’ (ESRB, 2014a). In order to prevent disruptions, the policy design should allow for timely interventions and avoid wrong incentives.
- *Cost-benefit analysis of the policy implementation.* As stressed by IMF, FSB, BIS (2016) formal *ex-ante* cost-benefit analyses of macroprudential tools are important (even if difficult to conduct) in order to design and calibrate macroprudential tools. As stressed by the Behn *et al.* (2016), ‘net benefit estimations are crucial for policy-makers who need to decide on the calibration and timing of measures’.

Overall, macroprudential policy seems indeed to effectively contribute to the mitigation of systemic risk. It is quite challenging to provide sound empirical evidence of the effectiveness of macroprudential policies implemented after the financial crisis in the banking sector in a number of countries. The understanding of the effectiveness of macroprudential policies implemented is still rather preliminary and limited (Akinci and Olmstead-Rumsey, 2015). Nevertheless, some available evidence in the banking sector

seems to point out that, in general, macroprudential policy may indeed have contributed to achieve its main objectives. As shown by Cerutti *et al.* (2015), the impact is, however, subject to several nuances depending on the objective that is pursued, the instrument used, the degree of development and openness of the economy or the phase of the cycle in which the policy is implemented. Lim *et al.* (2011) also provide empirical evidence that the most commonly used instruments are effective in reducing procyclicality. The effectiveness, though, depends on the type of shock, and the authors provide guidance by mapping instruments with sources of systemic risk for the banking sector.

1.4. Current status of discussions in insurance

This section seeks to summarise the state of play with regard to the discussion around the issue of macroprudential policy in insurance on the basis of the existing literature.

Insurance can also potentially create or amplify systemic risk. It is widely acknowledged that the traditional insurance activities are generally less systemically risky than banking.⁷ As stressed by Eling and Pankoke (2014), there seems to be a broad agreement that traditional insurance activities (be it in the life, non-life and reinsurance sectors) neither contribute to systemic risk,

⁷ Indeed, the fact that traditional insurance activities are characterised by an inverted production cycle, generates stable cash flows and makes insurers less reliant on short-term funding. As a result of this, also the nature of liquidity risk is different. Furthermore, traditional insurance is a liability-driven business, does not involve maturity transformation, is less dependent on the economic cycle and also less interconnected. See IAIS (2011) and CEA (2010) for an overview of the main differences between traditional insurance and banking and the implications of such differences.

nor increase insurers' vulnerability to impairments of the financial system. At the same time though, there is also a general consensus that under certain circumstances or certain conditions, insurance may become an originator and/or amplifier of

systemic risk.⁸ Furthermore, the IMF (2016) considers that the systemic risk contribution of insurance has increased, due to a rise in common exposures not only within the insurance sector itself, but also with the rest of the economy.

Box 2: Assessing the systemic risk in the insurance industry

The systemic relevance of insurers is a widely debated topic among academia, regulators and practitioners.⁹ The available literature can be classified in three main approaches:

- *Market based approaches* rely on market data (equity prices or CDS spreads) and aims at measuring the impacts of the externalities generated by one institution on the rest of the system or vice versa. These measures, assuming that markets reflect all the relevant information of a company, allow comparing the cross-sectional systemic relevance of different industry with the limitations of neglecting the industry specific characteristics and determinants. These measures include the most utilised systemic risk measures as the Conditional Value at Risk (Adrian and Brunnermeier, 2016), the Marginal Expected Shortfall (MES)/Systemic Expected Shortfall (SES) (Adrian *et al.*, 2010), the Distressed Insurance Premium (Huang *et al.*, 2012), the Contingent Claims Analysis (Gray and Jobst, 2011) and the linear and nonlinear Granger causality test (Billio *et al.*, 2012).¹⁰
- *Fundamental based approaches* are based on the analysis of accounting data, encompasses theoretical and empirical analysis focused on the specificity of the investigated business. Information sources for such investigations are balance sheets and account statements of the target companies. The major advantage of the fundamental based models is their ability of discovering the determinants of the systemic relevance of an institution through the analysis of the specificity of the business by looking at the asset allocation and investment strategy and at the running activities reflected in the liability side. Contributions, among others, are provided by Cummins and Weiss (2014), Harrington (2009), Bell and Keller (2009) and The Geneva Association (2010).
- *Mixed approaches*, by bridging between equity based analyses and fundamentals based analyses, attempt to overcome the weaknesses represented by data availability and limited focus on determinants. To do so this research puts into relation the systemic relevance obtained via market based measures with the accounting data in order to discover the specific determinants driving the systemic relevance for each business. Contributions come, among others, from Weiss and Muehlnickel (2014), Bierth *et al.* (2015) and, focused on the European insurance market, by Berdin and Sottocornola (2015).

A macroprudential approach seems justified beyond banking, including insurance. As explained by EIOPA (2016b), although the insurance sector appears to be more resilient to the impact of the financial crisis than the banking sector in the short term, insurance is a key element

of the financial system and should therefore be considered within the scope of the macroprudential framework. Furthermore, if accepted that, under certain circumstances, insurance can indeed originate or amplify systemic risk, a macroprudential approach is also justified for the insurance sector in case their *ex-ante* cost-benefit analysis leads to a net benefit estimation.

From a theoretical point of view, Bach and Nguyen (2012) reflect on whether there is economic justification for a macroprudential ap-

8 See, for example, IAIS (2011), Hufeld *et al.* (2017) or ESRB (2015). Section 3 is fully devoted to the identification of sources of systemic risk.

9 A comprehensive review on the literature on systemic risk in the insurance industry is provided by Eling and Pankoke (2012).

10 A comprehensive review of the market based models is provided by Bisias *et al.* (2012).

proach to insurance on the basis of the normative theory of regulation. According to this approach, regulation is justified if the public interest is better served by means of state intervention. Elements such as the relevance of insurance for an efficient functioning of the financial system, the potential costs in case of insurance failures or malfunctioning of the insurance sector, the need to protect the risk transformation function of insurance and the potential market failures lead the authors to conclude that a macroprudential approach would also be justified in insurance.

European and international institutions seem to agree with this idea. The IAIS (2013b), for example, considers that the micro and macroprudential approaches to policy and surveillance in insurance supervision are two sides of the same coin: 'Whereas the primary motive of microprudential supervision is policyholder or consumer protection, it also indirectly endeavours to preserve financial stability. In this view, the interests of policyholders are protected best when insurers are financially sound and solvent, and a collection of solvent firms subject to individual distress is viewed as not posing a threat of financial instability'. However, the IAIS is also of the view that the financial crisis has proven that the action of individual firms may well be optimal at firm level but not necessarily at macroprudential level.

In the same vein, the IMF (2016) analyses the contribution of insurance to systemic risk and also concludes that supervisors and regulators should take a more macroprudential approach to the sector.

The ESRB (2016) has also worked on the systemic risk in insurance and a macroprudential approach. A stra-

tegic paper considered that macroprudential instruments to address financial stability risks beyond the banking sector (encompassing also insurance) should be part of a wider macroprudential policy strategy.

Macroprudential policies for insurance could also have the benefit of crisis prevention. As pointed out by Goodhart and Perotti (2014), history shows that preventing the build-up of systemic risk is actually more efficient than fighting it once it materialises. Macroprudential policies should be designed in a way that they target the propagation of risks with the aim of preventing and containing crisis. This could be interpreted in the following terms: crisis prevention is the least expensive and more efficient way of managing a potential crisis. The preventive approach also applies to the need of a macroprudential approach to insurance.

Macroprudential policies should, however, be tailored to insurance. It is a fact that insurance differs from banking substantially also with regard to the way in which it poses systemic risk. Therefore, it is fundamental that the macroprudential approach is specifically designed for insurance, i.e. a simple extension of the banking framework should be avoided.¹¹ This has an impact on the type of tools/measures that could be used to address systemic risk in the insurance sector, which may differ substantially from the type of instruments used in the banking sector in terms of their nature, activation mechanism and intrusiveness.

Special attention should be devoted to the systemic risk arising from certain activities or products. The IAIS (2011) developed the concept of non-traditional and non-insurance business activities (NTNI) to illustrate activities that are more likely to

¹¹ See, for example, Christophersen and Zschiesche (2015).

create systemic risk compared to the traditional insurance business model. However, the IAIS (2016b) discontinued the use of the term NTNI and instead specified that products with certain features that expose insurers to substantial macroeconomic- or liquidity risks are more likely to create systemic risk.

A balance between the entity-based and activity-based approach needs also to be struck in insurance. Systemic risk may not necessarily arise only directly from individual institutions. As stressed by Saporta (2016), a balance between an activity-based approach and an entity-based approach to mitigate macroprudential risks should be considered. Furthermore, this activity-based approach geared towards indirect systemic risk should be considered in tandem with the design of the microprudential framework.

There could be a risk of arbitrage if insurance is not included within the wider macroprudential framework. As stressed by Wehrhahn and Jassaud (2014) a sound macroprudential framework should also encompass insurance, which could avoid that certain risks move from one sector to the other, thereby shifting systemic risk. This concern has also been expressed by the ESRB (2015).

The regulatory framework should, however, take into account the specific features of each sector and that therefore a 'one-size-fits-all' approach should be avoided. Furthermore, G-SII and G-SIB methodologies embed some coverage limitations derived from their industry specific perspective. Specifically, the assessment of banking and insurance conglomerates, relying on the regula-

tory scope of consolidation, exempts the insurance and banking subsidiary respectively from the evaluation making the financial system prone to regulatory arbitrage.

The effectiveness of macroprudential policies is also affected by the risk of arbitrage. Following Angeloni (2014), there are two elements that lie behind the effectiveness of macroprudential policies. The first is the extent to which financial intermediaries can circumvent the macroprudential measures put in place. The second refers to the ability of the other institutions to take over those business segments. This leads to the conclusion that coordination, both at supranational level but also across sectors, can be a fundamental element.

Sufficient tools need to be in place. Authorities should be equipped with sufficient tools to address the different sources of systemic risk. This implies the need to assess the already existing tools. For example in the EU and as stressed by EIOPA (2016a), although Solvency II was not designed as a macroprudential framework, it contains elements that may have a macroprudential and financial stability impact.¹² These elements should be taken into account when determining if additional tools for macroprudential purposes are warranted. Furthermore, in the insurance sector, supervisors have also taken certain measures or actions that may have macroprudential impact such as the reduction of the maximum guaranteed rates to contain the exposure of insurers to market risk in low yield periods.

¹² The second paper of this series will specifically address those elements.



2. The social dimension of macroprudential policy and financial stability

When it comes to macroprudential policies, the attention is usually put on their contribution to financial stability. However, although it might not be directly visible, macroprudential policy – like any other macroeconomic policy – has also a social impact. This social impact is equally important, but perhaps less explicitly emphasised and less perceivable by the general public.

The paragraph below by Acharya (2011) provides a clear overview of the bridge between macroprudential policy, its contribution to financial stability and, as a result, the social impact:

‘Current financial regulations such as the Basel capital requirements are microprudential in nature, in that they seek to limit each institution’s risk. However, unless the external costs of systemic risk are internalised by each financial institution, the institution will have the incentive to take risks that are borne by others in the economy. It is in this sense that the financial institution’s risk is a negative externality on the system. Thus, financial regulation should be macroprudential in nature and focused on limiting systemic risk, that is, the risk of a crisis in the financial sector and its spillover to the economy at large. Absent such macroprudential regulation, economies run the risk of excessively large amplifiers on top of the normal and cyclical macroeconomic fluctuations. In the limit, severe financial crises can cause prolonged loss of economic growth and welfare (e.g., ‘lost decade’ in Japan following the crisis of late 1980’s and current uncertainty around economic growth of the United States)’.

In order to better understand the social dimension of macroprudential policies and financial stability, attention should be put on the negative externalities in the financial system. Indeed, if not properly addressed, there is a tendency in the financial system that the costs of certain de-

isions taken by financial institutions are not borne by them (i.e. are not internalised), but may instead have to be borne by society as a whole. The issue becomes more relevant when negative externalities, in the form of excessive risk taking, crystallise and develop into a market wide stress and financial instability.

Macroprudential policies, together with other public policies, seek to enhance the resiliency of the financial sector as a whole and contribute to stable and sound financial systems. Therefore, to the extent that they effectively manage to achieve financial stability, macroprudential policies reduce the likelihood of systemic crises and the subsequent welfare cost of systemic crises.

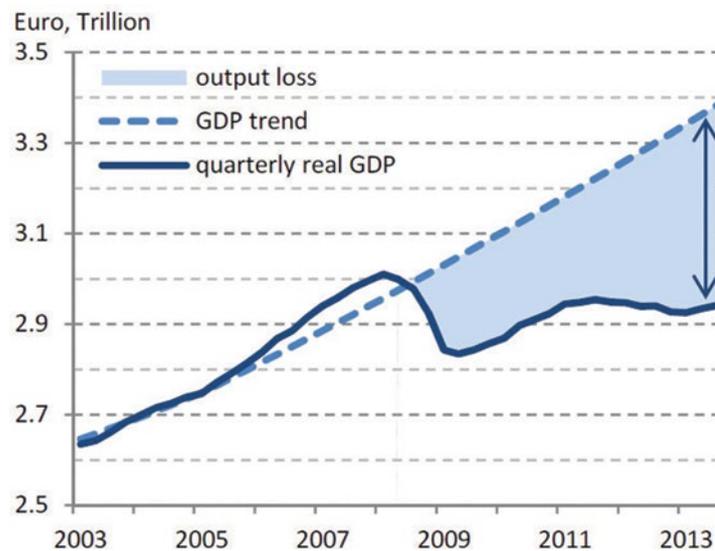
As explained by Acharya (2011), there is, however, a second round benefit which has a more obvious social dimension, which results from the link between financial stability and its contribution to economic growth. Indeed, several studies have examined the relationship between financial (in) stability and economic growth looking for evidence. Creel *et al.* (2015), for example, demonstrate empirically that financial instability has a negative impact on economic growth in the European Union. In similar terms, Manu *et al.* (2011) find a positive effect of financial stability on the GDP growth rate in Africa.

Financial instability leads to the impairment of the financial intermediation function of the financial system. In line with Dudley (2011), the financial crisis showed the importance of building a financial system that is able to provide credit to households and businesses throughout the business cycle. The crisis also underlined that the build-up of vulnerabilities during good times needs to be prevented, as the unwinding of these imbalances can lead to severe damage to the economy.

The costs of a disruption to the financial system, i.e. of financial instability, are high. Financial crises may cause large output losses. As

shown by the ESRB (2014a), in advanced economies the most recent global financial crisis has led to GDP losses.

Figure 2: GDP losses in the EU as a result of the global financial



Source: ESRB (2014a).

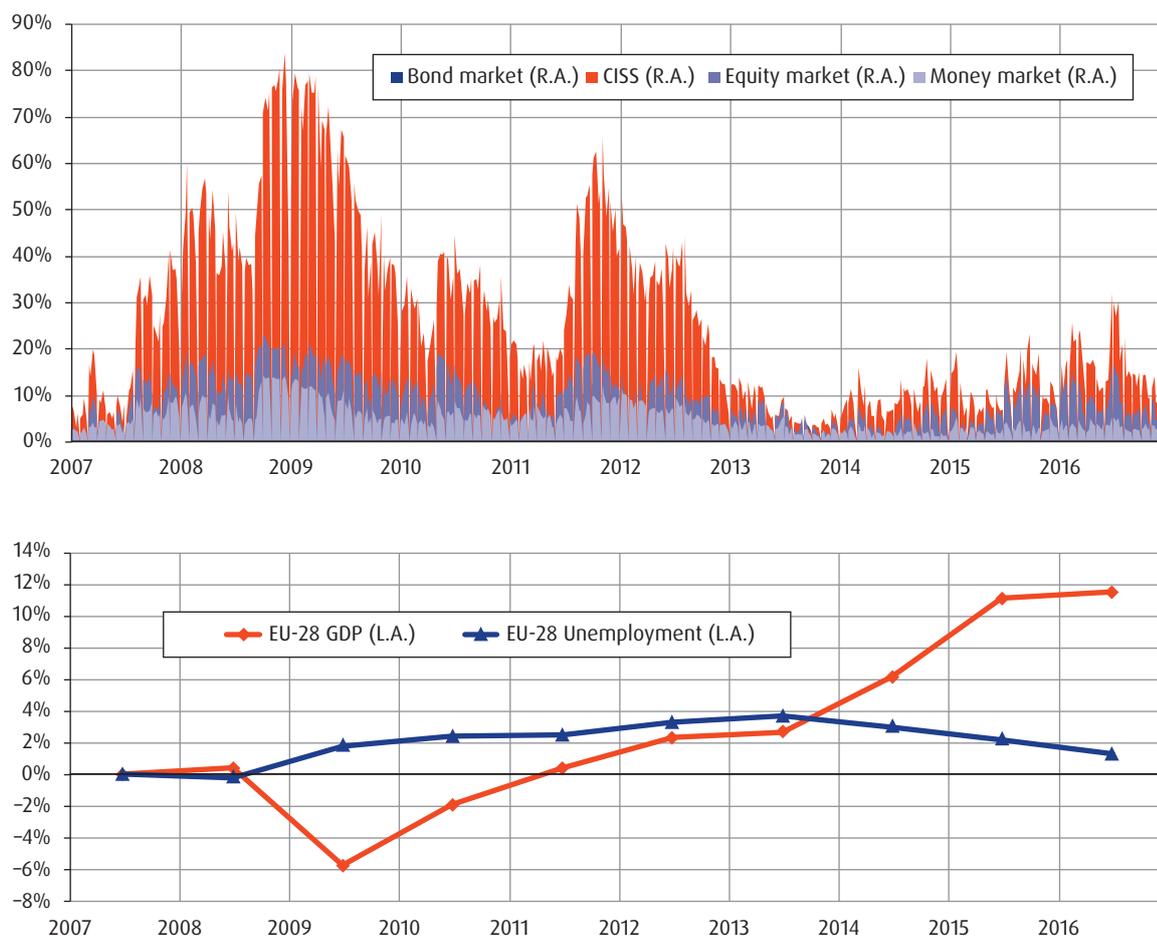
Several studies have shed some light on the cost of crises, usually focusing on banking crisis. For example, Abiad *et al.* (2009) focus on the medium-term behaviour of output following a banking crisis. They find that, although growth tends to eventually return to its pre-crisis level, output tends to be depressed substantially, with no rebound to pre-crisis trends. Ollivaud and Turner (2015) estimate the median loss in potential output in 2014 among 19 OECD countries that suffered a banking crisis in the period 2007-2011 amounted to around 5.5 %. The observation of significant cross-country differences seems to be a common finding in all studies that analyse the impact of financial crises.

Figure 3 visually shows the correlation between financial instability and GDP and unemployment. It can be seen that the toughest years of the financial crisis (2007-2012) were also associated with low or negative growth and rising unemployment.

Taking 2007 as the pre-crisis level, for the EU as a whole, such levels were not reached again until 2011 in terms of GDP. Employment, in turn, has not yet fully recovered in many Member States. Effective macroprudential policies, together with other macroeconomic and microprudential policies, to the extent that they contribute to financial stability, could have avoided or at least mitigated the negative impact and social costs of the financial crisis.

In addition to that, macroprudential policies and financial stability may also avoid that the costs of the externalities within the financial sector are borne by society. The failure of one or more companies may lead to disruptions in the provision of insurance products or services. Even if there is substitutability in the market, the transition to another company and/or the costs associated to it might be in detriment of policyholders. Furthermore, depending on the resolution process, governments may end up stepping-in to rescue the company by using public money.

Figure 3: Systemic stress, economic growth and unemployment (2007=100)



Source: Eurostat and ESRB Risk dashboard (Composite indicator of systemic stress).

NB: The CISS is unit-free and constrained to lie within the interval (0, 1). See Hollo, D., Kremer, M. and Lo Duca, M., "CISS – a composite indicator of systemic stress in the financial system", Working Paper Series, No 1426, ECB, March 2012. The Sovereign CISS applies the same methodological concept of the CISS.

However, certain macroprudential policies, while being generally effective on a macro level, could yet have negative implications. Bearing in mind the different traditional business models, the use of certain tools in the banking sector, where more experience is available, could serve as example of potential negative implications on (i) the financial undertakings themselves, (ii) the non-financial sectors which are reliant on financial services, and (iii) the single households or companies.¹³

Generally, it cannot be ruled out that any restrictive/ limiting measure set up as a macroprudential tool could potentially create a situation of limited accessibility to certain financial services by the customer, which would have a negative social impact. This may also be the case in insurance.

¹³ For example, there is academic evidence (Laerkholm-Jensen, 2013 or Gómez *et al.*, 2017) that macroprudential measures like dynamic provisions and countercyclical or additional capital charges will negatively affect credit supply or/and result in higher costs of

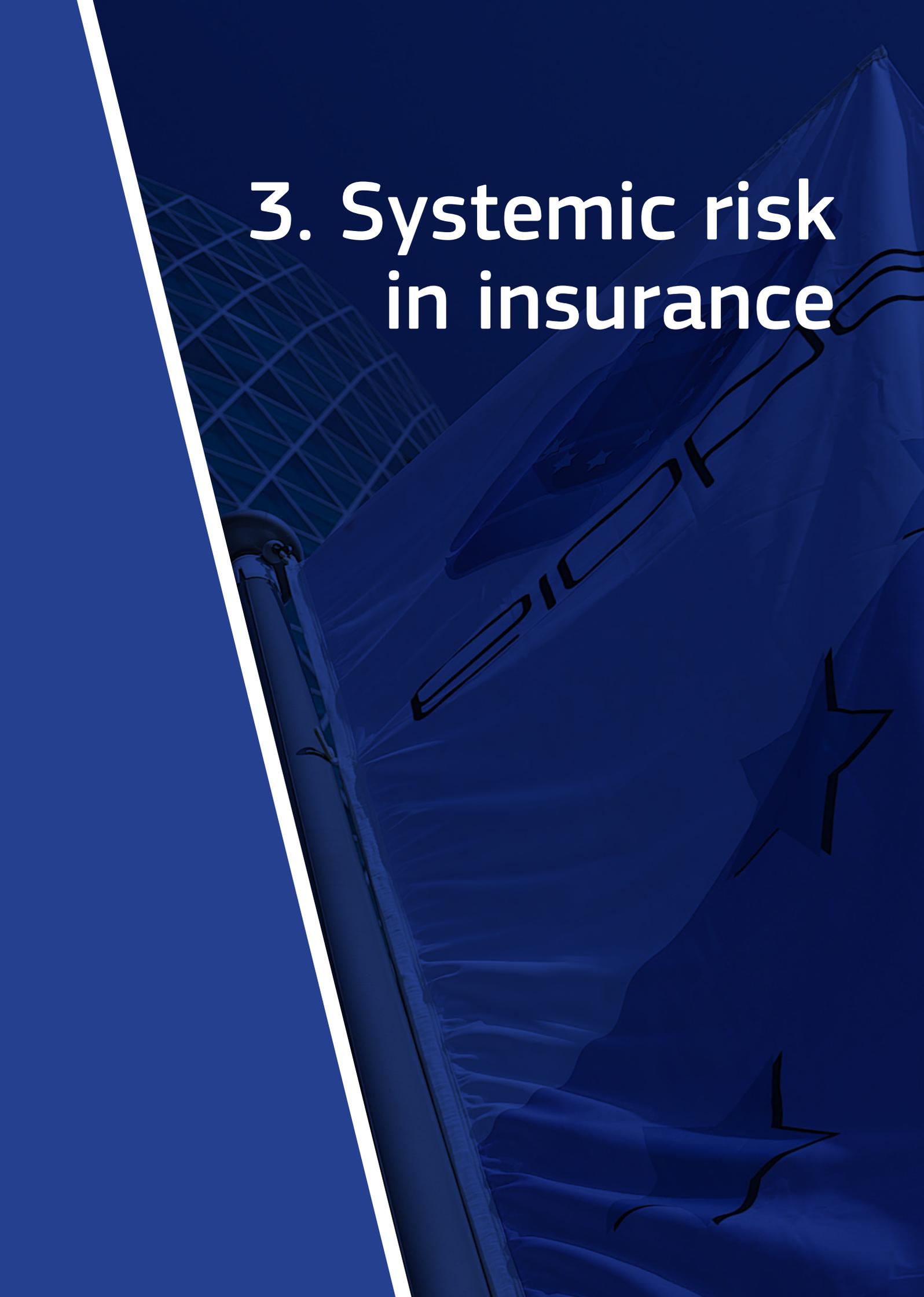
funding to the ultimate borrowers due to the increased cost of equity. Additionally, measures that limit lending to certain economic sectors (e.g. real estate or construction) could limit the funding to certain companies operating in this sector and negatively affect their operating activity (including redundancy). Some restrictive tools like loan-to-value ratios and loan-to-income ratios could have negative implications on borrowers as they reduce credit accessibility for the single borrowers.

Table 3: Direct and indirect impact of macroprudential policy

Macroprudential policy	➔ Direct impact: Financial stability	➔ Indirect impact: Social benefits/costs
Use of measures/ instruments	<ul style="list-style-type: none"> ➤ Mitigate systemic risk and preserve financial stability (via limiting system-wide externalities/market failures) 	<ul style="list-style-type: none"> ➤ Minimise social costs in terms of: <ul style="list-style-type: none"> - Output losses/less economic growth - Rising unemployment - Worsened living conditions ➤ Mitigate negative impact on the society: <ul style="list-style-type: none"> - Avoid disruptions in the provision of relevant financial products and services to consumers - Avoid that tax-payers end up paying the costs of failing institutions ➤ Depending on the measure, limit accessibility to certain financial products/services

As a summary, table 3 provides an overview of the potential direct and indirect benefits and costs of macroprudential policy. It can be concluded that macroprudential policies aim indeed at mitigating systemic risk and contributing to financial stability (together with other policies), but as a corollary, financial stability also

contributes to mitigate the social costs and potential harm of financial crisis to consumers and taxpayers. Some negative side effects can, however, not be excluded, which points to a need for an *ex ante* and careful assessment of the potential implications of any macroprudential measure.

The background is a dark blue gradient. A prominent white diagonal line runs from the top-left towards the bottom-center. In the upper-left, there is a faint grid pattern. On the right side, there is a stylized, dark blue flag with a white star and some illegible text on it. The overall aesthetic is modern and professional.

3. Systemic risk in insurance

This section is devoted to identifying the main sources of systemic risk where insurers could potentially act as originators or as amplifiers by building on and further developing the existing work of the IAIS, ESRB and other relevant bodies. The potential sources of systemic risk scrutinised here will serve as the basis to define the operational objectives that should be addressed from a macroprudential point of view by using either existing tools/measures in the Solvency II framework or by considering other potential additional tools/measures.

It worth noting that:

- This paper aims at identifying and analysing the sources of systemic risk in insurance from a conceptual point of view. Its content shall not prejudge or establish any link with any kind of policy measures developed by the IAIS.
- EIOPA developed its own view building on the available sources produced by academia, standard setting bodies, national authorities and the industry. In particular, EIOPA elaborates several of the concepts that are also used in other fora such as the IAIS. Although EIOPA's approach and position might not always be fully adherent to the IAIS approach, the outcomes presented in this paper is broadly consistent with it.

The aim of this section is to:

- Develop EIOPA's conceptual approach for systemic risk in insurance.
- Identify and analyse sources of systemic risk in insurance, describing the main systemic risk drivers and transmission channels.

- Illustrate the relevance of each of the sources defined.
- Define the macroprudential operational objectives to be pursued by authorities on the basis of the sources of systemic risk.

The sources of systemic risk identified in this section are not assessed in terms of likelihood or in terms of impact. Instead, a conceptual approach is developed and used for the identification. The fact that the sources can theoretically materialise requires an adequate understanding of the process of systemic risk creation. Regarding the impact, this is important to decide on an ad-hoc basis what specific measure should be taken.

While a common understanding of the systemic relevance of the banking sector has been reached, the issue is still debated in the case of the insurance sector (EIOPA, 2016a). This section does not aim at filling this gap. Instead, elaborating on the available contributions from supervisors and regulators, academia and practitioners, it proposes a holistic macroprudential approach to systemic risk in insurance with the attempt of providing a clear view on sources, systemic risk drivers and transmission channels.

It is however widely accepted that traditional insurance does generally not create systemic risk.¹⁴ This is particularly true if compared to the banking sector. Although this section is essentially focused on the potential sources of systemic risk in insurance, it should not be wrongly concluded that the insurance sector as a whole is particularly risky or prone to the creation of systemic risk (see Box 3)

¹⁴ See section 1.

Box 3: Preliminary notes on systemic risk in the insurance sector

(Based on EIOPA, 2016a)

Discussions on macroprudential policy have mainly focused on the banking sector due to its prominent role in the recent financial crisis. Indeed, the business model of banks, the role they play in the real economy and the interconnectedness with the financial system make them especially prone for a macroprudential approach.

Traditional insurance business, based on the principles of insurability and on the law of large numbers, differs from the banking business quite substantially. Some relevant features of traditional insurance are the following:¹⁵

- Insurance is characterised by an inverted production cycle. While premiums are paid up-front, claim payments are generally only settled in case the insured event occurs.
- The inverted production cycle generates a stable cash flow to insurers and makes the traditional insurance business less dependent on short-term funding.
- The nature of liquidity risk is operational rather than strategic, as a result of the extended claims payment period, which allows a better planning of the necessary funding. Even during the 2007-2008 financial crisis, insurers did not face significant liquidity crunches.
- Traditional insurers are not involved in maturity transformation or credit intermediation and are less dependent on the economic cycle.
- Although the interconnectedness within an insurance group or financial conglomerate is not negligible, the interconnectedness within the insurance sector is small. Reinsurance increases the interconnection between institutions, but it does not create the same network dynamics. In fact, reinsurance is in itself a risk management tool for insurance companies. The lack of substitutability could, however be a source of risk in the case of reinsurance.

Furthermore, while insurers are not immune to failures, one difference between banking and insurance is the fact that insurers are far less likely to be confronted with a so-called ‘run on the company’. The way the failures are resolved is another distinctive point. Insurers can be declared insolvent as quickly as banks but usually their business model does not require a rapid liquidation of assets to meet short-term liabilities as it happens with banks. As such the ‘over the weekend’ pre-requisite to resolve a bank orderly does not generally apply to insurance. Even if a run on the insurer did occur, it might be dampened by the existence of penalties and lengthier cancellation procedures. Although much less pronounced than in banking, a liquidity problem cannot be fully ruled out if policyholders start massively lapsing and surrendering their policies.¹⁶

In addition to that, insurers are required by regulation to hold technical provisions in order to meet their claims and address risks. Technical provisions normally make up the largest part on the liability side of insurers’ balance sheets. Together with capital requirements these are required to enable insurers to withstand severe yet plausible events and to provide sufficient loss-absorbency capacity and reduce any potential negative externalities (IAIS, 2011).

It should be stressed, however, that – according to the IMF (2016) – the contribution of insurance to systemic risk has increased as a result of raising common exposures of the sector and with the rest of the economy. It remains, however, below the contribution of banks.

¹⁵ See IAIS (2011).

¹⁶ There is also empirical evidence that lapse risk could materialise in the form of a ‘policyholder run’ if interest rates were to increase sharply (see Feodoria and Förstemann (2015). Furthermore, the case of the Belgian insurer Ethias, shows that insurance runs can also happen. Ethias suffered a significant number of cancellation of policies and withdrawals of savings during the 2008 crisis, which ended up in a capital injection by the Belgian Federal State and the Flemish and Walloon regions of EUR 1.5 billion (European Commission press release – http://europa.eu/rapid/press-release_IP-14-672_en.htm).

3.1. A macroprudential approach to systemic risk in insurance

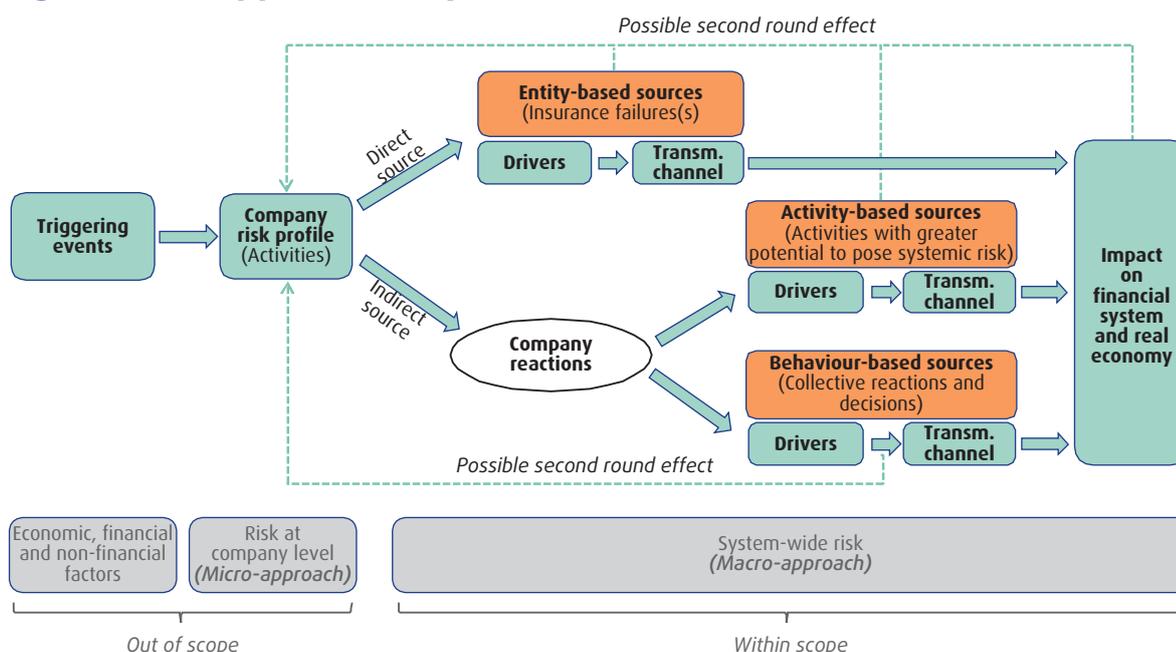
Conceptual approach

The proposed overall macroprudential approach to the 'sources of systemic risk' in insurance is shown in Figure 4, representing the dynamics of how systemic risk could materialise. In essence, the approach considers that a 'triggering event' has initially an impact at entity level affecting one or more insurers through their 'risk profile'. Potential individual or collective distresses may gener-

ate systemic implications whose relevance is driven by the presence of different 'systemic risk drivers' embedded in the insurance companies.

In EIOPA's view, systemic events might generate in two ways: *i)* the 'direct' effect, originated by the failure of a systemically relevant insurer or the collective failure of several insurers generating a cascade effect. This systemic source is defined as '*entity-based*'; *ii)* the 'indirect' effect, where potential externalities are enhanced by the engagement in potentially systemic activities (*activity-based sources*) or the widespread common reactions of insurers to exogenous shocks (*behaviour-based source*).

Figure 4: An approach to systemic risk in insurance



Potential externalities generated via direct and indirect sources are transferred to the rest of the financial system and to the real economy via specific channels (transmission channel) and might induce changes in the risk profile of insurers eventually generating potential second round effects. Additional explanation on each of the concepts is provided below.

Triggering event

A triggering event may be any exogenous event that has an impact on one or several insurance companies and may initiate the whole process of systemic risk creation.

Table 4 provides illustrative list of potential triggering events. It is worth noting that triggering events may not be uncorrelated and some of them could take place simulta-

neously. For example, yield movements may affect the behaviour of policyholders. In the same vein,

political changes may also have an impact on several financial factors, such as market prices.

Table 4: Examples of triggering events

Triggering events	Examples
Macroeconomic factors	<ul style="list-style-type: none"> - Unemployment - Inflation - Bubbles (e.g. housing)
Financial factors	<ul style="list-style-type: none"> - Yield movements - Market prices (equity, fixed income, etc.) - State of the banking system - Financial innovation
Non-financial factors	<ul style="list-style-type: none"> - Demographic changes (mortality/longevity) - Natural catastrophes - Legislative changes - Political changes - Technological changes - Consumer/policyholder behaviour (e.g. mass lapses, changes in the product demand, etc.) - Cyber attack

Risk profile

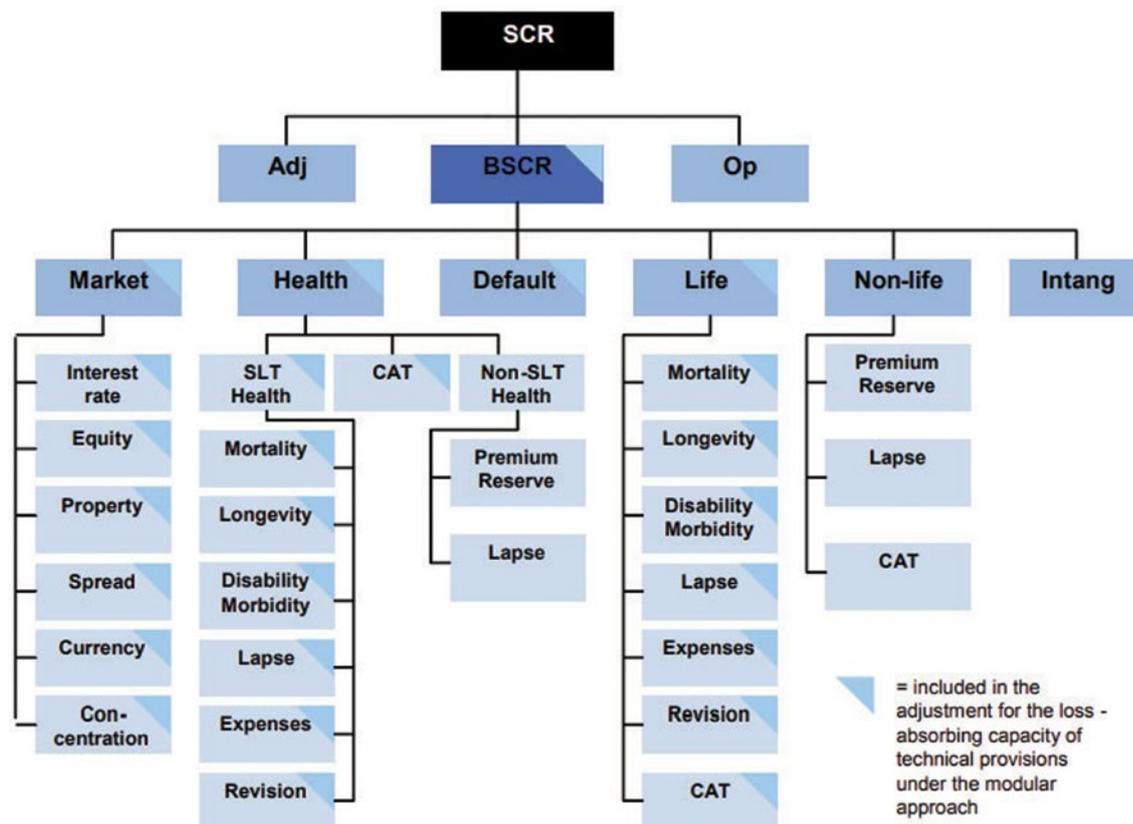
The risk profile of a specific company results from the collection of activities performed by the company itself. The concept of ‘activity’ should be understood in a broader sense, i.e. covering both asset and liability sides of the balance sheet. These activities will determine:

a) The specific features of the company, reflecting the strategic and operational decisions taken by the company, such as the investment and funding policy, the risk tolerance and the risk bearing capacity, the level of capitalisation or the business model and business strategy.

b) The risk factors the company is exposed to, i.e. the potential vulnerabilities of the company. The different modules of the Solvency II standard formula provide a good approximation of the risk factors that could be considered (see Figure 5). In addition to that, other elements such as model risk or geopolitical risks should also be considered as relevant risk factors.

The key assumption is that once a triggering event has taken place, the impact and vulnerability on each insurance company as well as its future reactions, will depend on its specific risk profile. This impact may lead to one of the three sources of systemic risk as defined in the next paragraphs.

Figure 5: Modules in the Solvency II standard formula



Source: EIOPA.

Sources of systemic risk

The sources of systemic risk essentially result from the systemic risk drivers and their transmission channels that are addressed below. They are direct or indirect externalities whereby insurance imposes a systemic threat to the wider system.¹⁷

These direct and indirect externalities lead to three potential sources' categories of systemic risks which are not mutually exclusive:

- *Entity-based related source*: two situations could take place: a) the failure of one or more systemically important institutions, or b) the collective failure of a significant share of institutions that are not necessarily systemic;¹⁸

- *Activity-based related source*: involvement in certain activities or products with greater potential to pose systemic risk that lead to potentially dangerous interconnections in the system. The idea is not to label specific products or activities as intrinsically systemic. Instead, the focus is put on the design and management by insurance undertakings; and
- *Behaviour-based related source*: collective actions that might exacerbate market price movements, excessive risk-taking, inappropriate exposures on the liabilities side or excessive concentrations.

The concepts 'entity-based' and 'activity-based' have been elaborated in response to the IMF's concepts of

17 Based on the 'hybrid approach' proposed by Hufeld (2016).

18 The term 'significant shared' is not quantified. The idea behind is that the share of affected companies should be high enough to generate systemic risk. Furthermore, we are aware that

by including 'collective' failures, the approach departs from the entity-based approach of the IAIS, who focuses only on G-SII's. Nevertheless, the main categories defined by the IAIS are still useful to analyse the aggregate impact of collective failures.

'domino view' and 'tsunami view' respectively. For the sake of clarity, even if the use that EIOPA and IAIS makes of the two definitions coincide to a large extent, the elements contained in the two categories thereof slightly differs. In particular, EIOPA's approach considers collective failures within the 'entity-based' consistently with the concept of propagation of distresses upon failure of an institution. This is not the case in the IAIS work that limits the concept of 'entity-based' to the identified G-SIIs.

Another difference lies in the identification of sources of systemic risk in which EIOPA includes also the 'behaviour-based' as a indirect source of systemic risk, together with the 'activity-based'. This is not explicitly considered in the IAIS work. The 'behaviour-based' source aims at capturing more explicitly other elements, such as concentration in specific asset classes that might have relevant effects on the markets in case of fire-sales generating procyclicality or mispricing. This way EIOPA's approach should still be seen as adding more details to existing approaches and is in that way consistent to, for example, the IAIS' approach.

It is important to note that, whereas the systemic risk drivers for the entity-based sources of systemic risk materialise automatically upon one or several insurance failures, the systemic risk drivers for the activity-based and behaviour-based sources (i.e. the indirect sources) require a reaction by the affected companies. Indeed, after a shock, the affected companies will try to reposition themselves, which may end up in additional sources of systemic risk being triggered.

Systemic risk drivers

Systemic risk drivers are elements that may enable the generation of negative spill-overs from one or more company-specific stresses into a systemic effect, i.e. they may turn a company specific-stress into a system wide stress.

As mentioned before, a triggering event will impact on a specific company through its risk profile. The systemic risk driver will determine whether this shock is spilled over to the rest of the financial system and the real economy.

The systemic risk drivers are linked to the sources of systemic risk. As such, some will be related to the entity-based source (e.g. size or substitutability of the failing company or companies), others to the activity-based source (e.g. the involvement in the formerly labelled by IAIS (2013a) non-traditional non-insurance, NTNI, activities or, more broadly, activities with greater potential to pose systemic risk) or to the behavioural source (e.g. risky behaviours when 'searching for yield').

Transmission channels

The transmission channels explain the process by which the sources of systemic risk may affect financial stability and/or the real economy. They can also be referred to as contagion channels. EIOPA has identified and further developed the existing approaches on transmission channels that are being discussed in the literature.¹⁹ Contagion might take place by means of the following five transmission channels (table 5).

¹⁹ For example IAIS (2016b) and IMF (2013).

Table 5: Overview of transmission channels

Transmission channel	Brief description
Exposure channel	Direct and indirect linkages whereby a shock in one or more insurance companies could spill over to other agents and/or markets that are exposed to them. It comprises four main linkages arising from: <ul style="list-style-type: none"> • Ownership structure of insurance company • Liabilities of the insurance company • Assets of the insurance companies • Business relations
Asset liquidation channel	As explained by the IAIS, this channel enters into operation in case a company is forced to liquidate assets quickly and on a scale that aggravates market movements and asset price volatility. It is proposed to consider two dimensions: <ul style="list-style-type: none"> • Liquidity – institution specific dimension. Liquidity risk that the insurer may suffer in case it needs to sell the assets quickly. • Procyclicality – financial market dimension linked to issues such as fire-sales and/or herding behaviour (including ‘fly to quality’)
Lack of supply of insurance products	This is the ‘critical function or service channel’ in the IAIS approach, which refers to the impact in case certain products or services are no longer provided (i.e. lack of substitutability).
Bank-like channel ²⁰	Refers to the impact caused by insurance companies, particularly in terms of interconnectedness, when they deviate from traditional insurance and get involved in banking-type activities, such as: <ul style="list-style-type: none"> • Maturity transformation, or • Leverage
Expectations and information asymmetries	‘Soft’ or ‘indirect contagion’ channel, linked to issues such as irrational panics and re-evaluation of expectations. It also includes reputational issues.

These transmission channels will be developed in more details in the following sections, when the different sources of systemic risk are explained. This should enable a better understanding on how each of these sources of systemic risk can end up affecting the financial system and the real economy.

Table 6 seeks to further elaborate on the overall approach introduced in the previous paragraphs, with the aim of identifying the potential sources of systemic risk. It should be stressed that the approach proposed connects well with two ongoing discussions regarding systemic risk in insurance:

- *Insurance as originator or amplifier of systemic risk.*²¹ An important consideration when analysing systemic risk in insurance refers to whether insurance is an originator or rather an amplifier of systemic risk. This approach considers both options as plausible. While insurance can indeed amplify or propagate a triggering event by reacting to it, it can also originate as a result of certain behaviours or due to institutional characteristics of a systemically important insurer.
- *‘Domino’ vs. ‘tsunami’ views of systemic risk.* In line with the IMF (2016) two different systemic risk effects can be considered, i.e. the ‘domino’ effect and the ‘tsunami’ effect. The former – the ‘domino’ view – considers the risk of failure of individual institutions together with the potential knock-on effects. The ‘tsunami’ view, in turn, goes beyond individual defaults and approaches systemic risk from

²⁰ This paper considers explicitly a traditional banking channel that refers to the core banking functions (i.e. maturity transformation and leverage) on the financial system and the real economy. It could be argued that this channel is actually embedded in the other channels to a substantial extent (e.g. the asset liquidation channel). For illustrative purposes, however, the channel is addressed separately.

²¹ See, for example, Annex 3 of ESRB (2015).

a macroprudential point of view, by considering that systemic risk may be amplified even by institutions that are financially solvent or by institutions that are not systemically important. This scenario can take place as a result of the increasing correlation within the sector but also across financial sectors that leads to a situation in which institu-

tions could be affected simultaneously by the same shock, possibly leading to comparable reactions in the insurance sector and/or other financial sectors. It should also be mentioned that the IAIS is currently in the process of defining an activity-based approach to identify and suggest some policy action to mitigate those risks.

Table 6: Sources of systemic risk, systemic risk drivers and transmission channels

Potential systemic risk drivers	Main transmission channels
Entity-based related sources – Direct sources	
<ul style="list-style-type: none"> ➤ Deterioration of the solvency position leading to: <ul style="list-style-type: none"> a) Failure of a G-SII, D-SII b) Collective failures of non-systemically important institutions as a result of exposures to common shocks 	
<ul style="list-style-type: none"> • Size • Global activities • Interconnectedness <ul style="list-style-type: none"> – Counterparty exposure – Macroeconomic exposure • Substitutability (incl. market niches) 	<ul style="list-style-type: none"> • Exposure channel • Lack of supply of certain products • Expectations and information asymmetries • Asset liquidation²²
Activity-based related sources – Indirect sources (i)	
<ul style="list-style-type: none"> ➤ Involvement in certain activities or products with greater potential to pose systemic risk ➤ Potentially dangerous interconnections 	
<ul style="list-style-type: none"> • Derivative trading (non-hedging) • Financial guarantees (incl. monolines) • Asset lending (e.g. securities lending) and management activities • Direct lending • Lapsable products and products that entail maturity transformation • Guaranteed products • Variable annuities 	<ul style="list-style-type: none"> • Exposure channel • Asset liquidation channel • Bank-like activities channel (maturity transformation and leverage)
Behaviour-based related sources – Indirect sources (ii)	
<ul style="list-style-type: none"> ➤ Collective behaviour by insurers that may exacerbate market price movements (e.g. fire-sales or herding behaviour) ➤ Excessive risk-taking by insurance companies ➤ Excessive concentrations ➤ Inappropriate provisioning (e.g. under-pricing as a result of competitive dynamics) 	
<ul style="list-style-type: none"> • Concentrations in certain asset classes and common exposures on the asset side • Excessive risk taking <ul style="list-style-type: none"> – ‘Search for yield’ – Too-big-to-fail/moral hazard problems • Heightened competition potentially leading to insufficient technical provisions or premiums 	<ul style="list-style-type: none"> • Exposure channel • Asset liquidation channel

²² IAIS considers the ‘asset liquidation’ as one of the categories to classify G-SIIs. According to EIOPA’s approach, however, this would be more closely linked to the transmission channels defined.

Impact on the financial system and the real economy

The impact on the financial system and subsequently the real economy would result from the materialisation of one of more sources of systemic risk, given that it would alter significantly the normal functioning of the insurance sector and/or the provision of insurance product and services.

In this context, it is important to highlight the contribution of a stable insurance sector and insurance market to financial stability and economic growth. The essence of insurance is managing risks of individuals and companies. It offers protection from risks through transferring and pooling (ESRB, 2015). By doing this, it fosters productive activities like setting up a business. In turn, these activities fuel demand and facilitate supply. As explained by the Geneva Association (2012), on an individual level, an insured person is better able to smooth his/her consumption and income over his life time and economic cycles. In aggregated terms insurance manages to 'level consumption patterns and contribute more widely to financial and social stability'.

It should also be stressed that insurers are long-term investors. According to EIOPA's data, the EEA insurance sector holds over EUR 11 trillion of assets.²³ Furthermore, the predictable and stable provision of long-term funds, which helps to promote economic growth and provides a better allocation of capital, has also been highlighted (IAIS, 2011).

Skipper (1997) summarises the contributions of the insurance sector to economic development. According to him, insurance 'a) promotes financial stability and reduces anxiety; b) can substitute for government security programs; c) facilitates trade and commerce; d) mobilises savings;

e) enables risks to be managed more efficiently; f) encourages loss mitigation; and g) fosters a more efficient capital allocation'.

The link between the insurance sector and economic growth has also been examined empirically. For example, Arena (2008), finds a causal relationship between insurance market activity and economic growth. Lee *et al.* (2013) quantifies this contribution, showing that a 1 % growth in the real life premium increases real GDP by 0.06 % per year.

In summary, in case the insurance sector is not able to perform its main functions adequately, individuals, other financial institutions, financial markets and the real economy might be negatively affected.

Practical example – A Natural Catastrophe event

For illustration, a *non-financial triggering event* such as a severe Nat-cat event, would mainly affect non-life (re)insurers depending on their *risk profile*, i.e. on the activities the companies are involved in. The activities determine the features of the company (e.g. the risk tolerance or the level of capitalisation) as well as the risk factors the company is exposed to. Particularly relevant are the catastrophe exposures included in life and non-life risk potentially inducing net losses on the balance sheets due to exhaustion of reinsurance coverages which might trigger liquidity distress.

Two potential sources of systemic risk could be considered:

- In a first instance a '*behaviour-based source*' could materialise. Earthquakes or severe windstorms are events that typically generate an abrupt increase in claims. Those events are usually reinsured by primary insurers under specific outward reinsurance treaties. Nevertheless under exceptionally

23 Data from Q1 2017.

severe circumstances the volume of claims may exceed the reinsurance agreements' thresholds therefore bearing on the undertaking itself. In order to cope with high cash outflows driven by claims, primary insurance undertakings might be forced to sell unplanned large amounts of assets (*asset liquidation as main transmission channel*). Depending on the size and/or number of companies involved, this behaviour might generate externalities that propagate through the asset liquidation channel.

- In a second instance, one or several failures of undertaking(s) could also take place, leading to an '*entity-based source*'. In case the net impact of the event on the balance sheets is too severe 'direct source' of systemic risk may be the result. The main impact to the financial system and the real economy would come from the *exposure transmission channel*.

The same patterns of direct and indirect materialisation of systemic risk can also affect reinsurers. This applies specifically to reinsurers whose exposures are concentrated in terms of risk covered and/or geography. In addition to that, given that the risk profile is a function of the activities of the company, the behaviour-based source will have an impact on the affected companies as well as on other companies that might not be directly affected, but might be underwriting similar risks (i.e. other non-life companies providing natural catastrophe coverage).

3.2. Entity-based related sources of systemic risk - Direct sources

3.2.1. Description

The entity-based related source of systemic risk captures the case in which a deterioration of the solvency position of an insurance undertaking leads to a) the failure of a systemi-

cally important company or b) the collective failure of non-systemically important insurers as a result of exposures to common shocks.

Failure of a systemically important institution

The literature and insurance supervisors have discussed in great detail whether a single insurance undertaking or group may become systemically relevant ('*too big to fail*') and cause a 'domino effect' at the point of failure (IMF, 2016). The domino perspective focusses on six characteristics considered to be crucial when assessing the systemic risk posed by an individual institution. These characteristics are size, interconnectedness with the rest of the financial sector, complexity of the products and the risk profile, substitutability, leverage and funding liquidity risk.

In the financial crisis, it became clear that, in order to safeguard financial stability, 'too big to fail' companies had to be prevented from failure, due to the large financial and economic costs that are associated with such a failure (BCBS, 2012).

Such an insurer's failure could lead to direct or indirect losses for other financial institutions or to the real economy. The latter could be the case where insurers would no longer be able to cover losses of policyholders.

Globally, the FSB, together with the IAIS, has already identified several systemically important insurers (G-SIIs). Among the current nine G-SIIs, five are based in the EU.

In addition to the Global SIIs, there could also be Domestic SIIs (D-SIIs). The discussion around D-SIIs is, however, less advanced compared also with the one at the Basel Committee (BCBS, 2012) and other fora regarding such banks.

In principle, reinsurers could also be considered regarding their potential for systemic importance. However, the

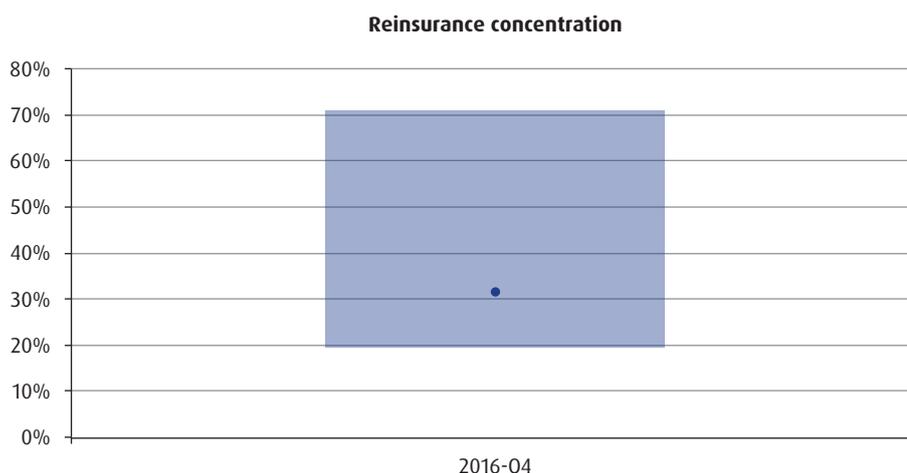
reinsurance business is usually not *per se* considered as systemic, but rather as a stabilising factor by taking risks that primary insurers cede to them.

The ESRB (2015) has identified certain features of reinsurance that may, however, increase the systemic impact in case of failure: a) The links that are created between insurers and reinsurers, as well as with other reinsurers (retrocession); b) The existing concentration in the market, which may pose substitutability issues; c) The creation of an alternative way of reinsurance, i.e. the insurance-linked securities, which transfers risks to investors and makes the reinsur-

ance market more vulnerable to their behaviour, potentially increasing procyclicality; and d) The risk of regulatory arbitrage, which may lead to the creation of reinsurance subsidiaries to move risks to these entities.²⁴

Figure 6 displays the quartile distribution of the concentration of the insurers' exposures towards reinsurers. The indicator (Herfindal-Hirschman Index) is based on the individual exposures of solo companies towards reinsurance companies. The median company does not show significant level of concentration however the higher-end of the distribution is much higher.

Figure 6: Concentration towards reinsurers



Source: EIOPA – Prudential Annual Reporting Solo, $N_{2016} = 1\ 070$.

NB: Weighted distribution (on gross written premium) of the Herfindal-Hirschman index (median and interquartile range) computed on the exposures of solo companies towards reinsurance companies.

It should be mentioned, however, that while reinsurance creates direct linkages within the insurance sector, reinsurance liabilities are not redeemable on demand as claim payments can be spread over years (IMF, 2016). Thus, the IAIS (2012) views that traditional reinsurance and most non-traditional reinsurance and alternative risk transfer (ART) activities are 'unlikely to cause, or amplify, systemic risk'. Since most

forms of ART do not involve credit intermediation, a bank-like transmission channel of systemic risk into the rest of the financial system or the real economy is unlikely.

However, depending on the scale and complexity of its business, some (re)insurance activities may have greater the potential to pose systemic risk. For instance, CDS/CDO underwriting without appropriate provisioning may entail systemic risk potential as well as non-insurance entities or entities that are set up by

²⁴ The current regime in EU should, however, prevent this risk.

banks, offering longevity or pension services normally offered by insurers (IAIS, 2012).

Collective failures

In addition to individual failures, certain types of shocks suffered by a number of insurers may lead to collective failures. It worth noting that collective failures are not included in the 'entity-based approach' of the IAIS.

Collective failure could, for example, be triggered if insurers are set under price erosion. In this case their financial situation is weakened and a shock which could normally be easily absorbed may hit them critically.

An example of this could be observed in the variable annuities market which, in some cases, combine high guarantees with a rather unsecure asset investment. Because in the past the rules for reserving were sometimes not robust enough, it was possible not to charge sufficient premiums for the promised benefits. Not enough premiums on the one side and aggressive risk taking on the other side made large capital injections for the variable annuities' business

and, in some cases, even state aid for other insurers necessary when they were hit by the financial crisis.

During the financial crisis even some smaller companies needed to be rescued by state aid. If a couple of these (small) insurers fulfil the conditions of being of systemic importance in aggregate terms, a triggering event that hits them simultaneously may cause systemic risk. These events may be endogenous (such as competitive dynamics in the insurance sector or reputational issues) as well as exogenous (such as movements in interest rates).

The failure of multiple insurers could also have an impact on the availability of insurance (market niches). Particularly important lines of business may no longer be available, credit insurance or aviation coverage, for example.

The insurance sector is currently subject to different kinds of shocks or triggering events that threaten the sector or significant parts of it. Box 4 identifies and describes some of the most relevant triggering events, which could put a significant share of the market under stress.

Box 4: Relevant triggering events potentially leading to collective failures

- Low interest rate environment

Persistent low interest rates affect insurers in different ways. On the liabilities side, they lead to an increase in the present value of firms' obligations and, consequently, to a deterioration of their financial position. On the assets side, low interest rates have an adverse impact on investment results and increase the reinvestment risk of assets. This problem is even more pronounced where guaranteed rates of returns have been offered to policyholders. In the case of short term insurance business, lower returns reduce the financial margin available to offset adverse combined ratios. Furthermore, low interest rates may encourage other business model changes such as alterations in asset allocations in a 'search for yield', which may create new risks on the asset side of the balance sheet.

At this juncture, the risk of a protracted low interest rate environment is probably the most widely acknowledged issue of concern for the insurance sector, as has been highlighted by several institutions and academics. For example, EIOPA (2013) explains the challenges to insurers and the need for coordinated supervisory response. This risk has also been captured in the different stress-tests and risk dashboards of EIOPA in the last years. In similar terms, the IMF (2016) and IAIS (2017a) also consider the low interest rate environment as an important source of risk for insurers, particularly for the life sector.

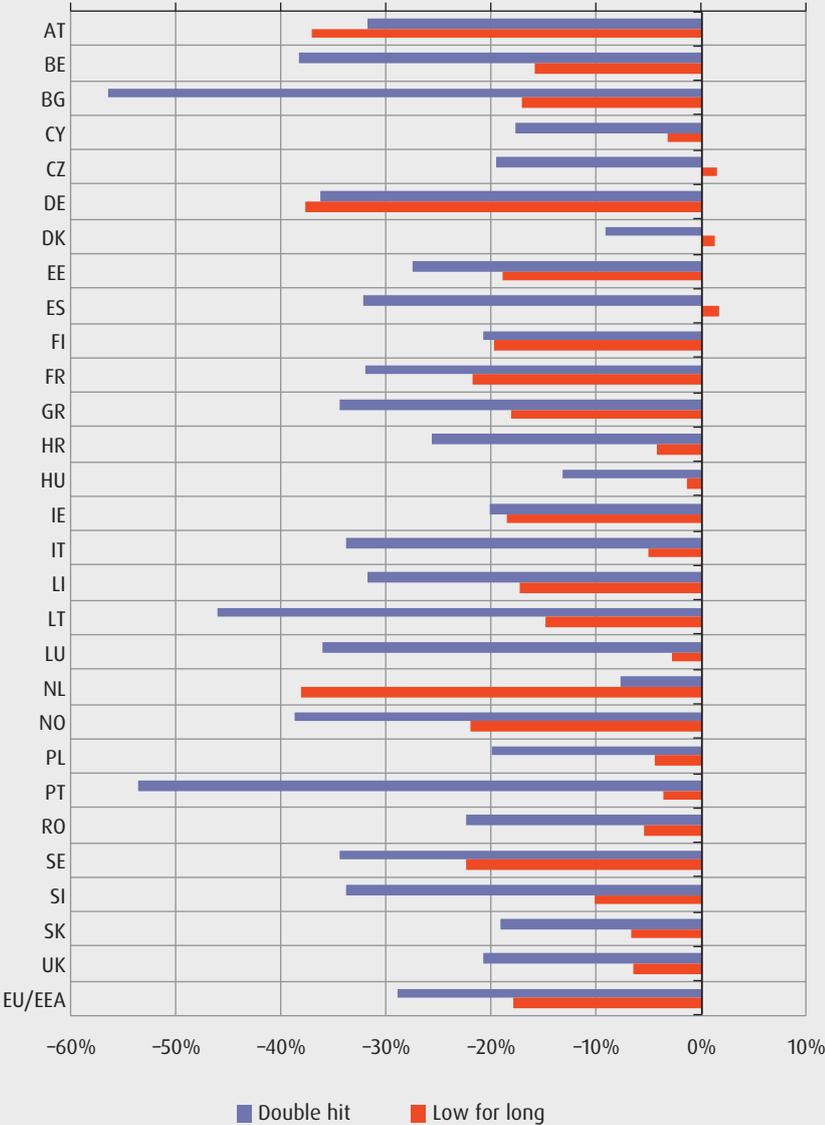
According to the 2016 EIOPA Insurance Stress Test (EIOPA, 2016c), the 'low-for-long' scenario resulted in a fall in the excess of assets over liabilities of about EUR 100 billion and undertakings representing 16 % of the sample would lose more than a third of their excess of assets over liabilities (25 % if LTG and transitional measures are absent).

• Double-hit scenario

A low interest rate environment also increases the likelihood of a double-hit affecting both sides of the balance sheet of companies, which may lead to fire sales of assets and procyclical behaviour in the short term. On the asset side, the adverse price developments caused by sudden increases in spreads may lead to a material deterioration of the investment portfolio.²⁵ This negative impact could be combined with an increase in the value of technical provisions on the liability side caused by low risk-free rates. The risk of a double-hit scenario was particularly addressed in EIOPA's stress test (EIOPA, 2016c), together with the low interest rate environment. This was considered a key source of systemic risk for the EU financial system, not only by EIOPA, but also by the ESRB (2015), which considers that life insurers could create significant disruption by failing collectively under a 'double-hit' scenario.

EIOPA's stress test showed that a 'double-hit' has a negative impact on the undertakings balance sheets of close to EUR 160 billion (-28.9 % of the total excess of assets over liabilities) with more than 40 % of the sample losing more than a third of their excess of assets over liabilities. In the absence of LTG and transitional measures, such impact would apply to almost 70 % of the sample.

Figure B1: Changes in excess of assets over liabilities (in %)



Source: EIOPA (2016c).

25 According to the scenario provided by the ESRB, an increase in the risk premia may potentially be triggered by several factors, such as emerging market stress, persistently low commodity prices or low nominal economic growth.

- Longevity risk

Aside from the macroeconomic conditions that affect the insurance sector, there are other more traditional insurance-specific risks that can also deteriorate the solvency position of insurance companies. One of the most outstanding examples is longevity risk, which is linked to ageing and demographic issues. The IMF (2012) has carried out an analysis of the impact of longevity. They stressed that, although this risk builds slowly over time, it could weaken the solvency position of insurance companies if not properly addressed, making them more vulnerable to other shocks and potentially affecting financial stability and the economy as a whole.

In the 2014 EIOPA Insurance Stress Test (EIOPA, 2014a), the major vulnerabilities as per the insurance specific stresses were mass lapse, longevity and natural catastrophes. The most severe single factor insurance scenarios tested are those related to life insurance risk, especially for longevity and lapse risk. A longevity uplift of 18 % would result in an average net loss of 9.4 % of EOF for the sample – the highest impact amongst the tested stresses.

- Cyber risk

In its magnitude, cyber risk is a relatively new type of risk that is becoming increasingly relevant in the last years. In less than five years, it surged into the top risks of global risks for business rankings. Cyber risk has two main dimensions, i.e. cyber risk as an operational risk that insurance undertakings are facing, but also as an underwriting risk that is emerging as a result of the need of individuals and companies to be protected against this risk.

As stressed by EIOPA (2016d) the increasing digitalisation implies moving towards highly integrated systems and big data storage, which makes them more prone to potential cyber-attacks. Furthermore, there is a certain risk of multiplier effect, as not only the direct risk to the company matters, but it also might spill-over in the form of business interruption, supply chain risk and loss of reputation (including risk of increasing lapses); an issue that is key in case of cyber-attacks leading to the leak of particularly sensitive information. Furthermore, cyber risk may also create solvency issues, e.g. because of the high legal costs involved in case of data breach with notifications, litigation and solution, as well with fraud.

The issue of collective failures is strongly linked to the discussion on the need to reconsider certain business models. Exogenous triggering events, especially the low interest rate environment and the ageing problem, may result in a shift in the viability of certain business models or business strategy and may also have an effect across a larger part of the insurance sector.

Indeed, as explained by EIOPA (2014b), a majority of supervisors in the EU have reported that insurers have decreased or are decreasing the guarantee levels for new contracts and are also focusing on products with no guarantees (e.g. unit-linked products).

Some life insurers have closed some of their deferred annuity business and offer new products instead (so called 'new classic'). These products offer less guarantees and allow the insurer to transform *ex-post*, in agreements with the policyholders, the individual profit participation into an additional provision, thus, also shifting some of the market risk to policyholders.

A shift of (part of) the market risk from insurers to policyholders entails that the solvency position of the insurers is no longer affected by an increase in the market risk that has been shifted. In this case the solvency position of an insurer ceases to be an adequate measure with regard to the risk of investment losses.

EIOPA observed in several issues of its Financial Stability Report (2015, 2016d,e) the increasing penetration of unit and index-linked product in the market and warned on the potential implications for the policyholders. In addition the ESRB (2015) notes such a shift of market risk to policyholders may cause issues for consumers, given that they are in a lesser position to manage and absorb market risk compared with large insurance undertakings. Furthermore, investment losses may directly affect the wealth of consumers and, thus, reinforce a possible economic downturn.

These changes in the business strategy might have an impact on the supply side, which may affect the real economy in two interrelated ways, depending on whether the life or the non-life segment is affected. On the former, depending on the availability and type of products offered, the saving channel could be negatively impacted. On the latter, the provision of specific business lines that are relevant for the economy might be altered or even discontinued, reverting the risk back to individuals and companies.

3.2.2. Systemic risk drivers

The IAIS (2013, 2016a) identified in its G-SII designation methodology the following main drivers for entity-based systemic risk in insurance: size, global activity, intercon-

nectedness, asset liquidation and substitutability. It worth noting that the 'asset liquidation' in the G-SII assessment encompasses a set of indicators aims at identify the entities that due to their fundamentals might generate footprints on the markets. According to EIOPA's approach, however, the 'asset liquidation' category would be more closely linked to the transmission channels defined, and is therefore further developed in 3.2.3.

In addition to the potential of systemically important institutions to create systemic turbulence, a number of smaller entities may have similar effects in case they fail collectively. In that sense the above mentioned categories would apply as well, though not in respect to single entities but rather in respect to the sum of a sufficiently high number of smaller entities that, on an aggregated basis, may create systemic risk.

To some extent the IAIS, while identifying mainly single G-SIIs, takes this into account when referring to 'absolute reference values (...) to better assess systemic importance of the Insurance Pool within the broader insurance sector or financial system' (IAIS, 2016a). This way not just a relative assessment among insurers regarding their systemic relevance is established but it is rather considered to what extent they compare to the total within financial markets.

Table 7: Overview of categories and indicators used by the IAIS methodology

Category	Subcategory	Indicator	Weight
Size		Total Assets	2.5%
		Total Revenues	2.5%
Global activity		Revenues derived outside of home country	2.5%
		Number of Countries	2.5%
Interconnectedness	Counterparty exposure	Intra-financial assets	6.7%
		Intra-financial liabilities	6.7%
		Reinsurance	6.7%*
		Derivatives	6.7%
	Macroeconomic exposure	Derivatives Trading (CDS or similar derivatives instrument protection sold)	7.5%*
		Financial guarantees	7.5%*
Minimum guarantees on variable products		7.5%	
Asset liquidation		Non-policy holder liabilities and noninsurance revenues	7.5%
		Short term funding	7.5%
		Level 3 assets	6.7%
		Turnover	6.7%
		Liability liquidity	7.5%
Substitutability		Premiums for specific business lines	5%

Source: IAIS (2016a).

Size

Even though a large size tends to imply a better pooling and diversification of insurance risks, the impact of a failure to the financial system also becomes more significant, especially where size does not only stem from the main insurance activities (IAIS, 2013). Due to their size, a large amount of counterparties will be affected in case of a failure/bankruptcy of a systemic institution. For example, the EU based G-SIIs account for 25 % of total EEA assets and 27 % of total EEA GWP.²⁶ The same holds in the case of collective failure of more insurers (either systemic or not) at once, which may be exposed to the same risks and therefore be affected in a comparable manner.

²⁶ Source: EIOPA. The data is calculated using groups for Q2 2017. In case solo data is used, the amount is slightly less, but very similar.

Global activities

The IAIS methodology (2013, 2016a) is focused on global activities in the sense that it considers global financial stability effects. Cross-border activities (measured by revenues derived outside the home country and number of countries involved) are considered an indicator for the potential of a SIFI to create negative disruptions internationally.

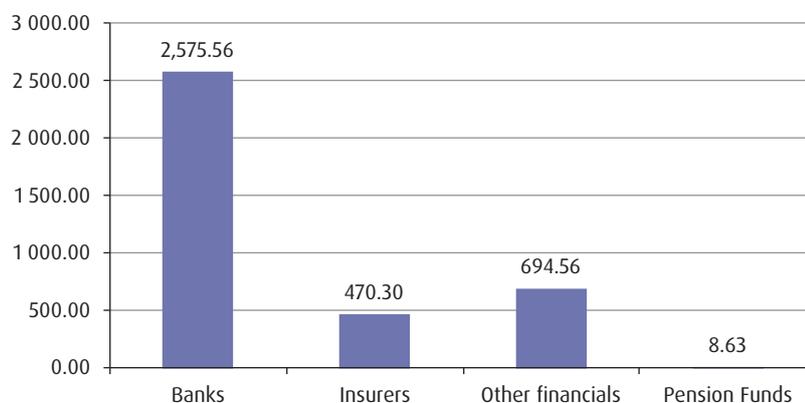
Interconnectedness

Systemic risk can be transmitted throughout the financial system through 'direct and indirect inter-linkages' (IAIS, 2013a) such that failures in one or several parts of the financial system may have effects for other parts of the system. The insurance sector (including reinsurers) is linked with other financial and non-financial

sectors through the performing of its primary functions – “pooling and transfer of risk and investing prepaid

premia” (ESRB, 2015). Figure 7 provides an overview of the intra-financial assets by insurers.

Figure 7: Intra-financial assets by issuer sector – bn Euros – 2016



Source: EIOPA.

NB: Information on assets held split by the economic sector of issuer based on the latest version of NACE code (as published in an EC Regulation). Total Solvency II amount- Value calculated as defined by Article 75 of the Directive 2009/138/EC. Sample based on solo companies.

The IAIS distinguishes two sub-categories:

- a) *Counterparty exposure*: Connect- edness increases with larger fi- nancial sector exposures (includ- ing through derivatives) as well as reinsurance.
- b) *Macroeconomic exposure*: This sub-category stresses that the more correlated an undertak- ing is with the broader economy, the higher is the risk of systemic im- pact from insurance failures. The extent to which an insurer engag- es in derivatives trading, financial guarantees or minimum guaran- tees on variable products provides an indication of the macroeconom- ic exposure.

Substitutability

Failure of a G-SII that is particularly active and important for a specific line of business may have larger consequences for the real economy or financial markets by affecting the supply of the products of this line of business, at least temporarily. In the case of failure of such an insurer there might be no or only few other

insurers with sufficient insurance capacity to serve the market. Thus, particular risks may no longer be sufficiently insured and some eco- nomic activities may no longer be viable, at least temporarily.

Some lines of business may be eas- ier to be substituted quickly rather than others, also depending on how similar available products are. In principle, the issue of substitut- ability could apply to the global, re- gional or national level. Depending also on the business line, at least at the regional or national level insur- ers from other regions or countries could at any rate in the medium- term substitute that kind of busi- ness. There may be short-term ef- fects at the local level, but even in cases such as HIH in Australia ‘the resultant gap was covered within a short period’ (IAIS, 2011).

The IAIS views that the insur- ance market is generally highly competitive, which suggests little risk of non-substitutability of most services (IAIS, 2011). However, the IAIS does not exclude the possibility of a lack of substitutability in certain market niches or where one or few

insurers/reinsurers have a very high market share. Examples for such markets may be 'export credit insurance, aviation coverage, and certain reinsurance lines of business' but also 'medical malpractice insurance or directors and officers (D&O) liability cover' (IAIS, 2011).

Table 8 provides an overview of the concentration existing in certain

business lines. As shown, in several of them, the concentration is very high which may potentially pose substitutability concerns in case of one or more insurance failures, also depending on the type of products. The impact on the financial system would also be higher in case large insurers were affected.

Table 8: Concentration in some lines of business (non-life) – Q2 2017

Line of business	Top-10 EEA groups	Top-5 EEA groups
Credit and suretyship	90 %	82 %
Marine, aviation and transport	89 %	69 %
Workers' compensation	88 %	70 %
Medical Expense	82 %	67 %
Legal expenses	73 %	55 %
General liability	68 %	51 %
Motor vehicle liability	63 %	44 %
Other motor insurance	63 %	45 %
Fire and other damage to property	61 %	42 %
Income Protection	22 %	16 %

Source: EIOPA.

NB: The selection of the top-10 and top-5 is based on amount of GWP of companies active in the respective business lines.

3.2.3. Transmission channels Exposure channel

Insurance failure(s) may impact the financial system and the real economy through four main channels: i) exposures; ii) asset liquidation, iii) lack of supply of certain products; and iv) expectations and information asymmetries.

The potential common shocks described above, and particularly the low interest rate environment and the ageing problem, may considerably deteriorate the solvency position of undertakings in the medium to long term, unless decisive actions are taken. This pattern could lead to collective failures of insurance companies that exhibit similar business strategies/lines and/or similar risk profiles potentially leading to financial stability issues.

a) *Linkages arising from ownership structure of insurance company*

Insurance failure(s) may be directly linked to other financial institutions belonging to the same group or conglomerate. Many insurance companies are directly owned subsidiaries of other financial institutions. Additionally, where there are not direct links through ownership, there are often bilateral service agreements between banks and insurance companies which create linkages.

Special attention should be given to financial conglomerates. They represent a sizable share of the European landscape, with six out of 11 European G-SIBs and 3 out of 5 European G-SIIs being financial conglomerates (ESRB, 2015). Signifi-

cant intragroup interconnectedness should be taken into account (cross-shareholding, common exposures and concentrations, etc.).

b) Linkages arising from the liabilities of the insurance company

This exposure impacts creditors and policyholders of the failing company or companies, i.e. it affects policyholders' liabilities and other intra-financial liabilities (such as borrowing from banks, issuance of subordinated debt, etc.).

Policyholders may be affected by the loss of insurance coverage if no suitable substitute is available (non-life), or where their claims (e.g. annuities) are not covered by the remaining technical provision and own funds of the failed insurer or a policyholder protection scheme. Other creditors may also not get paid or suffer a bail-in in case of insurance failure(s).

c) Linkages arising from the assets of the insurance companies

Insurance companies participate actively in the financial markets in their role of institutional investors, holding large amounts of debt securities and equity. Securities of or investments in investment funds, sovereigns and banks dominate the exposures on the asset side of insurers (ESRB, 2015).

Additionally, insurers play an important role in financial markets as a long lender of capital, for example, in France and Belgium banks are particularly dependent on insurers' investments (ESRB, 2015), which also contributes to deepening the liquidity of some markets.

Insurance companies are also significant users of derivatives for hedging purposes. These exposures could also create additional linkages through counterparty credit exposures (Cummins and Weiss, 2014).

Other activities are more likely to create risk exposures, such as in securities lending and repo markets,²⁷ lending or selling assets which can then be used as collateral or sold short possibly facilitating credit creation.

As a result of these exposures, the failure of one systemically important insurer or the collective failures of many companies may spill over to all these markets and impair their stability.

d) Linkages arising from the business relations

Business counterparts refer to vast variety of counterparties that an insurance company enters into relations with, such as other insurers (pool insurance), service providers (e.g. IT), reinsurers and insurance agents. The impact on these business counterparts will depend on how significant is the exposure and how concentrated it is on the failing insurer(s).

Asset liquidation

Asset liquidation refers to the potential of fire sales, i.e. due to policyholder behaviour/surrenders, causing or reinforcing volatility in markets and leading to further losses, and possibly failures of other companies (IAIS, 2013, 2016a). The category asset liquidation includes indicators that were previously in the NTNI category of the IAIS (IAIS, 2013), such as non-policyholder liabilities and non-insurance revenues and short term funding.

The asset liquidation category captures the scenario where particular insurers facing financial stress may be forced to sell at large scale parts

²⁷ Foley-Fisher, N., Narajabad, B. and Verani, S., 2015, Securities lending as Wholesale funding: Evidence from the US life Insurance industry. Available on SSRN. Baklanova, V., Copeland, A.M. and McCaughrin, R., 2015. Reference guide to US repo and securities lending markets. FRB of New York Working Paper No.FEDNSR740.

of their assets.²⁸ Although this does not usually have to result in an insurance run (i.e. mass lapse of policyholders), market prices may erode (further) due to these fire sales.

This paper distinguishes two dimensions:

- *Liquidity* – institution specific dimension. Selling assets in a distressed environment might create substantial liquidity risk to the insurers, due to the fact that the company may not be able to sell the assets fast enough to prevent or minimise losses, which might deteriorate the situation of the company even further.
- *Procyclicality* – financial market dimension. Changes in asset allocation of insurers which may materialise in the form of fire-sales and/or herding behaviour that, in an aggregated way, may exacerbate movements and volatility in the markets.

Lack of supply of certain insurance/reinsurance products

This channel is linked with the FSB concept of critical function²⁹ or, more broadly, essential/vital functions (including market niches). Substitutability is a key element to the extent that the absence of certain products or services could have a severe negative impact on both the financial system and the real economy.

The impact will depend on the market concentration and the lack of alternative insurers that could easily

replace the lost insurance capacity or particular insurance techniques within a short period of time and at a reasonable cost.

For example, it is argued that in the case of a failure of export credit insurers, there would be a direct relationship to the real economy and insured trades would no longer be covered by insurance and could potentially not take place.

Expectations and information asymmetries

This 'soft' contagion channel, which can be considered an 'indirect contagion' channel, is usually confronted with the 'direct contagion' channel that is based on tangible and direct real and financial linkages (Kamin and DeMarco, 2010). As explained by these authors, irrational panics and herding behaviours would be comprised within the indirect contagion channel. Due to the existence of information asymmetries, problems in a specific institution or group of institutions may lead to problems in other institutions or even across sectors that are not directly linked, just because the economic agents (which may also include policyholders in the case of insurance companies) fear that they are exposed to similar risks or subject to similar vulnerabilities. This is also closely related to the economic agents' expectations, their re-evaluation as new information becomes available.

In addition, there may be reputational issues that transmit systemic risk from a SIFI towards other parts of the financial system, even if these are perhaps not directly affected, i.e. CDS premia tend to be correlated between the financial industry and sovereigns where bank bailouts have occurred (Acharya et al, 2014).

²⁸ The case where several insurers behave similarly is covered in Section 3.4.

²⁹ Following the FSB (2016), a critical function has the following elements: (i) it is provided by an insurer to third parties not affiliated to the firm; (ii) the sudden failure to provide that function would be likely to have a material impact on the financial system and the real economy (by giving rise to systemic disruption or by undermining general confidence in the provision of insurance); and (iii) it cannot be substituted within a reasonable period of time and at reasonable cost.

3.3. Activity-based related sources of systemic risk – Indirect sources (i)

3.3.1. Description

As mentioned in the first section, the systemic relevance of the insurance industry is a widely debated topic among academia, regulators and practitioners, especially in the aftermath of the AIG active involvement in the 2008 crisis. Despite the heterogeneity of the positions, a common understanding has been reached in considering the insurance industry not systemically relevant as a whole but with some distinctions.

The formerly known non-traditional non-insurance activities (NTNI)³⁰ are considered more systemically relevant than the traditional activities. The rationale behind the greater potential to create systemic risk of activities and products derives mainly from their exposure to the most relevant risk factors, namely liquidity, market and credit risk. As noted before, the idea is not to label specific products or activities as intrinsically systemic. Instead, the focus is put on the design and management by insurance undertakings.

A substantial amount of work is currently being carried out at the level of the IAIS to gain a better understanding. More precisely, the IAIS is developing an activities-based approach to assess potential systemically risky activities at the insurance sector level (see IAIS, 2017b).

While an entity based approach focuses on the risk and possible knock-on effects stemming from the failure of one or several insurer(s) (the 'domino view'), an activity-based

approach focus on how firms activities may propagate, transmit or amplify shocks to the rest of the financial system and then to the real economy, independent of the failure of a single institution (the 'tsunami view'). An activity-based approach horizontally assesses the impacts of sector-wide distresses stemming from the engagement in activities with greater potential to pose systemic risk or from common responses to exogenous shocks.

As a consequence, interventions aimed at pre-empting systemic events shall target on a proportionate way all undertakings engaging in specific activities independently of their size.

In the IAIS's 2013 initial Assessment Methodology, NTNI was one of five categories whereby systemic risk in insurance could be measured. The IAIS has later decided to discontinue the NTNI label and to focus on substantial liquidity risk and macroeconomic exposure and their related systemic risk transmission channels (IAIS, 2016).

Activities and exposures can lead to negative externalities to the financial sector and the real economy in different ways. Policies or products that have features that expose the insurer to substantial macroeconomic risk (including credit guarantees) or substantial liquidity risk through the exposure and asset liquidation transmission channels contribute to higher systemic potential of insurers (IAIS, 2016).

Activities which expose insurers to aggregate non-diversifiable risk tighten the linkages with other financial institutions and the economic cycle, increasing the risk of poorly performance when also other financial institutions are adversely hit in a stressed environment. Bank-like activities are potential systemic risk drivers as this increases the exposure

³⁰ A comprehensive definition and classification of the Non Traditional Non Insurance activities is provided by IAIS (2015).

to macroeconomic shocks. Bank-like activities can be used to for leveraging by insurers directly amplifying macroeconomic exposure and indirectly amplifying risks to the financial system through increased participation in capital markets. Bank-like activities should also be considered systemic as such activity may exceed credit growth and give rise to vulnerability among households and corporates and in the financial system. Selling credit default swaps or buying mortgage-backed securities may also exacerbate the credit cycle if the prices charged or received do not suitably reflect risks.

For generating income or managing their risk exposure insurers use a wide range of complex financial instruments, with banks and other financial institutions as counterparties. In an adverse situation the risk connected to such activities and products may abruptly change partly because volatility and correlations may change substantially.

Potentially dangerous interconnections may exist where the interconnections, due to large exposures, within the financial system are strong and when the speed of contagion is high. For products which are traded in liquid markets and are valued mark-to-market, losses and collateral demand for derivatives will spread quickly through the finan-

cial sector. High speed of contagion limits companies and supervisory authorities scope for mitigating the systemic risk. Speculative derivate trading and certain types of guarantees are examples of activities that in an adverse scenario may pose contagion to the financial sector and consequently to the real economy. Interconnections from these products potentially pose systemic risk as shocks can be submitted among insurers, from banks to insurers or from insurers to banks.

3.3.2. Systemic risk drivers

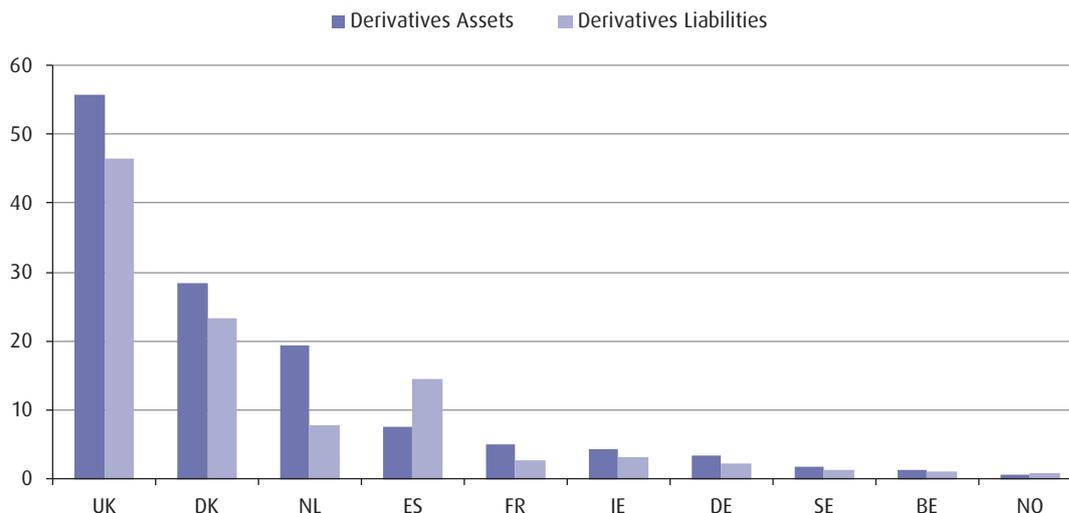
Several insurance products and activities, because of their intrinsic features, may act as systemic risk driver, by means of e.g. creating liquidity risk mismatches or by exacerbating the credit cycle in the medium to long run.³¹ This section seeks to explore these activities and illustrate how the systemic risk creation could take place.

Derivative trading (non-hedging)

Insurers use derivatives as interest rate swaps and foreign exchange derivatives in order to hedge risk, i.e. for hedging purposes. Figure 8 provides an overview of the exposure to derivatives on both assets and liabilities sides of the 10 countries with higher exposures in absolute terms.

³¹ See, for example, French *et al.* (2015).

Figure 8: Total Derivatives held on Balance Sheet – bn Euros – 2016



Source: EIOPA.

NB: Data based on solo companies.

Insurers may however also use derivatives for speculative purposes thus, strengthening the link of insurers to other parts of the financial sector and the economic cycle. The Figure above does not differentiate between derivatives for hedging and speculative purposes. The latter may generate income by selling derivatives like credit default swaps (CDS) which give the buyer protection against the default of reference borrowers. If the premia charged by the CDS seller does not reflect the credit risk in the contracts, this activity can contribute to lower the costs of funding in the credit markets and hence exacerbate the credit cycle.

Speculative derivative trading is potentially systemic as it implies leverage, complex risks and interconnectedness in the financial system. As the failure of AIG showed, the largest insurer worldwide at the time, selling of credit derivatives may have consequences for systemic risk.

Using derivatives for hedging creates dependencies on the derivatives markets. Often derivative contracts are shorter than the underlying exposures and insurers are dependent on rolling these

contracts over. In times of market stress and increasing concern about counterparty credit risk, these markets may become unavailable. This may in turn force insurers to sell some of their assets in time of market stress, which may have procyclical effects.

Financial guarantees and monoline insurance

Products such as credit protection insurances and mortgage insurances expose insurers to market movements and credit risk. These policies guarantee on the value of reference assets (mortgages or non-traded instruments). Therefore, besides being sensitive to the volatility of market prices, such products make insurers prone to economic downturns potentially amplifying the effects of shocks to the economy with particular reference to households and/or manufactory industry.

Some insurance companies (monolines) specialise in financial guarantees and similar products that are used by debt issuers as a way of attracting investors. This can increase the supply of finance to the real economy and affect the credit cycle.

Issuing of financial guarantees may have systemic effects in adverse situations. The downgrading of monoline insurers in 2008, because of concerns about their financial position, was followed by downgrading of the insured loans, contributing to large sell-offs of credit and loan assets. The downgrades of monolines had a significant negative impact on the value of the instruments insured (Chen *et al*, 2013).

Asset lending and management activities

As explained by French *et al.* (2015), insurers hold large portfolios of assets and sometimes lend bonds and equities to counterparties. The lender typically has the right to recall the securities and the borrower has the right to return the securities borrowed at will. Asset lending therefore exposes insurers with liquidity risk if borrowers return securities unexpectedly and in large amounts. This may happen if borrowers start doubting the lenders creditworthiness. If collateral is invested in less liquid assets this could lead to severe liquidity risk as was demonstrated by the large collateral calls on AIG in 2008.

As news arrived about massive write-downs in AIG's portfolio and collateral posting obligations, the borrowers of the securities lending program of AIG became concerned about the safety of their cash collateral given to AIG, which was invested in residential mortgage backed securities. In the following, the company had to sell these ABS and realising huge losses due to selling them in an unfavourable moment (plummeted prices and liquidity – see Sjostrom, 2009).

Insurers engage in repo and securities lending transactions where the counterparties are mainly banks, but also other financial institution. Insurers and pension funds account for 37 per cent (EUR 477 billion) of the assets available for securities lending in the EU (ESRB, 2015).

Direct lending activities

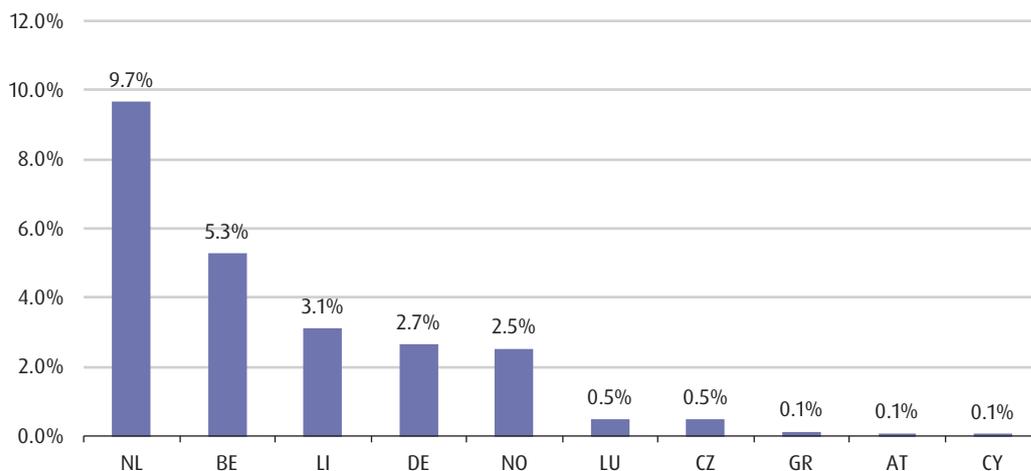
Insurers providing direct lending may contribute to the aggregated credit supply in the financial system and may exacerbate the impact of a crisis on the real economy in case they reduce or stop providing such funding activities.

As noted by the FSB (2015), 'insurance companies and pension funds are increasingly active players in credit intermediation through the direct purchase of credit assets, investments in vehicles that purchase credit assets, and occasional engagement in direct lending activities'. Direct lending also includes loans provided to households and non-financial corporate sector by insurers. Loans to households by insurers are more pronounced in the Netherlands and Belgium than in other EU countries.

Direct lending and mortgages substantially detach from the traditional insurance business modifying the risk profile of the companies and making it closer to the banks. This shift exposes insurers to externalities.

Loans to household and corporates can also increase supply of finance to the real economy. Increased competition between lenders may lead to a compression of lending rates that do not reflect risks.

Figure 9: Share of loan and mortgages to individuals to total assets – Q4 2016



Source: EIOPA.

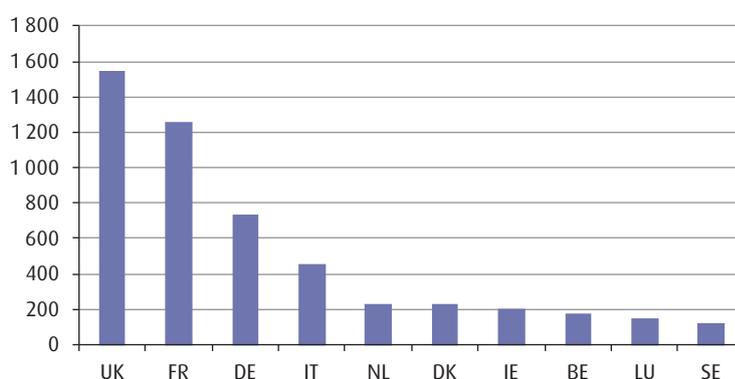
NB: Sample based on solo companies by country. The countries shown are the top 10 in terms of assets.

Loans by insurers in the EU are generally moderate. Loans to households are on average less than 1 per cent of EU insurance sector assets (EIOPA, risk dashboard). In some countries (Netherlands and Belgium), however, loans by insurers are not insignificant when compared with total assets held by insurers (see Figure 9).

Lapsable products and products that entail maturity transformation

Lapsable products allow policyholders to access their funds quickly (with no or low penalties) while the insurers have invested in assets with longer durations, thereby generating a duration mismatch which may lead to liquidity risk.

Figure 10: Surrender value by country (total amount) – bn Euros – 2016



Source: EIOPA.

NB: Sample based on solo companies by country. The countries shown are the top 10 in terms of amounts. Surrender value is defined as the amount to be paid to the policyholder in case of early termination of the contract (i.e. before it becomes payable by maturity or occurrence of the insured event, such as death), net of charges and policy loans; does not concern contracts without options, given that surrender value is an option. (Definition as mentioned in Article 185 (3) (f) of Directive 2009/138/EC)

As explained by Sharma (2014), insurers could give long-term performance promises compounded with short-term liquidity promises, i.e. certain products may allow policyholders to withdraw the investment with no or limited penalties and with no or a short notice period.

Holders of lapsable products may collectively react to market stress by withdrawal of their funds. In case insurers have not invested in sufficiently liquid assets, they may be forced to sell illiquid asset (assets not traded in deep markets). This may deteriorate the financial situation of insurers. If a significant number of insurers are exposed at the same time, the effect on the markets could be significant, impairing its functioning.

If the cash-flow of a product (consisting of the commissions to the insurance intermediaries, the premiums and the guaranteed surrender or accumulation value) has an internal interest rate higher than observable ones, insurers are in particular vulnerable to surrender arbitrage.

Variable annuities

Variable annuities and unit-linked products with capital protection normally include guaranteed levels of payment to policyholders. Often it is not possible for insurers to hedge perfectly the risks in these products, especially in stressed situations. As variable annuities often offer quite high guarantees insurers could be forced to sell assets in order to pay guaranteed amounts in an adverse market situations. This may potentially exacerbate market movements. By hedging part of the risk in these products, insurers may also adversely affect markets in times of stress.

Furthermore, the assets in the separate accounts may sometimes not be sufficient to pay the guaranteed

amounts promised to policyholders. In such cases, assets of the general account have to be sold to repay the guarantees. The assets of the general account are generally needed to cover the liabilities of traditional products. Therefore, the losses of the separate account and the inability to hedge them correctly impair not only an insurer's solvency position but also other policyholders due to the level of guarantee provided within the variable annuity products.

During the 2008 crisis, many insurers recorded losses in their variable annuities' business, because in addition to a high guarantee (which in fact is the reason for solvency problems and necessary capital injections), they were also invested in risky assets like stocks and their hedging portfolios. Such risky assets reported high losses and the hedging did not work properly. In consequence, such insurers had to inject capital to their subsidiaries in countries where variable annuities business was allowed and from where variable annuities had been sold.

Guaranteed products

Even if traditional products are generally not deemed as systemically relevant, under certain circumstances, insurance products with high minimum guarantees potentially give rise to procyclicality as insurers may be forced to increase risks if interest rates fall and their solvency position is weakened.

It is however worth noting the difference between *ex-ante* and *ex-post* sustainability of guaranteed products. If high yields compared to available low-risk market yields are offered by insurance companies, these guarantees should be considered to be *ex-ante* non-sustainable. In contrast, due to changes in attainable interest rates without taking over excessive risks, guarantees may be considered to be too high during the

lifetime of the contract (not sustainable *ex-post*). This can be observed and addressed if the margin between earned interest and guaranteed interest decreases over time.

3.3.3. Transmission channels

The risk drivers described above have the potential to generate negative spill-overs from one or more company-specific stresses into a systemic effect. Activity-based sources of systemic risk may affect financial stability and/or the real economy through several transmission channels.

Exposure channel

Through the interlinkages with banks and other financial institutions, problems in insurance companies can transmit to these institutions. This may happen if insurers are unable to meet contractual claims. Such claims could be linked to activities like selling of CDS, issuing financial guarantees or lending of securities (call on collateral).

As large institutional investors insurers are exposed to banks and other financial institutions through their holdings of debt and equities. Through these exposures shocks to the banking sector will transmit to insurers. If the creditworthiness of banks is questioned (rightly or due to irrational panics and herding behaviours) insurers may react by selling bank debt and equities and stop funding them. This may have systemic effects as it give rise to liquidity risk in the banking sector and impair liquidity in the markets for bank funding. Thus in an adverse situation insurers dispositions could exacerbate the problems in other sectors of the financial system.

Asset liquidation

Some activities and products expose insurers to liquidity risk. Holders of products like variable annuity

contracts may collectively react to market stress by withdrawal of their funds forcing insurers to liquidate assets. Asset lending also expose insurers with liquidity risk if borrowers return securities unexpectedly and in large amounts. This may happen if borrowers start doubting the lenders (insurers) creditworthiness. If collateral is invested in less liquid assets this could lead to severe liquidity risk.

In case insurers are forced to liquidate assets quickly at distressed prices it might deteriorate the situation in the companies. Liquidation of assets done quickly and on a large scale may also lead to further fall in market prices and increased asset price volatility, which could have negative systemic effects for other institutions.

Bank-like activities channel

In certain instances insurers may get involved in activities that may contain some features of maturity transformation and/or leverage that are typically banking activities. When this happens, insurers deviate from the normal asset-liability management (ALM) and contravene their traditional liability investment approach. In these circumstances, insurers behave closer to banks and, as a result, may exert systemic risk in a similar way. As mentioned by the ESRB (2015), the involvement in such activities tends to increase the correlation of financial risks in crisis situations, the probability of procyclical behaviours of insurers as well as the interconnectedness with the rest of the financial system.

Insurance companies may affect the cost and quality of credit in the medium to long run. Insurance can affect the credit cycle by offering direct lending, acting as financial guarantors, selling credit default swaps or purchasing asset backed securities. These activities may be motivated by 'search for yield' and regulatory arbitrage.

Products which combine long-term performance promises with short term liquidity promises exposes insurers to maturity mismatches. If a significant number of insurers face a sudden cash outflow at the same time forcing them to liquidate illiquid assets, it may weaken the solvency positions of insurers and possibly also impair the functioning of financial markets. Involvement in securities lending may have similar effects as it may involve liquidity mismatches if received collateral is invested in less liquid asset.

Bank-like activities as selling investment guarantees or options embedded in other products allow insurers to leverage their funding structure. Such leveraging involves participation in capital markets strengthening the interlinkages between insurers, banks and other financial institutions. This gives rise to contagion channels through which shocks can be transmitted increasing the correlation of financial risks in adverse situations.

3.4. Behaviour-based related sources of systemic risk – Indirect sources (ii)

3.4.1. Description

Insurance companies play an important role in the economy by providing protection from risks through pooling or transfer, through managing the long-term savings of individuals and providing investments to the real economy. Insurers are one of the major investors, given their significant size and role in the financial market and wider economy. Therefore, the behaviour of insurance companies could potentially affect the financial market and the rest of the economy through significant influence on market prices and capital flows.

The following main behaviour-base related sources of systemic risks insurers have been identified: a) Collective behaviour by insurers that may exacerbate market price movements; b) Excessive risk-taking by insurance companies; c) Excessive concentrations; and d) Inappropriate exposures on the liabilities side. The behaviour-based approach is usually not explicitly considered but instead addressed as part of the entity-based and activity-based related sources, e.g. IAIS approach.

Insurance companies could potentially have a significant impact on market prices of certain assets due to their collective reactions to negative shocks or stresses to which they themselves are exposed to through either common and/ or excessive concentrations in certain assets or significant risk-taking. Such reactions could be expressed through 'fire sales' of assets and/ or 'herding behaviour' in case of, for example, sudden devaluations or downgrades of sovereign bonds or default of one or several large corporate debt' issuers.

With regard to the excessive risk-taking by insurance companies, as mentioned before, the low interest rate environment represents one of the major risks for insurance companies, which could potentially trigger a 'search for yield' behaviour. It is usually strongly related with the change in the investment allocation, which potentially increases the exposure to more risky asset classes, such as lower rated or high yield bonds, equities or alternative asset classes. It could lead to unnecessary concentrations on certain risky asset classes, which in case of a shock could have a negative impact on the financial position of insurers. Systemically important financial institutions could be potentially among those encouraged to take an excessive risk due to the moral hazard problem.

Having an excessive concentration on certain asset classes or geographical concentration represents a significant risk for insurers by itself. It could also have a negative spill over effect on market price of these assets in case of negative shock through ‘fire sale’ or ‘herding’ by insurance companies.

Regarding the inappropriate exposures on the liabilities side, aggressive pricing (underpricing) and uncontrolled growth of insurer’s business caused by either heightened competition or poor management or other factors, could lead to under-reserving building up, which could pose the risk of a potential failure of insurance undertaking(s).

ness models and liabilities structure, insurance companies tend to have similarities in their asset allocation. Taking into account the size of insurance business as well, any asset allocation decisions of insurers could be crucial from both financial stability and economic growth perspectives, as noticed by Bank of England (2014).

The Bank of England (2014) underlines that investment decisions of insurance companies (together with pension funds, which are also considered in its discussion paper) are ‘important because changes in asset allocation have the potential to amplify asset price volatility and/or exacerbate business cycle fluctuations’. Evidence of procyclical investment behaviour by insurance companies both internationally and in the UK is provided. There are potentially several reasons for such behaviour of insurers, such as liability characteristics, regulation, accounting and valuation methodologies or industry practices (including ‘herding’), and they could lead to ‘important consequences for the economy as a whole’.

3.4.2. Systemic risk drivers

Concentrations and common exposures on the asset side

Given the generally long-term structure of their liabilities, insurance undertakings have a potential to provide important long-term investments to the economy. At the same time, due to similarities of their busi-

Figure 11a. Investment split: Life (Q2 2017)

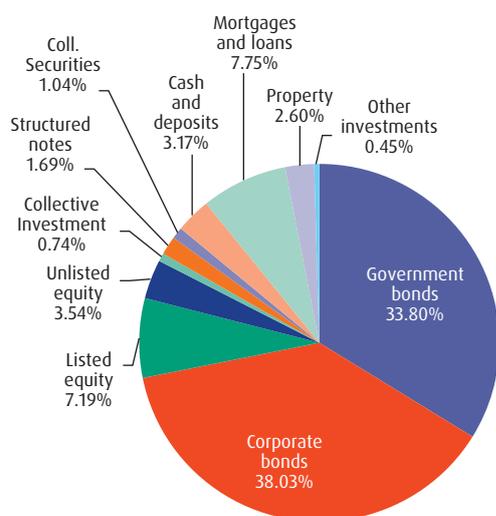
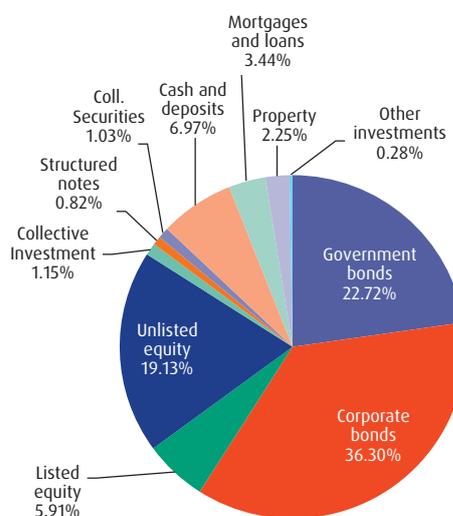


Figure 11b. Investment split: Non-life (Q2 2017)



Source: EIOPA.

NB: sample based on 2027 solo insurance undertakings in EEA, asset by asset template, look through approach applied. Reporting Reference Date: 30/06/2017.

As a result of the liability-driven investment approach of insurers, changes in the products offered by insurance companies may have direct implications for their asset allocations. For example, as one of the responses to low interest rate environment, there is certain evidence that unit-linked products have become a significant part of life insurers' liabilities (Bank of England, 2014; IAIS, 2017), with the shifting of risks from insurers to policyholders. Policyholders could display a different risk appetite and investment behaviour than insurers and therefore influence the asset allocation and subsequently assets prices through being more/ less reactive to different events.

The insurance sector is the largest institutional investor in the EEA, holding over EUR 11 trillion of as-

sets under management, invested in bonds, equities and other assets. Insurers typically have their assets significantly concentrated (see Figures 11a and 11b).

Due to the asymmetry of information (Bijlsma and Vermeulen, 2015), 'home bias' has been traditionally very strong in insurers' investment decisions, and also has been aggravated during the crisis for many countries, (see Figure 12 below). It was stressed that such behaviour of overinvestment could lead to systemic risk. As can be seen, the asset allocation and level of home bias varies from country to country, which could increase potential systemic risk in some of them.

Figure 12: Home bias of insurers in the euro area by investments – Q2 2017 (domestic financial assets as a percentage of total correspondent assets)

	Total assets	Corporate bonds	Government bonds	Equity
AT	57%	35%	28%	78%
BE	37%	13%	57%	35%
BG	39%	1%	48%	59%
CY	25%	7%	39%	72%
CZ	67%	55%	85%	69%
DE	60%	48%	43%	66%
DK	67%	84%	40%	47%
EE	10%	4%	0%	39%
ES	69%	40%	86%	73%
FI	58%	20%	28%	56%
FR	63%	45%	65%	78%
GB	58%	44%	74%	37%
GR	38%	2%	43%	77%
HR	77%	50%	77%	78%
HU	71%	73%	92%	80%
IE	16%	3%	8%	7%
IT	56%	28%	88%	46%
LI	6%	0%	0%	4%
LT	28%	0%	45%	30%
LU	31%	9%	4%	12%
LV	34%	28%	25%	62%
MT	17%	2%	23%	33%
NL	48%	16%	29%	74%
NO	51%	52%	41%	29%
PL	91%	65%	94%	96%
PT	53%	30%	68%	55%
RO	71%	23%	98%	83%
SE	66%	83%	78%	62%
SI	45%	14%	41%	88%
SK	54%	42%	72%	80%

Source: EIOPA.

NB: Total financial assets include: collateralised securities, collective investment undertakings, corporate bonds, equity, mortgage and loans, structured notes, government bonds, cash and deposits, call options, put options, forwards, futures, swaps, properties and other investments. The assets included in the table were chosen based on their relevance in terms of shares for the insurance sector (see Figure 9a. and 9b.) The calculations is based on the data reported by the countries.

European insurers are one of the main investors for banks' funding through holding EUR2.2 trillion of total investments in financial instruments issued by the banking sector (EIOPA, 2016e).

The exposure to banking sector by European insurers has also some degree of country concentration, (see Figure 13a and 13b). Additionally, the exposures to banks are both do-

mestic and cross border, representing a potential transmission channel of risk.

In case of a wider banking crisis, insurance companies could potentially start 'fire sale' of risky banking investments, which could significantly negatively affect the banking assets' prices and aggravate the situation in the banking system.

Figure 13a: Exposure of EEA companies to banking sector by country of issuer – Q2 2017

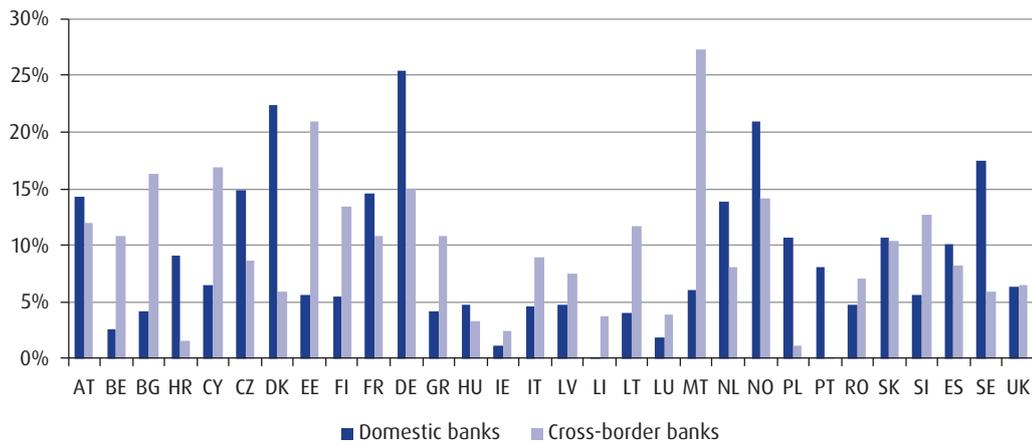
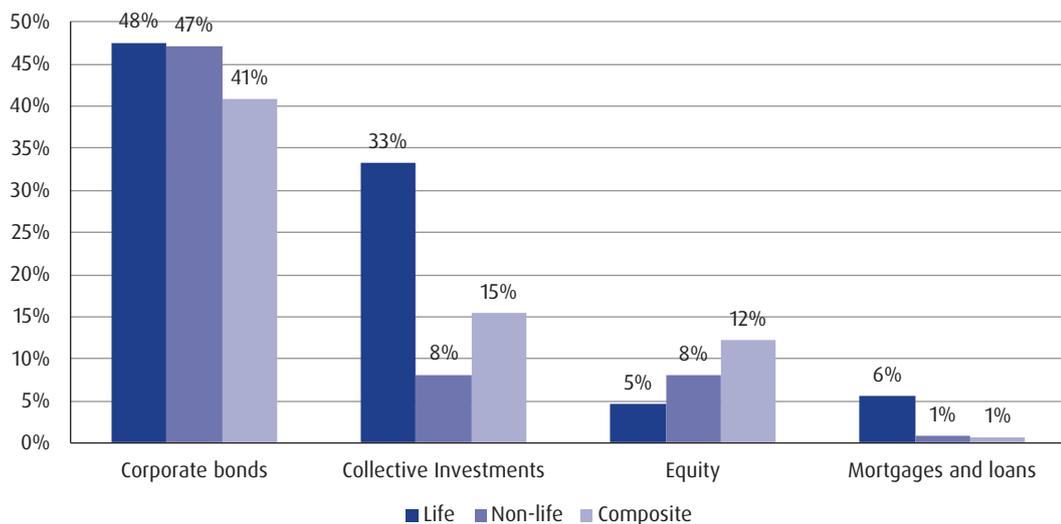


Figure 13b: Exposure of EEA companies to banking sector by main investment categories – Q2 2017



Source: EIOPA.

NB: Sample based on solo companies.

Paulson and Rosen (2016) analysed to what extent insurance companies in the US could destabilise the corporate bonds market thereby spreading risk to other financial institutions. Insurance companies are among the largest holders of corporate bonds, therefore, if insurers change their bond market activity as a response to a shock, it might potentially disrupt the bond market. Additionally, it was mentioned that regulation could potentially amplify the insurers’ reaction to shocks: for example, with capital requirements linked to

the bonds’ credit ratings, a wave of corporate bond downgrades could lead to the ‘fire sale’ of these investments by insurers which eventually could affect the bond pricing and liquidity of the market.

Ellul *et al* (2009) investigated fire sales of downgraded corporate bonds induced by regulatory constraints imposed on insurance companies. It was mentioned that regulatory constrained insurance companies are more likely to sell their holdings of downgraded cor-

porate bonds (at least part of) immediately, with such forced selling causing 'prices of these bonds to fall below fundamental values for several weeks around the downgrade event'.

Excessive risk-taking

Excessive risk-taking by insurance companies is a behaviour that can become a driver for systemic risk. Two behaviours are considered: a) The 'search for yield' behaviour; and b) The risk-taking under the assumption of being 'too big to fail', which leads to the issue of moral hazard.

a) 'Search for yield'

The environment of prolonged low interest rates represents a significant challenge and puts significant pressure on insurers' profitability, solvency and business models. It is particularly noticeable for life insurers, which hold a high portion of guaranteed products, with the duration of their liabilities being relatively long. Therefore, there is a challenge in matching the liabilities with assets of appropriate duration and returns, allowing them to meet their obligations. This could give an incentive to insurance companies to change their asset allocation, with increasing focus on higher return generating assets which, at the same time, are also more risky, i.e. it may create incentives to risky behaviour as insurers collectively 'search for yield'.

Becker and Ivashina (2015) noticed that such 'search for yield' behaviour could have a broader implication to the economy in the form of the concentration of systemic risk in insurance companies' portfolios and

in form of potential effect on the allocation of credit supply.

Profitability of non-life insurers is under pressure due to the falling interest rates. This results in decreased investment return, which is an important component of their income, therefore putting pressure on underwriting and pricing discipline.

As mentioned in EIOPA (2015), the problem is not the 'search for yield' per se, but that insurance companies could take on too much risk, beyond their risk-bearing capacity and risk management capabilities ('excessive search for yield behaviour'). This reflects the risk of insurers to potentially increase their investments in riskier assets, such as equities and alternative assets (examples, infrastructure projects or loans).

IAIS (2017a) noticed that large euro area insurer's investments portfolio continue to shift towards corporate bonds, which are considered to be more risky. Additionally, it is reported that insurers 'increasing their exposures to illiquid assets such as property and infrastructure investments'. However, it seems that on an aggregate level such shift in assets allocation is not obvious so far.

According to IMF (2016) and IAIS (2017a), 'search for yield' in insurance sector has been moderate so far, which may be explained by the fact that the higher return on riskier assets is not enough to compensate the higher prudential regulatory capital charges for these assets and/or the general lack of expertise in and experience of investing in these asset categories by insurance companies.

Box 5: Investment behaviour survey

EIOPA carried out an investment behaviour survey in order to identify changes and trends in the investment behaviour of insurers over the last 5 years including the identification, where possible, of a potential 'search for yield' given the persisting low yield environment (EIOPA, 2017). The focus of the survey was not to detect issues with individual groups or countries but rather, to identify developments in the investment behaviour of insurers across the whole sample.

The sample consisted of 87 large insurance groups and 4 solo undertakings across 16 European countries.³² The survey was conducted in the first quarter of 2017 and focused on the asset side of the balance sheet of insurance groups. It included both a quantitative and qualitative section. The quantitative section was an overview of the key investment categories of insurance groups under the Solvency I regime for the years 2011, 2013 and 2015. This dataset was subsequently complemented with Solvency II data for the year 2016 for the same investment categories. The qualitative section included a number of questions regarding portfolio trends, investment allocation decisions and questions regarding the asset management of insurers for the same period.

The analysis at a European level led to the identification of a number of trends that could be associated with a 'search for yield' behaviour:

- A trend towards lower credit rating quality fixed income securities was seen in the data. At the same time, the large number of sovereign and corporate downgrades during the observation period had to be considered.
- The average maturity of the bond portfolio for the majority of the sample increased in the past 5 years.
- The tendency to invest into new asset classes was observed among insurance groups. Although the amounts were low compared to the size of the portfolios, almost 75% of the sample responded positively towards increasing their investments in asset classes such as infrastructure, mortgages, loans, real estate.
- Nonetheless, when looking at the developments in the investment allocation on an aggregate level, changes in the three main investment categories (bonds, equity and other investments) from 2011 to 2016 were only marginal.

Finally, it has to be noted that the analysis focused on investments made to non-unit linked (UL) and non-index linked (IL) assets. In UL/IL investments the risk lies with policyholders rather than insurance groups. Based on the findings of the survey, the volume of UL/IL business significantly increased in the last years. Furthermore, the majority of the participants also mentioned the intention to further extend the product range and the selling of more UL/IL products in the next three years. The observed shift of market risk exposure from insurers to policyholders deserves further attention from a financial stability perspective.

b) *Too big to fail and moral hazard*

Some financial institutions can be of systemic importance as their collapse could lead to the damage of the wider financial system and broader economy. It is therefore important to identify those institutions. At the same time, such identification may create 'moral hazard' problems to the extent that the designation strengthens the perception that a company is viewed as 'too big to fail' and therefore subject to an implicit government support or guarantee; encourages systemically important financial institutions to take more risk knowing that not all potential costs would have to be borne by

itself;³³ or incentivise companies to take excessive risks to compensate the costs of the more stringent regulation (CEA, 2010).

Increased risk appetite of such insurers could potentially lead to their failure, which in its turn could be a source of significant disruption of the wider financial system due to the size, complexity and interconnectedness of these financial institutions. Furthermore, such behaviour may

³² AT, BE, DE, DK, ES, FI, FR, IE, IT, LU, NL, NO, PL, PT, SE, UK.

³³ Moral hazard is defined for example by the OECD as "behaviour when agents do not bear the full cost of their actions and are thus more likely to take such actions."

force smaller competitors to react to the advantages that G-SIIs receive and follow their risk-taking strategy in order to be able to offer prices as low as G-SIIs.

When a financial institution has already taken excessive risks, this may result in a 'gamble for resurrection', which means that the institution tries to increase its solvency by taking such risks, while 'shareholders and managers have less to lose from failure', given the reduced value of a firm the closer it gets to failure (IMF, 2014).³⁴

Insufficient technical provisions or premiums

Insufficient provisioning and inadequate pricing are the most important factors of financial impairments of insurers. According to IAIS (2017a), during the period between 1969 and 2014 45 % of impairment cases have been caused by deficient loss reserves. Inadequate prices materialise often in insufficient provisioning, which could be either due to poor actuarial work or as a result of aggressive pricing in order to compete for market share (IAIS, 2017).

Bellando (2001) noticed as well that among the causes of insurance undertakings' failures are those attributed primarily to under-pricing and under provisioning. In order to safeguard its financial position in the future, an insurer must charge adequate rates (premiums). However, there is a number of 'pricing errors', including lack of reliable statistics, improper use of available statistics, claims' under provisioning, insufficient loading for acquisition and administrative costs, changes in insured

risks and other errors, with aggressive pricing being one of them.

Aggressive underwriting could come from the competitors. Intense competition among insurance undertakings could drive premiums down, leading to a potential under provisioning and therefore imposing the risk of failure. Smaller monoline insurance undertakings are particularly vulnerable in comparison with wealthier multi-line undertakings. However, it should be mentioned that 'risk of under-pricing cannot be totally separated from the risk of poor management' (Bellando, 2001).

Additional pressure on insurer's profitability is coming from the falling interest rates, with 'lower investment earnings place a greater onus on underwriting and pricing discipline' (of non-life insurers) (IAIS, 2017). The same is true for life insurers.

Reich (1997) notes that within the US life insurance market, there have been several price wars in the 1980/90's. In consequence a couple of life insurers went bankrupt or put under state control (e.g. Monarch Life Insurance Company (1990), Mutual Benefit Life Insurance Company (1991) and Executive Life Insurance (1991)). According to Briys and de Varenne (2001), there were 19 bankruptcies in 1987, 40 in 1989 and 58 just one year later. In line with Reich they recognise the heightened competition as the main reason for this development which led to 'recklessly offered high yields and options'.

Junker and Ramazani (2010) state that ruinous price competition and false assumptions led to a ferocious competition among providers of variable annuities which issued ever more generous guarantees at ever lower prices. As a consequence, many insurers had to redesign their products or to offer buyback opportunities.

³⁴ Schiller *et al.* (2009) describe the case of Mannheimer Lebensversicherung AG which increased its equity exposure during the dot-com bubble, despite initial setbacks already up to the year 2000. Mannheimer itself noted in its annual report 2000 that they took advantage of reduced stock prices.

In order to perceive adverse developments in time, exposures to underwriting risks should be monitored by reviews of the essential insurers' assumptions against actual experience on a regular basis.

3.4.3. Transmission channels

Exposure channel

The behaviour-based source of systemic risk is transmitted to the financial system and the real economy, in a first instance, through changes in direct holdings of assets and counterparty linkages, i.e. through the existing exposures in the financial system and across financial institutions.

Given their relevance in the financial system, the decisions of insurance undertakings, e.g. in which assets to invest or what kind of risk to take, have an impact on other agents and/or markets, and can therefore spill over to them. This is particularly relevant in case the behaviour leads to the failure of SIFIs or the collective failures of insurance undertakings.³⁵

Asset liquidation channel

The main transmission channel of systemic risks driven by certain collective behaviours of insurance companies is the asset liquidation channel that may lead to procyclicality by means of 'fire sales' and 'herding behaviours'.

a) Fire sale

'Fire sale' of assets by insurance companies at a discount price is related to the procyclicality in asset allocation and liquidation in case of negative shock or event, which in turn could negatively affect the assets' market price.

Paulson and Rosen (2016) note that as insurers are major players in

corporate bond markets in the US, their responses to a shock through changing their activity (selling bonds or raising cash) could have the potential to disrupt the bond market, which then could lead to broader disruptions in financial markets. 'There is evidence that trading by insurers can affect bond liquidity and, in turn, bond liquidity can have a large effect on bond pricing'. Additionally, they emphasise that capital regulation may increase the degree to which insurers transmit shocks from one market to another.

b) Herding behaviour

'Herding behaviour' of insurers could be viewed as another assets liquidation channel. Insurers might be acting collectively, which could be both rational and irrational. Most likely it is due to the common exposures and similar business models of insurance companies, coupled with regulation measures and rules. Herding behaviour is viewed as one of the several factors that can drive possible procyclical investment behaviour of insurance companies (ESRB, 2015).

One example of this could be the exposure through non-unit or index linked investments, which are invested directly in the banking sector though financial assets, including debt securities and deposits. For example, 'insurance companies may sell bank bonds in response to a shock in that market, exacerbating the shock' (ESRB, 2015).

Chiang and Niehaus (2017) mention several reasons for existing of herding behaviour among life insurance companies as an example, such as:

- Common accounting and regulatory rules: similar accounting or risk-based capital rules can push insurers to trade in a similar way, especially in situation of changes of these rules;

³⁵ In case of insurance failure(s), the analysis should also consider the systemic risk drivers and transmission channels explained in the entity-based source of systemic risk.

- General economic knowledge and information about the value of specific types of securities, with insurance companies incline to adjust their portfolios in similar ways based in response to economic factors ('search for yield' could be one example);
- Information cascades: institutions receive information from traders of other institutions and then mimic their trading, which is more pronounced in bonds of smaller companies;
- Similar decisions of fund managers: mimic behaviour of fund managers based on concerns of their poor performance compare to other fund managers.
- Outsource of asset management: in case the asset management is outsourced, the trading activities of

insurers using the same asset manager could be correlated.

Cai *et al.* (2016) concluded that insurance companies have a great tendency to herd in the corporate bond's market and are especially reactive to rating change events than other institutional investors like mutual funds, for example. They highlight that generally institution investors, including insurance companies, tend to herd more in lower-rated, high-yield, illiquid, and smaller-sized corporate bonds, with stronger 'sell herding' behaviour compare to 'buy herding'. 'A significant price-destabilising effect' was documented as a consequence of sell herding behaviour of institutional investors in bonds market (especially high yield and illiquid corporate bonds), which could pose substantial risks to financial stability.



4. A macro-prudential framework for insurance

This sections aims at developing a macroprudential framework for insurance that links the different relevant elements. Overall, the section will address the following issues:

- The need for a framework
- The ultimate objective and the need to make the ultimate objective more concrete by splitting it into two intermediate objectives.
- The operational objectives and instruments.
- Operationalisation of the framework.

4.1. The framework

There are two main reasons why a macroprudential framework should be developed as part of the macroprudential strategy: a) the need to ensure a coherent decision-making process; and b) the need to ensure a proper interaction with other economic policies and, in particular, the microprudential policy.

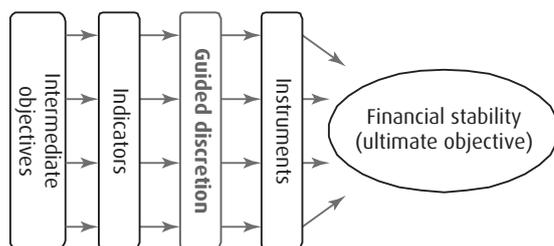
A macroprudential framework should lay down the essential elements of the macroprudential strategy,

allowing for a coherent decision-making process. Like with any other macroeconomic policy, a strategy that links objectives and instruments should be in place. Only if all relevant elements and their interactions are considered, can a macroeconomic policy succeed.

This goes in line with the approach of the BIS, FSB and IMF (2011), who consider that the main elements of a macroprudential policy framework are the objective (limiting systemic or system-wide financial risk), the scope of analysis (the financial system as a whole and its interactions with the real economy), a set of powers and instruments and their governance (prudential tools and those specifically assigned to macroprudential authorities).

The ESRB (2014a) has developed a macroprudential policy strategy that establishes the link between objectives, instruments and indicators. The strategy also includes guided discretion, i.e. sound judgement when it comes to the activation and deactivation of instruments (see Figure 14).

Figure 14: ESRB’s macroprudential strategy

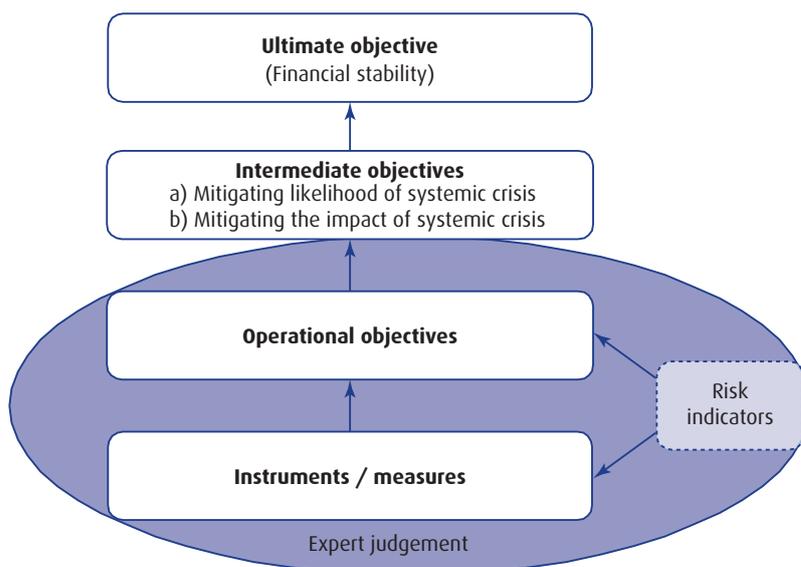


Source: ESRB (2014a).

EIOPA has also defined its macroprudential strategy in past publications.³⁶ The approach developed links between three layers of objectives (ultimate, intermediate and operational) with the existence of a set of instruments. Essential information is provided by risk indicators. The use of indicators should, however, be supplemented with ex-

pert judgement, particularly when it comes to the use and calibration of the instruments and measures. This combination, which is a fundamental element of the framework, can be defined as a sort of 'guided discretion'³⁷ (see Figure 15). The different elements of EIOPA's strategy will be further elaborated below.

Figure 15: EIOPA's macroprudential strategy



There is, however, a relevant issue that should be addressed at this point, which refers to the relation between the macroprudential policies and other policies. Macroprudential policies cannot be considered as a standalone framework to achieve the goal of financial stability. As mentioned in the first section, macroprudential policies interact with other policies (e.g. monetary and fiscal) as well as with microprudential policies which can also have macroprudential consequences. In summary, not every measure contributing to the improvement of the stability of the financial system can

be considered as a primary macroprudential measure, as other policies do contribute to this objective as well.

Schoenmaker and Wiertz (2011) underline the need 'to take into account the impact of using one area's instrument not only on that area's own objective, but also on the objectives of the other areas. Being aware of such cross-effects may lead to a choice and use of instrument that is less damaging to other areas, and thus to better overall results'.³⁸

36 See, in particular EIOPA (2016b). This approach is largely based on the approach proposed by Christophersen and Zschiesche (2015).

37 See IMF (2013) or ESRB (2014a).

38 Furthermore, it could also be added that these cross-effects should also be adequately considered to avoid overshooting as well as unintended consequences in other areas.

The specific relation between the micro and macroprudential policies is of particular relevance. In line with the IMF (2013), it can be asserted that, although conceptually it is possible and even necessary to split the two approaches, this separation is not easy to draw in practice.

In many instances, micro and macroprudential policies will use similar or the same instruments and will supplement each other. This might however not always be the case. Given the potential for conflict between macroprudential and microprudential policies, a certain hierarchy between the policies (which, however, should not lead to automatism in the decision-making process) should be considered when setting up the policies. Furthermore, it is important to consider the combined effects of both policies.

As explained by Osiński *et al.* (2013), tensions between micro and macroprudential policies are more likely to take place in the downturn of the cycle. In a downturn, the microprudential objective of ensuring individual undertakings' safety could conflict with the macroprudential objective of avoiding excessive deleveraging, or allowing vulnerable firms to absorb losses and possibly fail. In order to reduce these tensions, relevant micro and macroprudential authorities should establish fluent dialogues and mechanisms for cooperation and coordination where appropriate.

A clear hierarchy of objectives and transparent decision-making processes should be in place to avoid arbitrary decisions.³⁹ This implies that issues such as how to ensure coordination between the micro and macroprudential authorities should be considered in the framework in advance of the crisis occurring.

As macroprudential measures may unintentionally place an onerous burden on single insurers and their policyholders, microprudential authorities should have some room to limit the negative impact of macroprudential measures in clearly defined circumstances.

As summarised by Bernardino (2017), 'it is almost certain that tension will arise at some point, but a clear framework, well defined objectives, adequate coordination and cooperation, as well as a proper regulatory framework should help overcome these difficulties'.

4.1.1. The ultimate and intermediate objectives

This section considers the rationale of having financial stability as the ultimate objective of macroprudential policies. In other words, it explores the link between financial stability and economic growth. As a related aspect, this section considers the contribution of insurance to financial stability. Lastly, it explains why the ultimate objective of financial stability is split into two intermediate objectives.

The ultimate objective

Existing literature shows a consensus on the fact that the ultimate objective of a macroprudential framework is to ensure financial stability and, by extension, less volatile economic growth (IMF, 2013). Macroprudential policies try to achieve 'the stability of the system as a whole', as a stable financial system contributes to economic growth. In fact, it is a prerequisite for sustainable economic growth (Dudley, 2011). By allocating funds to the most profitable investment opportunities, economic growth is promoted (Duisenberg, 2001).

³⁹ This does, however, not call for decision-making automatisms. Expert judgement should also be considered.

The relationship between financial (in)stability and economic growth was further addressed in section 2. As will be explained, financial stability paves the ground for a more solid economic growth, thereby minimising the negative consequences of the lack thereof in terms of output losses, negative impact on unemployment and, as a result, worsened living conditions.

In other words, by pursuing the ultimate objective of financial stability, negative consequences of financial distress on the real economy can be avoided. To this end, the resilience of the financial system needs to be strengthened and the build-up of vulnerabilities needs to be contained. This helps to ensure a sustainable contribution of the financial sector to economic growth (ESRB, 2014b).

Intermediate objectives

As mentioned before, the ultimate goal of the macroprudential framework is financial stability. This can be described as avoiding or containing the costs caused by system-wide financial distress (Borio, 2011). In similar terms, as explained by Crockett (2000), this macro-prudential objective can be considered in terms of 'limiting the likelihood of the failure, and corresponding costs, of significant portions of the financial system'.

In practice, this can be interpreted as a way to split the ultimate objective in two related intermediate objectives: (1) mitigating the likelihood of systemic risk; and (2) mitigating the negative impact in case such a risk finally materialises.

These intermediate objectives, which have a basis in current risk management practices (risks are typically assessed in terms of likelihood and impact), is followed in EIOPA's framework. Any proposed instrument should therefore contribute to one of the two intermediate objectives, or both. Furthermore, due consideration should also be paid to the benefits and costs of each instrument, with the aim of identifying those whose potential benefits offset the likely costs.

4.1.2. Operational objectives

The intermediate objectives should be further broken down into more concrete and tangible objectives. These are called 'operational objectives' (see also EIOPA, 2016b). The realisation of these objectives by macroprudential authorities should contribute to the intermediate objectives highlighted above.

The operational objectives should be based on the sources of systemic risk and transmission channels associated with insurance. Table 9, defines five operational objectives. Some of the objectives in the table can be approached both from a micro and a macroprudential perspective. This will depend on whether they target the stability of specific institutions (microprudential approach) or of the financial system as a whole (macroprudential approach).⁴⁰

⁴⁰ In fact, from a microprudential perspective, several of the objectives are already covered in the Solvency II framework.

Table 9: Mapping of sources of systemic risk and potential operational objectives

Source of systemic risk	Operational objectives
Deterioration of the solvency position leading to: <ul style="list-style-type: none"> • Failure of a G-SII, D-SII. • Collective failures of non-systemically important institutions as a result of exposures to common shocks. <i>[Liability side (own funds)]</i>	<ul style="list-style-type: none"> ➤ Ensure sufficient loss-absorbency capacity and reserving
Involvement in certain activities or products with greater potential to pose systemic risk <i>[Liability side (technical provisions)]</i>	<ul style="list-style-type: none"> ➤ Discourage excessive involvement in certain products and activities ➤ Discourage excessive levels of direct and indirect exposure concentrations
Potentially dangerous interconnections <i>[Asset and liability sides]</i>	
Collective behaviour by insurers that may exacerbate market price movements (e.g. fire-sales or herding behaviour). <i>[Asset side (investment)]</i>	<ul style="list-style-type: none"> ➤ Limit procyclicality ➤ Ensure sufficient loss-absorbency capacity and reserving
Excessive risk-taking by insurance companies (e.g. ‘search for yield’ and the ‘too-big-too fail’ problem) <i>[Asset side (investment)]</i>	<ul style="list-style-type: none"> ➤ Discourage risky behaviour ➤ Ensure sufficient loss-absorbency capacity and reserving
Excessive concentrations <i>[Asset side (investment)]</i>	<ul style="list-style-type: none"> ➤ Discourage excessive levels of direct and indirect exposure concentrations
Inappropriate exposures on the liabilities side (e.g. as a result of competitive dynamics) <i>[Liability side (technical provisions)]</i>	<ul style="list-style-type: none"> ➤ Ensure sufficient loss-absorbency capacity and reserving

Ensure sufficient loss-absorbency capacity and reserving. Although insurers may fail for many different reasons,⁴¹ own funds and technical provisions become the last backstop. As explained by Plantin and Rochet (2007), insufficient reserving or lack of adequate capital would lead to insurance defaults in adverse scenarios. Under-reserving or under-capitalisation therefore increases the likelihood and impact of a default in a single institution or in several institutions in case of exposure to common shocks that may affect the insurance sector. Ensuring sufficient loss absorbing capacity and reserving is therefore not only a microprudential objective, but also a macroprudential one, particularly when it affects a SIFI or a significant number of undertakings in a given market.

Discourage excessive involvement in certain products and activities. The IAIS points out that the involvement by insurance undertakings in certain products and related activities may have greater potential to pose systemic risks (IAIS, 2016b). Discouraging an excessive involvement should reduce both the likelihood and impact of systemic crisis arising.

Discourage excessive levels of direct and indirect exposure concentration. As explained by the ESRB (2014a), ‘exposure concentrations make a financial system (or part of it) vulnerable to common shocks, either directly through balance sheet exposures or indirectly through asset fire sales and contagion’. Excessive direct and indirect exposures should therefore be considered by authorities.

Limit procyclicality. Procyclicality generally relates to the potential

41 In fact the different sources of systemic risk already point at some of them such as the involvement in certain activities, the existence of dangerous interconnections, etc.

correlation of the investment conduct of insurance undertakings. Issues such as fire-sales and herding behaviours may exacerbate market price movements. Procyclicality in the investment behaviour could increase the tendency of insurers to transmit shocks rather than to absorb them (IMF, 2016). Limiting such effects should therefore be considered as a macroprudential policy goal.

Discourage risky behaviour. Under certain circumstances, insurers may be tempted to take on additional risks above their risk bearing capacity. Discouraging risky behaviour, such as insurers (be it SIFIs or non SIFIs) collectively ‘searching for yield’, is therefore an important macroprudential objective, particularly in the current macroeconomic environment (EIOPA, 2016a). Other possible risky behaviours that should be limited might be associated, for instance, to the potential moral hazard problem, whereby insurers may be tempted to take additional risks under the assumption that they are ‘too big to fail’.

4.1.3. Instruments

Once the operational objectives have been established, the next step of the proposed approach consists in developing a set of properly calibrated macroprudential instruments or build upon existing microprudential instruments with a macroprudential impact, all of which should have a net positive impact and enable supervisory authorities to pursue the achievement of these objectives.

While the insurance sector has substantial differences to the banking sector, this does not preclude some lessons could be drawn from the existing experience with regard to instruments. For instance, Lim *et al.* (2011) have found evidence that, while no-one-size-fits-all, some

policy approaches pose more advantages, such as the use of multiple instruments to tackle the same risk, the application of instruments that target specific risks rather than broader-based ones, or the setting of adjustable instruments over different phases of the economic and financial cycles.

Risk indicators play a key role in this context. As considered by EIOPA (2016a), indicators are useful for two main purposes. ‘First, indicators allow macroprudential authorities to identify the build-up of potential risks and assess their size. Second, they provide relevant information as to the extent that the operative objective is being achieved. In that sense, macroprudential authorities can be alerted on the need to re-calibrate the instruments that are in place, activate additional instruments or deactivate the existing ones’. This indicator/calibration connection fosters transparency and accountability of the policy decision-making process, by linking it with the identification of vulnerabilities and the objectives of macroprudential policy.

In terms of instruments for the insurance sector, it should be noted that although the regulatory regime in force for the European insurance and reinsurance sector – Solvency II – was not designed as a macroprudential framework, some of its elements may have macroprudential features or may act as macroprudential instruments. The second topic of this series of papers is devoted to these elements, which cannot be overlooked or underestimated when considering the development of a macroprudential framework for the insurance sector, and could be seen as a starting point for setting macroprudential instruments. In addition, some tools and measures have also been developed at national level, which could provide useful information as well.

Once these elements have been identified and their contribution to the achievement of the operational objectives adequately accounted for, additional tools may be considered in case not all potential sources of systemic risk have been properly addressed. This will be further developed in the third topic of this series of papers.

4.2. Operationalisation of the framework. Some possible indications for insurance

The elements to make the framework operational need to be identified. After defining the macroprudential framework, this section summarises those elements that are relevant to make it operational, i.e. to make it work effectively in practice. For this purpose, the work of the IMF (2013) and the ESRB (2014a) are used to identify the relevant elements to focus on.

Developing the capacity to assess systemic risk. In order to assess potential systemic risks, authorities need to consider the build-up of risks, including the risks that are built up over time as well as the interconnectedness within the financial sector and the wider economy. Linkages in the insurance sector and between the insurance sector and other parts of the financial sector, most notably the banking sector, need to be addressed and analysed. As part of the assessment, key indicators and indicative thresholds that signal the build-up of vulnerabilities and highlight the potential need for action should be included. They would serve as an early warning, and help authorities to judge whether mitigating action is required. Indicators should never stand alone in an assessment, but always be supported

by other data. Macro stress-testing could potentially also bring information about the build-up of risks.

Selecting and assembling macroprudential instruments. Authorities might need to select and assemble a set of macroprudential instruments in order to address systemic risk in insurance. The selection should take into account the cost efficiency of the deployment of the instruments. Since the manifestations of systemic risk can depend on country-specific characteristics and, furthermore, implementing new tools might take more time than the build-up of risks itself, introducing a range of instruments that can be adjusted on their own is very important. The relevant instruments depend on the risks they address. From that point of view, it seems clear that the nature of the tools to be considered for the insurance sector need to adapt to the business model, the way in which insurance exerts systemic risk and considering the behaviour of insurers.

Calibrating tools and clearly communicating to the public and markets. Authorities need to calibrate the tools available, in a manner that takes account of their likely benefits and costs. It is important that the bases for policy judgments are clearly communicated to the public and markets so that benefits and limitations of a specific macroprudential tool become clear. Clear communication is also important to be able to manage expectations. On the other hand communication is time consuming and should be balanced with the need for flexibility in the deployment of macroprudential tools. As mentioned above, when calibrating tools, a purely static calibration might not be enough. It will be necessary to include some form of expert judgement and 'guided discretion', so that a build-up of systemic risk can be timely addressed.

Monitoring. The authorities need to continuously monitor the implementation of the macroprudential policies to ensure that they properly address the risks they are targeting. As mentioned before, the risk indicators can play a key role in this context.

Closing data and information gaps.

It needs to be assessed whether there is a need to fill data gaps that impede the following:⁴² a) the analysis of macro-financial linkages; b) the effectiveness of some of the indicators; c) the design and calibration of macroprudential tools; and d) the detection of regulatory gaps. Closing information gaps might require improvements in supervisory data.⁴³

Policy evaluation. Ongoing evaluation of both the policy and of the different steps of the operationalisation is necessary both to address new risks and to improve the existing model. The evaluation will be of even higher importance during the first years of implementation where it is to be expected that general issues concerning the implementation and the chosen instruments will arise and will need to be handled accordingly. The evaluation should be based on both

quantitative and qualitative information to allow for maximal use of information. Macroprudential tools and modelling of systemic risk as a scientific field is a comparatively new area, particularly with regards to the insurance sector, and it is to be expected that several changes will emerge as the field matures. The evaluation and assessment of the macro-prudential instruments should happen against their stated objectives. This requires that the stated objective is clear and that it can be assessed. As the assessment will rely heavily on empirical methods an instrument cannot be considered of any real value if it cannot be evaluated.

Governance of the framework.

Summarising the considerations above, it follows that a strong governance framework that deals with all relevant aspects of the decision-making process (e.g. how to deal with conflicting micro and macroprudential policies) is needed. Knot (2014) argues, that the governance setup should particularly be geared towards countering inaction, as action often will be difficult to justify. In general, the cost and the uncertainty connected with the deployment of macroprudential tools will imply a bias towards inaction. Furthermore, the 'long-tailed' events the macroprudential policy seeks to mitigate will also favour inaction. A streamlined activation processes would help to mitigate the risk of inaction. This is particularly relevant in insurance, given that – contrary to banking – its business model is not inherently systemic.

42 The assessment depends on the specific risks being monitored.

43 It should be acknowledged that the implementation of Solvency II reporting requirements has improved the quantity and quality of data and as a consequence the ability to monitor systemic risk compared to previous data collections. However, a need may still arise either for new types of data or for an improvement in existing data i.e. the granularity and frequency of data.

References



- Abiad, A., Balakrishnan, R., Brooks, P.K., Leigh, D. and Tytell, I. (2009): 'What's the Damage? Medium-term Output Dynamics After Banking Crises', *IMF Working Paper WP/09/245*, November 2009.
- Acharya, V.V. (2011): 'Systemic Risk and Macro-Prudential Regulation', New York University Stern School of Business, Draft March 2011.
- Acharya, V., Drechsler, I. and Schnabl, P. (2014): 'A Pyrrhic Victory? — Bank Bailouts and Sovereign Credit Risk', in *Journal of Finance*, 2014, vol. 69, issue 6, 2689-2739.
- Adrian, T., Acharya, V. V., Pedersen, L. H., Philippon, T., and Richardson, M. P. (2010): 'Measuring systemic risk', *FRB of Cleveland Working Paper*, (10-02).
- Adrian, T. and Brunnermeier, M. K. (2016): 'Co Va R'. *American Economic Review* 106(7): 1705-1741.
- Akinci, O. and Olmstead-Rumsey, J. (2015): 'How effective are macroprudential policies? An empirical investigation', Board of Governors of the Federal Reserve System *International Finance Discussion Papers* 1136, June 2015.
- Angeloni, I. (2014): 'European macroprudential policy from gestation to infancy', Banque de France, *Financial Stability Review*, April 2014, pp. 71-84.
- Arena, M. (2008): 'Does Insurance Market Activity Promote Economic Growth? A Cross-Country Study for Industrialized and Developing Countries', the *Journal of Risk and Insurance*, Vol. 75, No 4 (Dec., 2008), pp. 921-946.
- Bach, W. and Nguyen, T. (2012): 'On the systemic relevance of the insurance industry: Is macroprudential insurance regulation necessary?' *Journal of Applied Finance & Banking*, vol.2, no.1, 2012, 127-149
- Bank of England (2014): 'Procyclicality and structural trends in investment allocation by insurance companies and pension funds', *Discussion Paper by the Bank of England and the Procyclicality Working Group*, July 2014.
- Baklanova, V., Copeland, A.M. and McCaughrin, R. (2015): 'Reference guide to US repo and securities lending markets'. *Federal Reserve Bank of New York Staff Reports*, Number 740, September 2015.
- BCBS (2012): 'A framework for dealing with domestic systemically important banks', October 2012.
- Becker and Ivashina (2015): 'Reaching for Yield in the Bond Market', *Journal of Finance*, 2015, vol. LXX, No.5, 1863-1901
- Bell, M. and Keller, B. (2009): 'Insurance and stability: the reform of insurance regulation', *Zurich Financial Services Group Working Paper*.
- Behn, M., Gross, M. and Peltonen, T. (2016): 'Assessing the costs and benefits of capital-based macroprudential policy', *ECB Working Paper Series*, No 1935 / July 2016.
- Bellando, J. L. (2001): 'Assessing the financial health of insurance undertakings to protect the insured from the risks to which these firms are exposed: Solvency rules'. OECD.
- Berdin, E. and Sottocornola, M. (2015): 'Insurance Activities and Systemic Risk', *ICIR/SAFE Working Paper n.121*.
- Bernardino, G. (2017): 'The Micro and Macro Approaches: A Happy Marriage?', *SAFE Newsletter Q4 2017*
- Bierth, C., Irresberger, F., and Wei, G. N. (2015): 'Systemic risk of insurers around the globe', *Journal of Banking & Finance*, 55:232 – 245.
- Bijlsmaa, M. and Vermeulen, R. (2015): 'Insurance companies' trading behaviour during the European sovereign debt crisis: Flight home or flight to quality?', *DNB Working Paper*, No. 468 / March 2015.
- Billio, M., Getmansky, M., Lo, A. W., and Pelizzon, L. (2012): 'Econometric measures of connectedness and systemic risk in the finance and insurance sectors', *Journal of Financial Economics*, 104(3):535-559.

- BIS, FSB, IMF (2011): 'Macroprudential policy tools and frameworks. Update to G20 Finance Ministers and Central Bank Governors', 14 February 2011.
- Bisias, D., Flood, M., Lo, A.W. and Valavanis, S. (2012): 'A survey of systemic risk', *analytics*, *Annual Review of Financial Economics*, 4(1):255-296.
- Borio, C. (2003): 'Towards a macroprudential framework for financial supervision and regulation?', BIS Working Papers No 128.
- (2011): 'Implementing a macroprudential framework: Blending boldness and realism', *Capitalism and Society*: Vol. 6: Iss. 1, Article 1.
- Briys, E. de Varenne, F. (2001): *Insurance from underwriting to derivatives*, John Wiley & Sons, LTD
- Cai, F., Han, S., Li, D., and Li, Yi (2016): 'Institutional Herding and Its Price Impact: Evidence from the Corporate Bond Market', *Finance and Economics Discussion Series* 2016-091. Washington: Board of Governors of the Federal Reserve System.
- CEA (2010): 'Insurance: a unique sector. Why insurers differ from banks', June 2010.
- Cerutti, E., Claessens, S., and Laeven, L. (2015): 'The Use and Effectiveness of Macroprudential Policies: New Evidence', *IMF Working Paper WP/15/61*.
- Chen, F, Chen, X, Sun, Z, Yu, T and Zhong, M (2013): 'Systemic risk, financial crisis, and credit risk insurance', *The Financial Review*, Vol. 48, Issue 3, pages 417-42
- Chiang, C. and Niehaus, G. (2017): 'Insurance from underwriting to derivatives', Darla Moore School of Business, University of South Carolina, June, 2017.
- Christophersen, C. and Zschiesche J. (2015): 'Macroprudential objectives and instruments for insurance – An initial discussion', *EIOPA Financial Stability Report*, May 2015.
- Creel, J., Hubert, P. and Labondance, F. (2015): 'Financial stability and economic performance', *Economic Modelling*, Volume 48, August 2015, Pages 25-40.
- Crocket, A. (2000): 'Marrying the micro- and macro-prudential dimensions of financial stability', Remarks before the Eleventh International Conference of Banking Supervisors, held in Basel, 20-21 September 2000.
- Cummins, J. D. and Weiss, M. A. (2014): 'Systemic risk and the US insurance sector', *Journal of Risk and Insurance*, 81(3):489-528.
- Dudley, W.C. (2011): 'Financial stability and economic growth'. Remarks by Mr William C Dudley, President and Chief Executive Officer of the Federal Reserve Bank of New York, at the Bretton Woods Committee International Council Meeting 2011, Washington DC, 23 September 2011.
- Duisenberg (2001): 'The role of financial markets for economic growth'. Speech delivered by Dr Willem F. Duisenberg, President of the European Central Bank, at the Economics Conference 'The Single Financial Market: Two Years into EMU' organised by the Oesterreichische Nationalbank in Vienna on 31 May 2001.
- ECB (2015): 'A framework for analysing and assessing cross-border spillovers from macroprudential policies', in *Financial Stability Review*, May 2015, special features, pp. 124-133.
- EIOPA (2013): 'Opinion on Supervisory Response to a Prolonged Low Interest Rate Environment', EIOPA-BoS-12/110, 28 February 2013.
- (2014a): 'EIOPA Insurance stress test 2014', EIOPA-BoS-14/203, 28 November 2014.
- (2014b): 'Low interest rate environment stock taking exercise 2014', EIOPA-BOS-14-103, 28 November 2014.
- (2015) 'Financial Stability Report' December 2015, EIOPA-FSC-15-088/2015.

- (2016a): ‘A potential macroprudential approach to the low interest rate environment in the Solvency II context’, EIOPA-BoS-15/202, 23 March 2016.
 - (2016b): ‘EC Consultation on the Review of the EU Macroprudential Policy Framework – EIOPA Response’, EIOPA-BoS-16/219-rev, 25 October 2016.
 - (2016c): ‘2016 EIOPA Insurance Stress Test Report’, EIOPA 16/302, 15 December 2016.
 - (2016d): ‘Financial Stability Report’ June 2016, EIOPA-FSC-16-010/2016.
 - (2016e): ‘Financial Stability Report’ December 2016, EIOPA-FSI-16-016.
 - (2017): ‘Investment behaviour report’, EIOPA-BoS-17/230, 16 November 2017.
- Eling, M. and Pankoke, D. (2012): ‘Systemic risk in the insurance sector. What do we know’, University of St. Gallen, *School of Finance Working Paper* 2012/22.
- (2014): Systemic Risk in the Insurance Sector: Review and Directions for Future”, *Working Papers on Finance No. 2014/21*, Institute of Insurance Economics, November 2014.
- Ellul, A., Chotibhak Jotikasthira, Ch., and Christian T. Lundblad, C.T. (2009): “Regulatory pressure and fire sales in the corporate bond market”, *Journal of Financial Economics*, 101 (2011), 596-620
- ESRB (2014a): ‘Flagship report on Macroprudential Policy in the Banking Sector’, March 2013.
- (2014b): ‘Handbook on Operationalising Macro-prudential Policy in the Banking Sector’, March 2014.
 - (2015): ‘Report on systemic risks in the EU insurance sector’ (including Annexes), December 2015.
 - (2016): ‘Macroprudential policy beyond banking: an ESRB strategy paper’, July 2016.
- European Commission (2016): ‘Consultation document – Review of the EU macro-prudential policy framework’.
- Foley-Fisher, N., Narajabad, B. and Verani, S. (2015): ‘Securities lending as Wholesale funding: Evidence from the US life Insurance industry’, *Finance and Economics Discussion Series 2016-050*. Washington: Board of Governors of the Federal Reserve System.
- French, A. Minot, D. and Vital, M. (2015): ‘Insurance and financial stability’, *Bank of England Quarterly Bulletin* 2015 Q3.
- FSB (2010): ‘Reducing the moral hazard posed by systemically important financial institutions. FSB Recommendations and Time Lines’, 20 October 2010.
- (2015): ‘Global Shadow Banking Monitoring Report 2015’, 12 November 2015.
 - (2016): ‘Developing Effective Resolution Strategies and Plans for Systemically Important Insurers’, 6 June 2016.
- Geneva Association (2010): ‘Systemic risk in insurance: an analysis of insurance and financial stability’, *Technical report*, Special Report of The Geneva Association Systemic Risk Working Group, Switzerland.
- (2012): ‘The Social and Economic Value of Insurance’, September 2012.
- Gómez, E., Lizarazo, A., Mendoza, J.C. and Murcia, A. (2017): ‘Evaluating the impact of macroprudential policies on credit growth in Colombia’, *BIS Working Papers* No. 634.
- Goodhart, Ch. and Perotti E. (2014): ‘From tapering to preventive policy’, Banque de France, *Financial Stability Review*, April 2014, pp. 33-38.
- Gray, D. F. and Jobst, A. A. (2011): ‘Modelling systemic financial sector and

- sovereign risk', *Sveriges Riksbank Economic Review*, (2).
- Harrington, S. E. (2009): 'The financial crisis, systemic risk, and the future of insurance regulation', *Journal of Risk and Insurance*, 76(4):785-819.
- Huang, X., Zhou, H., and Zhu, H. (2012): 'Systemic risk contributions', *Journal of Financial Services Research*, 42(1-2):55-83.
- Hufeld, F., Koijen, R.S.J. and Thimann, Ch. (eds) (2017): *The Economics, Regulation, and Systemic Risk of Insurance Markets*, Oxford University Press, UK.
- Hufeld, F. (2016): 'A Regulatory Framework for Systemic Risk in the Insurance Industry', in F.Hufeld, R. S. Koijen and C. Thimann (eds): *The Economics, Regulation, and Systemic Risk of Insurance Markets*, Oxford University Press, UK.
- IAIS (2011): 'Insurance and Financial Stability', November 2011.
- (2012): 'Reinsurance and Financial Stability', 19 July 2012.
 - (2013a): "Global Systemically Important Insurers: Initial Assessment Methodology", 18 July 2013.
 - (2013b): 'Macroprudential Policy and Surveillance in Insurance', 18 July 2013.
 - (2016a): "Global Systemically Important Insurers: Updated Assessment Methodology", 16 June 2016.
 - (2016b): 'Systemic Risk from Insurance Product Features', 16 June 2016.
 - (2017a): 'Global Insurance Market Report (GIMAR) 2016', 31 January 2017.
 - (2017b): 'Activities-Based Approach to Systemic Risk', Public Consultation Document, 8 December 2017.
- IMF (2012): 'The financial impact of longevity risk', *IMF - Global Financial Stability Report 2012*, Chapter 4
- (2013): 'Key aspects of macroprudential policy', 10 June 2013.
 - (2014): 'Global Financial Stability Report Risk - Taking, Liquidity, and Shadow Banking Curbing Excess while Promoting Growth', October 2014.
 - (2016): 'The insurance sector - Trends and systemic risk implications', *IMF - Global Financial Stability Report 2016*, Chapter 3.
- IMF, FSB and BIS (2016): 'Elements of Effective Macroprudential Policies - Lessons from International Experience', 31 August 2016.
- Junker, L. Ramezani, S (2010): 'Variable Annuities in Europe after the Crisis: Blockbuster or Niche Product', *McKinsey Working Paper on Risk*, Number 19.
- Kamin, S. B. and DeMarco, L. P. (2010): 'How did a Domestic Housing Slum Turn into a Global Financial Crisis?', *International Finance Discussion Papers*, No. 994, January 2010.
- Knot, K. (2014): 'Governance of macroprudential policy', Banque de France, *Financial Stability Review*, April 2014.
- Laerkholm-Jensen, T. (2013): 'The cost of financial stability: How increased capital requirements to banks impact firm growth', University of Copenhagen and Denmark Nationalbank, August 2013.
- Lee, C.C. Lee, C.C. and Chiu, Y.B. (2013): 'The link between life insurance activities and economic growth: Some new evidence', *Journal of International Money and Finance*, Volume 32, February 2013, Pages 405-427.
- Lim, C., Columba, F., Costa, A., Kongsamut, P., Otani, A., Saiyid, M., Wezel, T. and Wu, X. (2011): 'Macroprudential Policy: What Instruments and How to Use Them?', *IMF Working Paper WP/11/238*.
- Manu, L.P., Adjasi, C.K.D, Abor, J. and Harvey, S.K. (2011): 'Financial stability and economic growth: a cross-country study', *Int. J. of Financial Services Management*, 2011 Vol.5, No.2, pp.121 – 138

- Noyer, Ch. (2014): 'Macroprudential policy: from theory to implementation', Banque de France, *Financial Stability Review*, April 2014, pp. 7-11.
- Ollivaud, P. and Turner, D. (2015): 'The effect of the global financial crisis on OECD potential output', *OECD Journal: Economic Studies*, Volume 2014.
- Osiński, J.; Seal, K.; and Hoogduin, L. (2013): 'Macroprudential and Microprudential Policies: Toward Co-habitation', *IMF Staff Discussion Note*, SDN/13/05, June 2013.
- Paulson, A. and Rosen, R.J. (2016): 'The Life Insurance Industry and Systemic Risk: A Bond Market Perspective', *Federal Reserve Bank of Chicago Working Paper*, No. 2016-04, 2016.
- Plantin, G. and Rochet (2007): *When Insurers Go Bust – An Economic Analysis of the Role and Design of Prudential Regulation*. Princeton University Press, London
- Reich, A. H. (1997): 'Der gegenwärtige Preiskrieg im US-amerikanischen Lebensversicherungsmarkt', in *Der Aktuar* 3 (1997) 2, pages 54-59.
- Saporta, V. (2016): 'Macroprudential Policy for Insurers', Speech at the *Association of British Insurers Annual Conference 2016*, 22 November 2016.
- Schiller, J., Jaspersen, J., Weber, F. (2009): 'Der Fall Mannheimer Lebensversicherung', in *Wirtschaftswissenschaftliches Studium*, No 12/2009, p. 657ff.
- Schoenmaker, D. and Wierds, P. (2011): 'Macroprudential Policy: The Need for a Coherent Policy Framework', *DSF Policy Paper*, No 13.
- Sharma, P. (2014): 'GSIs and the Framework for Macroprudential Supervision: Strengthening GSIs and Reducing the Systemic Risks They Pose', in J. Monkiewicz and M. Malecki (eds.): *Macroprudential supervision in insurance. Theoretical and Practical aspects*, Palgrave and Macmillan, London.
- Skipper, H. D. (1997): 'Foreign Insurers in Emerging Markets: Issues and Concerns', Center for Risk Management and Insurance', *Occasional Paper 97-2*.
- Sjostrom, W. K. (2009): 'The AIG bailout', *Washington and Lee Law Review*, Vol., 66, p. 943, 2009.
- Weiss, G. N. and Muehlnickel, J. (2014): 'Why do some insurers become systemically relevant?' *Journal of Financial Stability*, 13:95-117.
- Wehrhahn, R. (2014): 'How to align microprudential and macroprudential supervision in insurance', in J. Monkiewicz and M. Malecki (eds.): *Macroprudential supervision in insurance. Theoretical and Practical aspects*, Palgrave and Macmillan, London.
- Wehrhahn, R. and Jassaud, N. (2014): 'Macroprudential Policies: What toolkit for the Insurance sector?', in J. Monkiewicz and M. Malecki (eds.): *Macroprudential supervision in insurance. Theoretical and Practical aspects*, Palgrave and Macmillan, London.



Annex 1 — Triggering events, risk profile, systemic risk drivers and transmission channels

Triggering events (Examples)	Risk profile of the company	Potential systemic risk drivers	Main transmission channels
<ul style="list-style-type: none"> • Macroeconomic factors <ul style="list-style-type: none"> - Unemployment - Inflation - Bubbles (e.g. housing) - Others • Financial factors <ul style="list-style-type: none"> - Yield movements - Market prices (equity, fixed income, etc.) - State of the banking system - Financial innovation - Others • Non-financial factors <ul style="list-style-type: none"> - Demographic (mortality/longevity) changes - Natural catastrophes - Legislative changes - Political changes - Technological changes - Consumer/policyholder behaviour (e.g. mass lapses, etc.) - Cyber attack - Others 	<ul style="list-style-type: none"> • Market risks <ul style="list-style-type: none"> - Interest rate - Equity - Property - Etc. • Health risks <ul style="list-style-type: none"> - Mortality - Longevity - Lapse - Etc. • Default risks • Life risks <ul style="list-style-type: none"> - Technical provision - Mortality - Longevity - Lapse - CAT - Etc. • Non-life risks <ul style="list-style-type: none"> - Premium reserve - Lapse - CAT • Operational risk (incl. fraud) • Model risk 	<p style="text-align: center;">Entity-based related sources - Direct sources</p> <ul style="list-style-type: none"> > Deterioration of the solvency position leading to: <ul style="list-style-type: none"> a) Failure of a G-SII, D-SII b) Collective failures of non-systemically important institutions as a result of exposures to common shocks • Size • Global activities • Interconnectedness <ul style="list-style-type: none"> - Counterparty exposure - Macroeconomic exposure • Substitutability (incl. market niches) <p style="text-align: center;">Activity-based related sources - Indirect sources (i)</p> <ul style="list-style-type: none"> > Involvement in certain activities or products with greater potential to pose systemic risk > Potentially dangerous interconnections • Derivative trading (non-hedging) • Financial guarantees (incl. monolines) • Asset lending (e.g. securities lending) and management activities • Direct lending • Lapsable products and products that entail maturity transformation • Guaranteed products • Variable annuities <p style="text-align: center;">Behaviour-based related sources - Indirect sources (ii)</p> <ul style="list-style-type: none"> > Collective behaviour by insurers that may exacerbate market price movements (e.g. fire-sales or herding behaviour) > Excessive risk-taking by insurance companies > Excessive concentrations > Inappropriate provisioning (e.g. under-pricing as a result of competitive dynamics) • Concentrations in certain asset classes and common exposures on the asset side • Excessive risk taking <ul style="list-style-type: none"> - 'Search for yield' - Too-big-to-fail/moral hazard problems • Heightened competition potentially leading to insufficient technical provisions or premiums 	<ul style="list-style-type: none"> • Exposure channel • Lack of supply of certain products • Expectations and information asymmetries • Asset liquidation <ul style="list-style-type: none"> • Exposure channel • Asset liquidation channel • Bank-like activities channel (maturity transformation and leverage) <ul style="list-style-type: none"> • Exposure channel • Asset liquidation channel



eiopa
EUROPEAN INSURANCE
AND OCCUPATIONAL PENSIONS AUTHORITY