Comparative Assessment of Insurance and Banking Regulation: Solvency II Versus Basel III

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Abstract. *The paper provides a cross-sectorial quantitative assessment of the insurance and banking regulatory frameworks: Solvency II and Basel III based on the seven criteria: characteristics of the banking and insurance industries, importance of systemic risk, types of risks taken into account, formula complexity of capital requirements calculation, time perspective and solvency assessment typology, quality and quantity of the regulatory capital and level approach of capital requirements. The results of the quantitative assessment reveal several similarities between the two frameworks such as: the three pillars structure, the complex methodology applied to determine the capital requirements, the various alternatives for capital requirements calculation as standard approach or own internal model and capital classification into tiers. The evaluation shown significant differences: business models in banking and insurance industries differ substantially, systemic risk is more pronounced in banking sector, banks and insurers are exposed to different categories of risks and Basel III is heavily focused on liquidity risk. Even if the two frameworks used a complex methodology to calculate the capital requirements, the Solvency II formula can be considered more complex due to the holistic approach and the diversification effects reflected at all three levels. Considerable differences between the two regulatory regimes appear in terms of own internal models. Solvency II internal models are purely principle-based models without any restrictions, compared to the Basel III internal models which have heavy restrictions. Also, the items eligibility of the different capital tiers and the proportion of the capital tiers have indicated lower capital quality standards for insurance companies compared to banks, both in the advantage for insurance companies. These differences can be mainly attributed to the different particularities of the two industries and to the different supervisory purposes: Basel III is focused on the financial sector stability, while Solvency II is focused first on the policyholders' protection and then on the financial sector stability.*

Keywords: *Solvency II; Basel III; regulatory frameworks; insurance; banking.*

Introduction

Since the financial crisis in 2007/2008, the regulatory landscape of the European financial sector has undergone a significant number of reforms to strengthen the quality of capital for banks and insurers with the goal to ensure the resilience of the financial system through consistent capital standards. The Basel Committee on Banking Supervision (BCBS) has introduced an in-depth reform of banking regulation regime Basel II, known as Basel III. Basel III represents an extension of Basel II framework, developed after the financial crisis in 2007/ 2008 and most elements of Basel II have remained in force after the Basel III introduction. Basel III framework has imposed stronger capital and liquidity requirements for banking industry. On the other hand, the European Insurance and Occupational Pensions Authority (EIOPA) has initiated a review of Solvency I framework and developed a new risk-oriented regulatory regime for insurance supervision of the European insurance sector which came into force in January 2016, known as Solvency II. Solvency II represents a comprehensive principles-based solvency regulatory regime, establishing common risk-based capital and market consistent standards for all the European (re)insurance companies.

The paper provides a cross-sectorial quantitative assessment of the Solvency II and Basel III regulatory regimes with the goal to identify the similarities and differences between the two frameworks applied in banking and insurance sectors. Although Solvency II was designed based on the same three-pillar structure as Basel III, the two frameworks for banking and insurance sector financial supervision differ significantly, because the business activities are different, types of risks are different and therefore regulatory measures are also different. The results of the research are relevant for practitioners, regulators and other interested parties to better understand the similarities and differences between the two regulatory regimes.

The article has the following structure: a brief overview of the literature review is provided in the second section of the paper, the research methodology is presented in the third section of the article, the fourth section contains the results of the theoretical assessment of the Solvency II and Basel III regulatory frameworks and the fifth section outlined the main conclusions with respect to similarities and differences of the two regimes. There is also a list of references in the sixth section.

Literature review

In the academic literature, the subject of the insurance and banking regulation has been analyzed by many researchers. The extensive literature related to Solvency II and Basel III regulatory frameworks can be summarized in three strands of literature.

The first strand of literature provided a comprehensively assessment among Solvency II insurance solvency regime. Doff (2008), Cummins and Phillips (2009), Eling and Holzmuller (2008), Holzmuller (2009), Siegel (2012), Fung et al. (2018) have provided an overview and comparison of the regulatory insurance frameworks from European Union (Solvency II), United States of America (Risk-Based Capital - RBC), Switzerland (Swiss Solvency Test – SST), New Zealand and China (China Risk Oriented Solvency System C-ROSS). They concluded that Solvency II is currently one of the most complex insurance regulatory framework in the world.

The second strand of literature provided a comprehensively scientific literature of the Basel III framework and its potential impact. Authors such as Beatty and Liao (2011), Bridges et al. (2014) have investigated the impact of bank capital ratios on bank-lending-growth. Their papers shown different results (significant / not significant impact of the capital ratios in the determination of bank lending) due to the heterogeneity of samples taken into consideration or due to the different methods used in the estimation. Roulet (2017) has extended the literature of this topic and has analyzed both the impact of the new Basel III capital and liquidity regulation on bank lending following the 2007/2008 financial crisis. His paper reveal significant negative effects on large European bank retail and other lending-growth of the capital ratios and liquidity indicators have indicated positive impacts on the bank lending growth.

The third strand of literature provided a cross-sectoral comparison between Solvency II and Basel III. Al-Darwish et al. (2011) and Gatzert and Wesker (2012) provided a qualitative assessment among two regulatory frameworks. Their papers shown significant differences between the two regulatory regimes, especially with respect to the quantitative requirements. Laas and Siegel (2016) extended the literature on this topic and provided both a theoretically and numerical comparison for market and credit risks in conformity with Solvency II and Basel III standard approaches. Their analysis reveal very different capital requirements for the same types of risks.

Methodology

This article provides a qualitative evaluation of the two regulatory regimes: Solvency II and Basel III based on the following seven criteria:

Criterion 1: Characteristics of the banking and insurance markets. This criterion is focused on the analysis and comparison of the insurers and banking business models.

Criterion 2: Importance of systemic risk. The systemic risk assessment of the two financial institutions was carried out on the following criteria set by the Financial Stability Board and the International Association of Insurance Supervisors: size of the company, interconnections with the rest of the financial system and speed of contagion to the economy.

Criterion 3: Types of risks taken into account. This criterion is focused on the risk types taken into account in the capital requirements determination.

Criterion 4: Complexity of formula in order to ensure capital adequacy. This criterion examines the key aspects of the capital requirements determination in conformity with the standard approaches of two frameworks, focusing on: complexity of the capital requirements calculation methodology, risk aggregation and dependencies and risk measure and calibration. The risk dependencies have been examined according to three levels of diversification defined by Comite Europeen des

Assurances (CEA): Level 1 - diversification within a specific risk class or line of business, Level 2 - diversification across risk classes within a specific legal entity and Level 3 - diversification across all risk classes and legal entities.

Criterion 5: Time perspective and solvency assessment typology. This criterion analyses the two regimes based on the two aspects. The first aspect is focused on retrospective/prospective method and calculation frequency for capital requirements and the second aspect is focused on the solvency assessment typology: standard approach provided by the regulator or development of own internal model;

Criterion 6: Quality and quantity of regulatory capital. This criterion is focused on the classification of capital into tiers;

Criterion 7: Level approach of capital requirements.

Results and discussions

In this section are discussed the similarities and differences between the two regulatory frameworks based on the seven criteria presented in the methodology section.

Criterion 1: Characteristics of the banking and insurance markets

Insurance companies and banks have a critical role in the efficient functioning of the financial sector. Insurance companies have a significant contribution to the economic growth by providing consumers and businesses with protection against unforeseeable events. On the other hand, banks are part of the payment and settlement system and through their role as credit providers they are the main transmission channel of central banks' monetary policy. Thus, insurance capital requirements are based on the economic capital necessary to achieve a certain default probability to ensure payments to policyholders, while the Basel III capital requirements are based providing sufficient capital to absorb losses within each risk categories. The risk profiles of the two industries differ substantially: banking sector is exposed especially to financial risks, while insurance sector is exposed to both financial and non-financial risks. Also, there are important differences between the business models of the two industries: insurance business model is based on the risk pooling and risk transformation, while the banking business model is based on the collection of deposits and the issuing of loans, together with the provision of a variety of fee-based services.

Criterion 2: Importance of systemic risk

In the insurance and banking industries, the interconnections with the rest of the financial system is different due to their particularity of the business models which are different, therefore the potential exposure of the two financial undertakings to systemic risk is different. The bank's business model is based on the various interconnections with the rest of the financial system. Banks are engaged in maturity transformation by acting as intermediaries between savers who deposit money into liquid accounts and borrowers who need loans with long maturities. For their financing needs, banks are dependent on interbank lending and may make significant use of leverage. Banking system is built by complex interconnections, along with the central bank that acting as a lender of last resort and to which each bank is linked. Consequently, the bigger a bank gets, the more systemically risky it is and its failure can led to a domino effect that could dangerously affect the functioning of the financial system.

Insurers have different business model compared with the banks and the interconnections with the rest of the financial system are limited and as result, the failure of an insurance company cannot lead to a domino effect and therefore, the speed of contagion is very low. Insurance business model is based on pooling risk, not on exchanging or transferring risk. The key condition for an insurance business model to function correctly is that the risks insured must be uncorrelated. In the systemically risky assessment of an insurance company, the size of the undertaking cannot be considered an accurate criterion of their systemic risk potential exposure. In the insurance sector, the bigger the companies get, more financially stable it becomes and less exposed to a single event, that should be payed all at once. Furthermore, insurance activity is focused also on diversification, as a result is not systemically risky. Usually, the traditional insurance is not systemically risky. Systemic risk in insurance industry can arise from a very limited of activities types managed on a large scale in the inaccurate circumstances, that can affect the wider financial system in the situation of a failure. Even if AIG is known as an insurer, the AIG "too big to fail" is not eloquent example of the systemic risk potential of the insurance sector, because it was caused by non-insurance

activities (collateralized debt obligations underwriting) of AIG subsidiary without sufficient capital backing, risk control and specific regulatory measures. Furthermore, this non-insurance subsidiary was outside of the insurance regulation.

Criterion 3: Types of risks taken into account

Due to differences in their business activities, banks and insurers are exposed to different risk categories. The Pillar 1 requirements of the Based III are focused on four types of risks: market, credit, operational and liquidity risk. In contrast, the Pillar 1 quantitative requirements of Solvency II cover a comprehensive assessment of all quantitatively measurable risk classes to which an insurer is exposed: market, credit, underwriting (for life, non-life and health), operational and intangible asset risks. However, both financial sectors invest in part into the same asset classes and as result are exposed to market and credit risks. A remarkable difference in the risk classes taken into account under Solvency II and Basel III is represented by liquidity risk. Basel III is heavily focused on liquidity risk . Due to the liquidity difficulties encountered by banking industry during the financial crisis of 2007/2008, Basel III has introduced stricter liquidity measures such as liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR). Liquidity risk is high in banking sector because the business model of banks is based on maturity transformation of long-term loans financed with short term deposits, while the business model of insurers does not include maturity transformation. Solvency II promotes long-term investments.

Criterion 4: Complexity of formula in order to ensure capital adequacy

Both Solvency II and Basel III apply complex risk-based approaches to determine the capital requirements which are needed to ensure the entity's business.

The Solvency II Standard Formula applied a modular structure to determine the solvency capital requirements (SCR). The overall risk exposure of the insurance company is split up into five risk modules (market, credit, underwriting, operational and intangible asset risks), which are divided into sub risks and sub-sub risks. For each risk/sub risk module, SCRs are being calculated. Afterwards, these SCRs are aggregated into an overall SCR using a correlation matrix to consider the diversification discount effect. The application of correlations can reduce substantially the solvency capital requirements, compared to a linear formula.

Under Solvency II Standard Formula adjustments of the diversification effects and risk interdependencies are applied at all three levels: within the class of risk and line of business, across lines of business and classes of risk and at a group level. Figure 1 presents an overview of the Solvency II formula.

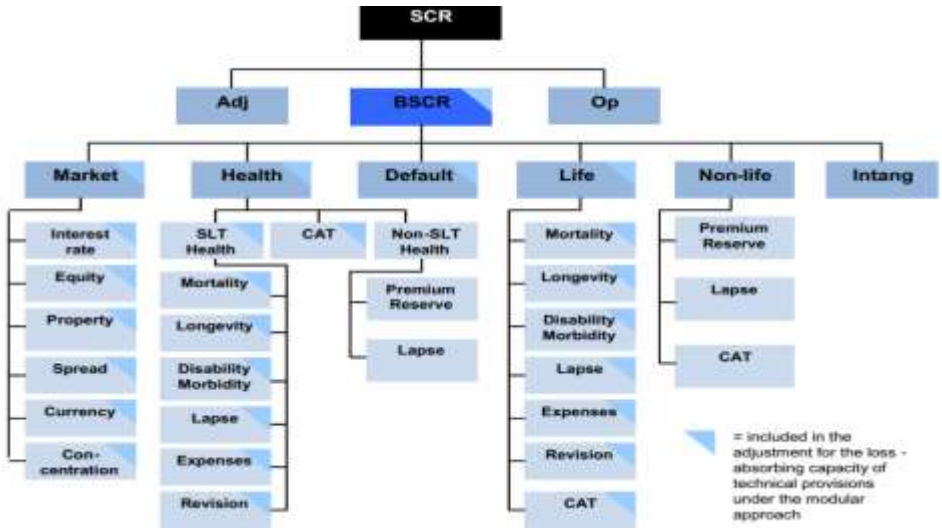

Figure 1. *Solvency II Standard formula*
(European Insurance and Occupational Pensions Authority, 2014, p.6)

Basel III has maintained the Basel II methodology for capital requirements calculation, but was considerably strengthened. The most important changes to the new accord are: more rigorous

requirements for minimum common equity capital ratio, the introduction of a capital conservation and countercyclical buffer, new liquidity measures and additional requirements for systematically-important banks. The aggregate risk level of a bank is expressed in terms of an equivalent amount of risk-weighted assets and the capital requirements are calculated as a percentage of total of risk-weighted assets. The calculations of risk-weighted assets are carried out independently for each types of risk: credit risk, market risk and operational risk.

Afterwards, these capital requirements of each risk are added together, without any adjustment for possible correlations. Basel III considers only Level 1 of the diversification effects within each of the three risk classes. Figure 2 provides an overview of the Basel III framework.

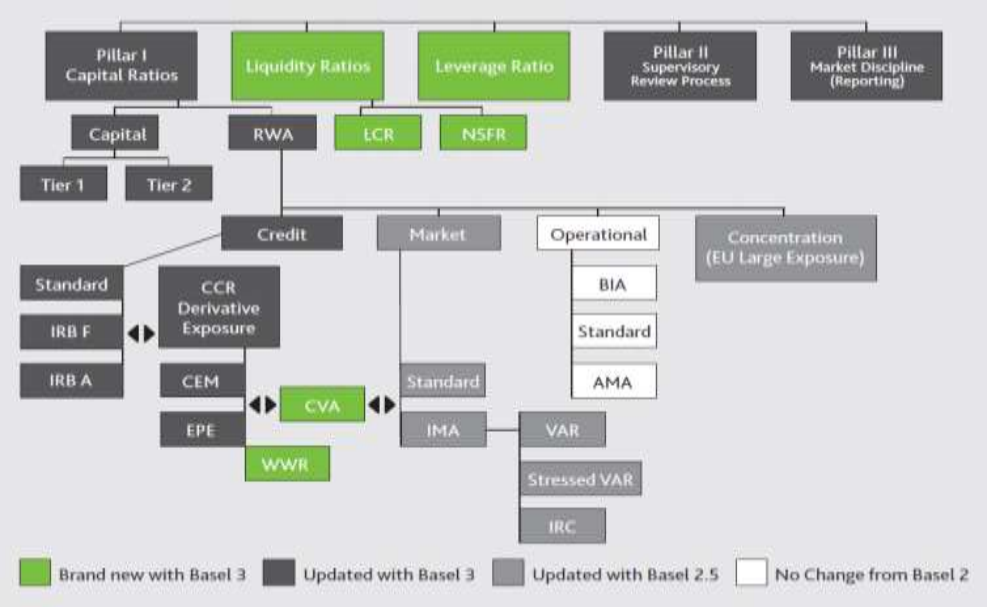

Figure 2. *Basel III Framework*
(Moody's Analytics, 2012, p.5)

In the both regulatory frameworks, risk measures such as Value-at-Risk and Expected Shortfall are applied to calculate the capital requirements. Solvency II applies a holistic approach to calculate the solvency capital requirements, based on the Value-at-Risk to a confidence level of 99.5 % over a one-year period. Basel III does not apply a holistic approach, setting different limits for each type of risk: market risk corresponds on the 97.5% Expected Shortfall (moving from 99% Value-at-Risk), the credit risk (IRB) and operational risk (advanced approach) are calibrated to a 99.9% Value-at-Risk.

Criterion 5: Time perspective and solvency assessment typology

The first aspect of the criterion is focused on the time perspective (retrospective or prospective method as well as calculation frequency) of the two frameworks, which differ substantially. Solvency II applies a prospective method, covering both existing business as well as the new business expected to be written over the next 12 months. Under the Solvency II regime, solvency capital requirement (SCR) should be calculated at least once per year in the situation in which there are not significant changes of the insurer risk profile, but solvency must be ensured at all times and the frequency calculations of the minimum capital requirement (MCR) is quarterly. Basel III applies a retrospective method: new business is not taken into consideration and the capital requirements should to be calculated at least twice a year or even daily in the situation in which an internal model for market risk is applied.

The second aspect of the criterion is focused on the solvency assessment typology: standard approach provided by the regulator or development of own internal model. Both regulatory frameworks are principle-based regimes which allow to calculate the capital requirements using the standard approaches or own internal models. Solvency II offers five methods to calculate the SCR: standard formula, full internal model, partial internal model, standard formula with undertaking-specific parameters and standard formula with simplifications. Basel III provides two to three methods depending on the risk type. For market risk are available two options: standard approach and internal model. For operational risk can be

used three approaches: basic indicator approach, standard approach and advanced measurement approach (AMA). For credit risk, it can be applied standard formula or internal ratings-based approach (IRBA).

In both regimes the standard approaches are based on stipulated rules and scenarios. Solvency II standard formula is in general risk-sensitive, combining scenario-based models and factor-based models. In contrast, Basel III standard approach is more a static risk factor-based model.

The principle-based approach of the two framworks gives more flexibility for undetakings to apply their own internal models, which are subject to the supervisory approval. Concerning the applicability of internal models in the two frameworks there are significant differences. Solvency II internal models are purely principle-based models without any restrictions, while in the Basel III regime these models have heavy restrictions and only the input parameters can be adjusted to reflect the bank risk profile. For example, under IRBA model of credit risk, banks may apply internal estimations for some parameters but must use standard approach to calculate the capital requirements.

Criterion 6: Quality and quantity of regulatory capital

Both frameworks are following a similar process to determine the capital need to meet the obligations based on three steps: calculation of the capital requirements, classification of the capital according to its quality into tiers and assessment of the instruments eligibility for each tier. Basel III divides the capital into two tiers (Tiers 3 eligible to cover market risks in Basel II was eliminated): Tier 1 - higher quality and Tier 2. Compared with the banking framework, insurance regime take into consideration two additional tiers. Solvency II splits the capital into basic own-funds and ancillary own-funds. Basic own-funds (BOF) are divided into Tier 1, Tier 2 and Tier 3 and ancillary own-funds (AOF) are divided into Tier 2 and Tier 3. Table 1 presents the most significant differences with respect to the eligible capital instruments of each tier under the two regulatory frameworks.

Table 1. *Capital tiers differences under Solvency II and Basel III*

Tier	Solvency II	Basel III
Tier 1	Similar criteria are used to define the eligible instruments Highest quality (for example common shares) Two comparable sub-categories: not limited (Common Equity Tier 1 – Basel and unrestricted Tier 1 – Solvency) and limited (Additional Tier 1 – Basel and restricted Tier 1 – Solvency)	
Tier 2	Includes called-up but unpaid capital Original maturity of at list 10 years Mandatory suspension of repayment in the situation of SCR non-compliance	Includes items need to be paid-in Original maturity of at list 5 years No mandatory suspension of repayment in the situation of capital ratios non-compliance
Tier 3	Includes for example deferred tax assets	Was eliminated
Ancillary own - founds	Includes items which need regulatory approvals such as: unpaid share capital that has not been called up, letters of credit or guaranties or any other legally binding commitments received by insurer or reinsurers.	Not included

(adopted from Thibeault and Wambeke, 2014, p.49)

To ensure sufficient quality of capital, Solvency II and Basel III have set different weights of the capital tiers. Table 2 shown the different limits set of the capital tiers under the two frameworks.

Table 2. *Capital tiers limits under Solvency II and Basel III*

Solvency II	Basel III
Tier 1 basic own-funds: at least 50% of the Solvency Capital Requirement (SCR) Tier 1 restricted own-funds: less than 20% of all Tier 1	Common Equity Tier 1 (CET1): 4.5% of risk-weighted assets (RWA) + 2.5% RWA for the capital conservation buffer Total Tier 1: 6% RWA + 2.5% RWA for the capital conservation buffer

Solvency II	Basel III
Tier 2 & 3 basic own-funds + Tier 2 & 3 ancillary own-funds: less than 50% of the SCR	Tier 1 + Tier 2: 8% RWA+ 2.5% RWA for the capital conservation buffer
Tier 3 basic own-funds + Tier 3 ancillary own- funds: less than 15% of the SCR	Was eliminated
Not included	Countercyclical buffer: up to 2.5% in CET1
Not included	Capital surcharge for SIFIs: 1% to 2.5% in CET1 + an additional surcharge of 1% for certain banks

(adopted from Thibeault and Wambeke, 2014, p.50)

Tables 1 and 2 shown that the capital tiers under the two frameworks are not consistent with one another in terms of items eligibility or share of the capital tiers. Basel III is focused more on the higher quality tiers of capital, while Solvency II puts less importance on the quality of capital. For example, Solvency II account the paid-in subordinated liabilities as Tier 1 items, deferred tax assets are considered eligible instruments as basic own-funds under Solvency II, compared with Basel III where are deducted from Common Equity Tier 1). Furthermore, ancillary own funds represent one of the major innovations under Solvency II, as unfunded capital instruments (there are not included in insurer balance sheet) which are eligible to cover the capital requirements, while under Basel III all capital items are included in the balance sheet. The items eligibility of the different capital tiers and the proportion of the capital tiers indicate lower capital quality standards for insurance companies compared to banks, both in the advantage for insurance companies. In conformity with the Basel III framework, approximatively 81%-87% of the capital requirements must be covered by Tier 1. In contrast, Solvency II requires substantially less share of Tier 1: only 50% of the solvency capital requirements must be covered by Tier 1.

Criterion 7: Level approach of capital requirements

In the determination of the capital requirements, Solvency II adopts a two-level approach: solvency capital requirement which represent the target capital (SCR) and minium capital requirement (MCR) that represents the regulatory intervention threshold. The SCR is calculated using a risk based formula that cover all risk types of which an insurance company is exposed, to absorb unexpected losses and ensure a one year default probability. The MCR is calculated independently of the SCR using a linear formula based on the factors applied to the volume of the best estimate of technical provisions and written premiums.

After the additional capital buffer introduced by Basel III, the banking regulatory framework can be considered as heading towards a three level approach: minimum common equity (Tier 1 and Tier 2 capital ratios), capital conservation buffer and countercyclical buffer. Banks were obliged to keep 8% of risk weighted assets as a minimum common equity. Capital conservation buffer was introduced to offer to the banks an additional safety net and in the situation in which a bank falls into this buffer range, the regulator can intervene. The countercyclical buffer represents a common equity tranche imposed by regulator during periods of excessive credit growth and build-up of systematic risk.

Conclusions

The results of the quantitative assessment of the Solvency II and Basel III reveal several similarities such as: both frameworks are based on a three pillars structure, both financial sectors invest in part into the same asset classes and as result are exposed to market and credit risks, both regimes apply a complex methodology to determine the capital requirements based on the probabilistic risk measures and include various alternatives for capital requirements calculation as standard approach or own internal model. Furthermore, the two regimes allow the capital classification into tiers. The detailed evaluation of the two regulatory frameworks shown significant differences. The risk profiles of banking and insurance industries differ substantially. Systemic risk is more pronounced in banking sector, especially due to the high interconnections with the rest of the financial system, banks and insurers are exposed to different categories of risks. Basell III Pillar 1 quantitative requirements are focused on four types of risks: market, credit, operational and liquidity risks. Solvency II Pillar 1 quantitative requirements cover five risk classes: market, credit, underwriting, operational and intangible asset risks.

A remarkable difference in the risk types taken into account is represented by heavily focusing of Basel III on liquidity risk. Even if the two framworks used a complex methodology to calculate the capital requirements, the Solvency II formula can be considered more complex due to the holistic approach and diversification effects reflected at all three levels applied in the solvency capital requirement. Important differences exist with respect to time perspective: Solvency II applies a prospective method, while Basel II/III applies a retrospective method and furthermore, Basel III involves a more frequent recalculation of capital reguirements. Concerning the solvency assessment typology, in the two frameworks there are significant differences: Solvency II standard formula is in general risk-sensitive, while Basel III standard approach is more a static risk factor-based model and Solvency II internal models are purely principle-based models without any restrictions, compared to the Basel III internal models which have heavy restrictions. The two regulatory frameworks are not consistent with one another in terms of the capital tiers. The items eligibility of the different capital tiers and the proportion of the capital tiers indicate lower capital quality standards for insurance companies compared to banks, both in the advantage for insurance companies. Also, discrepancies are concerning the level approach of capital requirements: Solvency II adopts a two-level approach: SCR and MCR and Basel III implies a three level approach: minimum common equity, capital conservation buffer and countercyclical buffer.

Consequently, the financial supervision is different in insurance and banking industries, Business models are different, risks are different and therefore regulatory frameworks are also different. These differences can be mainly attributed to the different particularities of the two industries and to the different supervisory purposes: Basel III is focused on the financial sector stability, while Solvency II is focused first on the policyholders' protection and then on the financial sector stability.

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