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## **PROBLEMI OBRAČUNA RIZIKO-MARGINE U REGULATORNOM OKVIRU SOLVENTNOST II**

ORIGINALNI NAUČNI RAD

### **Apstrakt**

Predmet rada su problemi obračuna riziko-margine kao elementa tehničkih rezervi osiguravača u regulatornom okviru Solventnost II. Usled nedostataka propisane metode troškova kapitala, u kombinaciji s niskim kamatnim stopama, riziko-margina je isuviše visoka i varijabilna, čime su pogođena prvenstveno društva koja se bave životnim osiguranjima. U radu se daju konkretne preporuke za prevazilaženje ili ublažavanje problema previsoke i kamatno osetljive riziko-margine. Preporučena rešenja uključuju kako modifikacije postojeće metode troškova kapitala tako i napuštanje ove metode i njenu zamenu drugim metodama za obračun riziko-margine.

**Ključne reči:** *riziko-margina, Solventnost II, stopa troškova kapitala, tehničke rezerve*

### **I. Uvod**

Uspostavljanje stabilnog i jedinstvenog tržišta osiguranja u cilju zaštite interesa korisnika usluge osiguranja, na bazi zakonodavstva kojim se reguliše delatnost osiguranja, predstavlja važan zadatak regulatornih organa u zemljama članicama Evropske unije (EU). Jedinstven regulatorni okvir utvrđivanja solventnosti osiguravajućih kompanija u tim zemljama formalno je uspostavljen 70-ih godina XX veka. S ciljem uvažavanja inflatornog dejstva, 2002. godine izvršene su minorne izmene dotadašnjeg režima, stupanjem na snagu režima Solventnost I. U međuvremenu,

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došlo je do pojave novih i jačanja dejstva postojećih rizika koji ugrožavaju osiguravače, ali je ostvaren i znatan napredak u domenu znanja i instrumenata neophodnih za merenje rizika i upravljanje njima. Savremeno poslovno okruženje odlikuje se složenijim uslugama osiguranja i investicionim strategijama osiguravača, intenzivnom konsolidacijom i širenjem poslovanja na nova tržišta i delatnosti, kao svojevrstnim izazovima za organe nadzora. U bitno izmenjenim okolnostima poslovanja na početku XXI veka, došli su do izražaja strukturni nedostaci koncepta Solventnost I i uočena je potreba za pristupom evaluaciji solventnosti osiguravača koji bi bio zasnovan na rizicima.<sup>3</sup> Nakon 15 godina razvoja, počev od 1. januara 2016. godine, uspostavljen je nov regulatorni okvir za osiguravače i reosiguravače u Evropskoj uniji – Solventnost II.

Solventnost II je trenutno jedan od najsloženijih regulatornih okvira delatnosti osiguranja u svetskim razmerama. Neretko se označava kao „zlatni standard“ regulative osiguranja, prema kome se kreću i druge zemlje izvan EU.<sup>4</sup> Ključne novine koje je taj regulatorni okvir doneo jesu eksplicitno uvažavanje većeg broja rizika pri obračunu kapitalnih zahteva osiguravača, visoki standardi u pogledu adekvatnosti kapitala i upravljanja rizicima, prudenciona regulacija umesto kvantitativnih ograničenja investicija, mogućnost primene internih modela osiguravača za kalkulaciju kapitalnih zahteva i zaokret od supervizije zasnovane na pravilima (*rules-based*) ka superviziji zasnovanoj na principima (*principles-based*).<sup>5</sup> Uprkos nesumnjivim prednostima, u prvim godinama primene ispoljili su se i određeni nedostaci novog regulatornog režima.

Predmet ovog rada su problemi obračuna riziko-margine, kao elementa tehničkih rezervi osiguravača u režimu Solventnost II. Pored činjenice da je sam obračun riziko-margine prema metodi troškova kapitala svojevrstan izazov za osiguravače, uočeno je da je, u aktuelnim uslovima niskih kamatnih stopa, riziko-margina isuviše visoka i varijabilna. Cilj rada je da se formulišu konkretni predlozi za rešavanje problema previsoke riziko-margine osetljive na kamatne stope. U radu je, takođe, na hipotetičkom primeru pokazano na koji način obračun riziko-margine može biti pojednostavljen kroz tzv. proporcionalni pristup.

## **II. Riziko-margina kao element tehničkih rezervi u konceptu Solventnost II**

Za razliku od režima Solventnosti I, koji je bio zasnovan na knjigovodstvenim vrednostima bilansnih pozicija i, kao takav, neosetljiv na rizike, novi regulatorni

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<sup>3</sup> Jelena Kočović, Dejan Trifunović, Marija Jovović, „Risk treatment in Solvency II and Basel III concepts“, *Risk management in the financial services sector* (editors Jelena Kočović, Biljana Jovanović Gavrilović, Dejan Trifunović), Belgrade, 2016, str. 5.

<sup>4</sup> Jean-Christophe Graz, *The Power of Standards*, Cambridge University Press, 2019, str. 138.

<sup>5</sup> Jelena Kočović, Marija Koprivica, Blagoje Paunović, „Initial effects of Solvency II implementation in the European Union“, *Ekonomika preduzeća* br. 7–8, 2017, str. 450.

okvir za osiguravače u EU uvodi prospektivno vrednovanje imovine i obaveza na tržišnim principima, primenom tehnike fer vrednosti. Fer vrednost obaveza osiguravača jeste cena koja bi morala biti plaćena trećoj strani, spremnoj da preuzme na sebe odgovornost za izmirenje datih obaveza.<sup>6</sup> Međutim, nepostojanje likvidnog sekundarnog tržišta obaveza po osnovu ugovora o osiguranju usložnjava problem njihovog ekonomskog vrednovanja.<sup>7</sup>

Članom 77 direktive Solventnost II predviđena su dva moguća načina vrednovanja obaveza iz osiguranja. Rezerve za obaveze čiji novčani odlivi mogu biti precizno replicirani (hedžingovani) novčanim prilivima od odgovarajućih finansijskih instrumenata (kao u slučaju unit-linked proizvoda), vrednuju se na osnovu tržišne vrednosti tih instrumenata. Fer vrednost obaveza koje ne mogu biti replicirane investicionim portfeljom jednaka je zbiru najbolje procene i riziko-margine. Uporište takvog pristupa jeste ideja da obaveze iz osiguranja svojom vrednošću treba da odraze kako očekivanu vrednost budućih isplata osiguranicima tako i neizvesnost koja je s njom povezana.<sup>8</sup> Otuda proizlaze dva ključna elementa tehničkih rezervi u režimu Solventnost II.

Najbolja procena odgovara ponderisanom proseku sadašnje vrednosti budućih novčanih tokova potrebnih za izmirenje obaveza iz osiguranja, gde se kao ponderi koriste verovatnoće realizacije tih novčanih tokova. Pri diskontovanju se koristi odgovarajuća kriva bezrizičnih kamatnih stopa, shodno ročnosti svakog projektovanog godišnjeg neto novčanog toka. Najbolja procena iskazuje se na bruto osnovi, a odgovarajuća potraživanja iz reosiguranja treba da budu prikazana odvojeno, na strani aktive bilansa stanja osiguravača, i prilagođena za očekivane gubitke na ime rizika od nemogućnosti njihove naplate.

Poštovanjem koncepta vremenske vrednosti novca eliminiše se implicitna margina solventnosti, koja je prethodno bila sadržana u tehničkim rezervama iskazanim po nominalnoj vrednosti. Istovremeno, fer vrednovanjem povećava se volatilnost tehničkih rezervi. Stoga se, preko nivoa najbolje procene, formira riziko-margina, kao dodatna mera obezbeđenja izvršavanja obaveza osiguravača.

Riziko-margina odgovara iznosu u kome treba povećati tehničke rezerve do onog teorijskog nivoa (tj. fer vrednosti) koji bi drugi, hipotetički („referentni“) osiguravač zahtevao kao kompenzaciju za trenutno preuzimanje na sebe obaveza

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<sup>6</sup> International Actuarial Association, *Measurement of Liabilities for Insurance Contracts: Current Estimates and Risk Margins*, Ottawa, 2009, str. 8.

<sup>7</sup> Jelena Kočović, Marija Koprivica, Blagoje Paunović, „New challenges for insurance companies – Solvency II and IFRS 17“, *Insurance in the post-crisis era* (editors Jelena Kočović, Biljana Jovanović Gavrilović, Branislav Boričić, Mirjana Radović Marković), Belgrade, 2018, str. 7.

<sup>8</sup> Danica Jović, Jelena Kočović, Marija Koprivica, „Valuation of insurance liabilities under Solvency II and IFRS 17“, *Quantitative Models in Economics* (editors Jelena Kočović, Jasmina Selimović, Branislav Boričić, Vladimir Kaščelan, Vesna Rajić), Belgrade, 2018, str. 225.

po osnovu portfelja datog osiguravača.<sup>9</sup> Za referentnog osiguravača, riziko-margina predstavlja „nagradu“ za izlaganje riziku od nepovoljnijih stvarnih novčanih tokova u odnosu na očekivane novčane tokove na osnovu kojih je određena najbolja procena tehničkih rezervi.<sup>10</sup>

U režimu Solventnost II, za izračunavanje riziko-margine koristi se metoda troškova kapitala. Prema toj metodi, riziko-margina se posmatra kao sadašnja vrednost troškova držanja kapitala u iznosu jednakom solventnosnom kapitalnom zahtevu (*Solvency Capital Requirement – SCR*) za referentnog osiguravača u toku celokupnog perioda do izmirenja odnosnih obaveza iz osiguranja. Pri tome se kapitalni zahtevi određuju u odnosu na rizike osiguranja (među kojima kod životnih osiguranja dominira rizik od dugovečnosti), tržišne rizike koji ne podležu hedžingu, kreditne rizike i operativni rizik. Dakle, iz obračuna su isključeni tržišni rizici čije je efekte moguće hedžinovati.

Prilikom obračuna riziko-margine, najpre je potrebno projektovati iznose solventnosnog kapitalnog zahteva po svim budućim godinama trajanja portfelja. Na svaki od njih primenjuje se jedinstvena godišnja stopa troškova kapitala od 6%. Tako izračunati troškovi držanja kapitala diskontuju se po relevantnoj bezrizičnoj kamatnoj stopi, s obzirom na svoju ročnost. Suma diskontovanih vrednosti po svim obuhvaćenim godinama predstavlja riziko-marginu osiguravajuće kompanije (*RM*):<sup>11</sup>

$$RM = \sum_{t \geq 0} CoC \cdot \frac{SCR_t}{(1 + p_{t+1})^{t+1}} \quad (1)$$

gde je *CoC* stopa troškova kapitala,  $SCR_t$  je projektovani solventnosni kapitalni zahtev na kraju godine  $t$  i  $p_{t+1}$  je bezrizična kamatna stopa za ročnost  $t+1$  godina. Dobijeni iznos riziko-margine potrebno je alocirati po pojedinim linijama poslovanja, shodno njihovom relativnom doprinosu ukupnom solventnosnom kapitalnom zahtevu osiguravača.

Obračun riziko-margine počiva na pretpostavci da referentni osiguravač nema sopstvenih sredstava, niti prethodnih obaveza iz osiguranja.<sup>12</sup> U trenutku

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<sup>9</sup> Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II), *Official Journal of the European Communities*, 2009/138/EC, čl. 77.

<sup>10</sup> Marija Jovović, *Merenje rizika pri utvrđivanju solventnosti neživotnih osiguravača*, doktorska disertacija, Ekonomski fakultet Beograd, 2015, str. 244.

<sup>11</sup> Commission Delegated Regulation (EU) 2015/35 supplementing Directive 2009/138/EC of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II), *Official Journal of the European Union*, 2015/35, čl. 37.

<sup>12</sup> Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS), Final CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: Technical Provisions – Article 86(d) – Calculation

transfera portfelja  $t=0$ , on obezbeđuje raspoloživi kapital (engl. *eligible own funds*) u visini solventnosnog kapitalnog zahteva  $SCR_0$  koji će biti dovoljan da podrži izmirenje preuzetih obaveza. Raspoloživa sredstva se investiraju po bezrizičnoj kamatnoj stopi, pri čemu referentni osiguravač zahteva dodatni prinos na svoju investiciju u visini godišnje stope troškova kapitala  $CoC$ . Tako će na kraju prve godine, u trenutku  $t=1$ , njegova sredstva narasti na iznos  $SCR_0(1+p_1+CoC)$ . Tada raspoloživi kapital mora biti jednak kapitalnom zahtevu  $SCR_1$ , da bi nakon narednih godinu dana, tj. u trenutku  $t=2$ , narastao na iznos  $SCR_1(1+p_2+CoC)$ . Navedeni postupak se ponavlja tokom svih godina do isteka obaveza po osnovu preuzetog portfelja osiguranja. Stopa troškova kapitala  $CoC$  služi kao kompenzacija referentnom osiguravaču za rizik da neće povratiti uloženi kapital zajedno sa interesom određenim po bezrizičnoj kamatnoj stopi.<sup>13</sup>

Najznačajniji izazov u pogledu samog obračuna riziko-margine predstavlja predviđanje iznosa SCR za svaku od budućih godina  $t=1,2,\dots$  sa aspekta trenutka  $t=0$ . Precizan obračun podrazumevao bi stohastičko simuliranje portfelja do isteka njegovog trajanja, a zatim izračunavanje i diskontovanje kapitalnog zahteva za svaku simulaciju i u svakom trenutku  $t$ . Kako bi se određivanje riziko-margine olakšalo, dozvoljena su pojednostavljena prilikom projektovanja budućih iznosa SCR.<sup>14</sup> U praksi je najčešća primena proporcionalnog pristupa, kojim se solventnosni kapitalni zahtev na kraju godine  $t=1,2,\dots$  aproksimira na osnovu najbolje procene obaveza na kraju iste godine ( $BE_t$ ), u srazmeri sa odnosom dve veličine u trenutku  $t=0$ :

$$SCR_t = BE_t \cdot \frac{SCR_0}{BE_0}, t = 1, 2, \dots \quad (2)$$

Na taj način, obezbeđuje se da projektovani iznos SCR opada s protekom vremena u skladu sa očekivanom dinamikom kojom će se odvijati razvoj (engl. *run-off*) obaveza datog portfelja. Primenu proporcionalnog pristupa projektovanja budućih kapitalnih zahteva pri obračunu riziko-margine možemo ilustrovati na hipotetičkom primeru portfolija čije je pretpostavljeno trajanje četiri godine. Neka je  $SCR_0=80$  novčanih jedinica, a najbolja procena obaveza  $BE_0=500$  n. j. Poznati su kumulativni procenti rešenih šteta po pojedinim godinama trajanja portfelja, kao i bezrizične kamatne stope za date ročnosti (Tabela 1). Vrednost  $SCR_t$  za  $t=1,\dots,4$  određujemo na osnovu formule (2), a zatim diskontujemo na trenutak obračuna riziko margine  $t=0$ .

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of the Risk Margin, 2009, <https://register.eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-on-TP-Risk-Margin.pdf>, pristupljeno 5. 2. 2021, str. 14.

<sup>13</sup> Hans Waszink, „Considerations on the Discount Rate in the Cost-of-capital Method for the Risk Margin“, *ASTIN Colloquium*, Hague, 2013, str. 3.

<sup>14</sup> European Insurance and Occupational Pensions Authority (EIOPA), Guidelines on the valuation of technical provisions, 2014, [https://www.eiopa.europa.eu/content/guidelines-valuation-technical-provisions\\_en](https://www.eiopa.europa.eu/content/guidelines-valuation-technical-provisions_en), pristupljeno 15. 1. 2021, str. 21.

**Tabela 1. Proporcionalni pristup projektovanju budućih iznosa SCR**

Godina $t$	Kumulativni procenat rešenih šteta	Najbolja procena $BE_t$	Solventnosni kapitalni zahtev $SCR_t$	Bezrizična kamatna stopa $p_t$	Diskontovani solventnosni kapitalni zahtev $\frac{SCR_t}{(1 + p_{t+1})^{t+1}}$
0	0%	500	80	0,75%	79,21
1	40%	300	48	1,00%	47,05
2	60%	200	32	1,00%	30,83
3	80%	100	16	1,25%	15,07
4	100%	0	0	1,50%	0
				Ukupno	172,16

Izvor: Adaptirano prema Arthur J. Zaremba, How to Estimate Risk Margins Under Solvency II, 2012, [https://www.casact.org/education/spring/2012/handouts%5CSession\\_4857\\_handout\\_407\\_0.pdf](https://www.casact.org/education/spring/2012/handouts%5CSession_4857_handout_407_0.pdf), pristupljeno 20. 1. 2021.

Primenom formule (1) uz propisanu stopu troškova kapitala  $CoC=6\%$  dolazimo do iznosa riziko-margine u datom primeru:

$$RM=0,06 \cdot 172,16=10,33$$

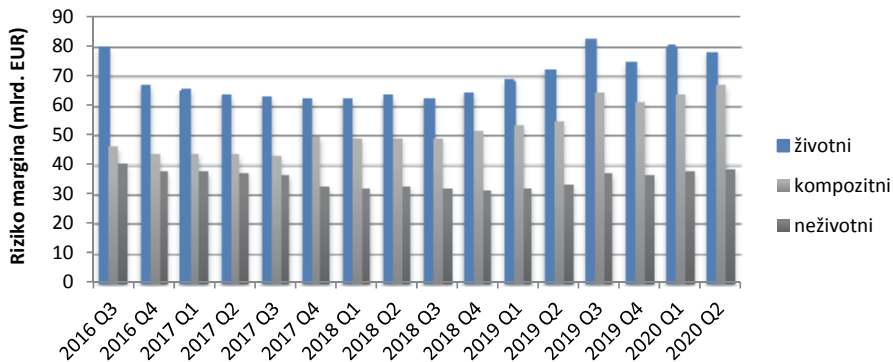
Ipak, važno je napomenuti da postojanje mnoštva pojednostavljenih pristupa za utvrđivanje riziko-margine otvara prostor za subjektivno rasuđivanje. Time se problem nekonzistentnosti vrednovanja tehničkih rezervi između osiguravača, koji je već bio prisutan u režimu Solventnost I, zadržava i u aktuelnom regulatornom režimu Solventnost II.

### III. Problem previsoke riziko-margine

Riziko-margina je teorijski koncept koji treba da omogući da osiguravač koji je nesolventan transferiše svoj portfelj na drugog osiguravača. Dakle, ona nije namenjena za pokriće očekivanih šteta (koje pokriva najbolja procena), niti za pokriće viška stvarnih u odnosu na očekivane štete (koje treba da pokrije solventnosni kapitalni zahtev). Stoga intencija kreatora režima Solventnost II nije bila da riziko-margina značajno utiče na bilans stanja osiguravača. Ipak, ispostavilo se da je riziko-margina značajno veća nego što je očekivano. Prema podacima iz drugog kvartala 2020. godine, ukupna riziko-margina osiguravača koji posluju u Evropskom ekonomskom prostoru (*European Economic Area* – EEA) prevazilazi 200 milijardi evra.<sup>15</sup> Oko 79% od ovog iznosa odnosi se na životne i kompozitne osiguravače, pri čemu ovo učešće s protekom vremena raste (Slika 1).

<sup>15</sup> European Insurance and Occupational Pensions Authority (EIOPA), Insurance Statistics, [https://www.eiopa.europa.eu/tools-and-data/insurance-statistics\\_en#Balancesheet](https://www.eiopa.europa.eu/tools-and-data/insurance-statistics_en#Balancesheet), pristupljeno 20. 1. 2021.

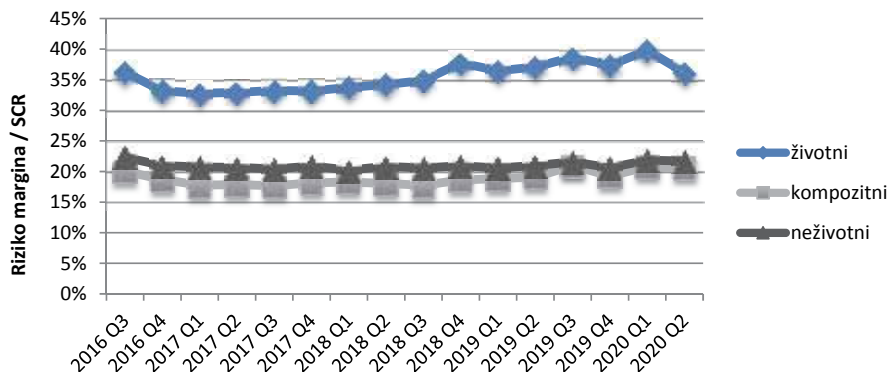
Slika 1. Riziko-margina osiguravača na nivou EEA



Izvor: Pripremljeno na osnovu European Insurance and Occupational Pensions Authority (EIOPA), Insurance Statistics, [https://www.eiopa.europa.eu/tools-and-data/insurance-statistics\\_en#Balancesheet](https://www.eiopa.europa.eu/tools-and-data/insurance-statistics_en#Balancesheet)

Riziko-margina evropskih životnih osiguravača u proseku dostiže 40% njihovog solventnosnog kapitalnog zahteva (Slika 2). U četiri zemlje (Nemačka, Češka, Holandija i Norveška), riziko-margina životnih osiguravača veća je od 50% SCR, a u deset zemalja (Estonija, Grčka, Irska, Lihtenštajn, Litvanija, Poljska, Slovačka, Španija i Velika Britanija) jeste između 40% i 50% SCR.<sup>16</sup>

Slika 2: Odnos riziko-margine i SCR osiguravača na nivou EEA



Izvor: Pripremljeno na osnovu European Insurance and Occupational Pensions Authority (EIOPA), Insurance Statistics, [https://www.eiopa.europa.eu/tools-and-data/insurance-statistics\\_en#Balancesheet](https://www.eiopa.europa.eu/tools-and-data/insurance-statistics_en#Balancesheet)

<sup>16</sup> Insurance Europe, Insurance Europe comments on the review of the Solvency II risk margin, 2017, <https://www.verzekeraars.nl/media/3673/insurance-europe-positionpaper-on-solvency-ii.pdf>, pristupljeno 12. 1. 2021, str. 1.

Prosečno učešće riziko-margine u SCR za osiguravajuće grupe na nivou EEA iznosi 35%. Pri tome, u slučaju pojedinih grupa osiguranja, riziko-margina dostiže ili čak prevazilazi iznos solventnosnog kapitalnog zahteva (Tabela 2).

**Tabela 2: Riziko-margina izabranih evropskih grupa osiguranja u 2019. godini**

	Riziko-margina (u mlrd. EUR)	Procentualno učešće riziko-margine u SCR
AXA	13,6	45,4%
BNP Paribas Cardif	41,3	70,9%
HDI	5,7	61,8%
KLP Group	12,9	91,1%
Munich Re Group	20,1	115,1%
NN Leaven	6,6	112,8%
Vienna Insurance Group	1,6	44,4%
Zurich	6,0	38,3%

Izvor: Pripremljeno na osnovu izveštaja o solventnosti i finansijskom položaju za navedene grupe osiguranja u 2019. godini

Moguće je izdvojiti tri razloga za previsoku riziko-marginu. Kao prvo, stopa troškova kapitala od 6% relativno je visoka. Osiguravaču čiji je raspoloživi kapital jednak SCR, tj. koji ima ratio solventnosti od 100%, kakav je slučaj sa referentnim osiguravačem, odgovara kreditni rejting BBB.<sup>17</sup> Istorijski posmatrano, kreditni spred obveznica sa ovim rejtingom kretao se u rasponu od 2 do 3%, što je značajno niže od 6%.<sup>18</sup> Naravno, pretpostavka da jedna stopa troškova kapitala važi na celokupnom evropskom tržištu osiguranja jeste diskutabilna, budući da ova stopa varira između pojedinih zemalja, vrsta osiguranja<sup>19</sup> i samih osiguravača. Floreani (2011) ističe da sama ideja da troškovi kapitala osiguravača ne zavise od njegove finansijske strukture predstavlja jednu interpretaciju hipoteze Modiljanija i Milera o irelevantnosti strukture kapitala, koja je zasnovana na nerealnim pretpostavkama. Takođe, nije logično da stopa troškova kapitala bude fiksna i da ne podleže reviziji u promenljivim tržišnim uslovima.

Kao drugo, pri definisanju metodologije obračuna riziko-margine važili su drugačiji makroekonomski uslovi od aktuelnih. Nakon svetske ekonomske krize iz 2008. godine, izražen je globalni fenomen pada kamatnih stopa, pod uticajem mera

<sup>17</sup> Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS), Final CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: Technical Provisions – Article 86(d) – Calculation of the Risk Margin, 2009, str. 25.

<sup>18</sup> Insurance Europe, Insurance Europe comments on the review of the Solvency II risk margin, 2017, str. 6.

<sup>19</sup> David J. Cummins, Richard D. Phillips, „Estimating the cost of equity capital for property-liability insurers“, *Journal of Risk and Insurance*, 72(3), 2005, str. 441–478.



monetarne politike preduzetih od strane vodećih centralnih banaka. Danas su kamatne stope na istorijski niskom nivou – blizu nule, ili su čak negativne, u zavisnosti od ročnosti i zemlje. Kada kamatne stope padaju, sadašnja vrednost očekivanih budućih novčanih tokova po osnovu obaveza iz osiguranja raste. Drugim rečima, raste najbolja procena obaveza, pa samim tim raste i solventnosni kapitalni zahtev koji je na njoj zasnovan, a koji ulazi u obračun riziko-margine. Istovremeno raste i sadašnja vrednost projektovanih troškova kapitala, jer se oni diskontuju po nižim kamatnim stopama. Na taj način, rekordno niske kamatne stope utiču na povećanje riziko-margine po dva osnova.

Treće, u okviru projektovanih SCR dominira kapitalni zahtev za pokriće rizika od dugovečnosti (jer se tržišni rizici najvećim delom ne uključuju u obračun), a on se projektuje za veoma veliki broj godina u budućnosti na koje se taj rizik proteže. Stoga su visokom riziko-marginom pogođeni prvenstveno osiguravači koji nude dugoročne usluge s garancijama.

Što je veći iznos tehničkih rezervi, to je veći stepen sigurnosti da će obaveze iz osiguranja biti izmirene u celosti i u rokovima dospeća. Međutim, kada je riziko-margina isuviše visoka, osiguravači su prinuđeni da drže finansijska sredstva koja znatno prevazilaze očekivane troškove izmirenja obaveza preuzetih prema osiguranicima. Time se umanjuje prinos za akcionare i povećavaju troškovi kapitala za osiguravače, čiji teret, u krajnjoj instanci, snose osiguranici, kroz veće premije osiguranja.

#### **IV. Problem kamatno osetljive riziko-margine**

Drugi problem vezan za riziko-marginu jeste taj što je njena visina osetljiva na kretanja kamatnih stopa, i to u značajno većoj meri nego što je osetljiva najbolja procena obaveza istog portfelja. Unoseći volatilnost u bilans stanja, riziko-margina postaje izvor rizika za osiguravače. Zbog načina njenog obračuna, kretanje riziko-margine obrnuto je srazmerno kretanju kamatnih stopa. U periodima kada kamatne stope padaju, riziko-margina raste, i obrnuto, u periodima kada stope rastu, riziko-margina opada.

Međutim, uočeno je da je riziko-margina osetljivija na pad nego na rast kamatnih stopa. Prema procenama Engleske banke, pad kamatnih stopa za 100 bazičnih poena povećava riziko-marginu za 27%. Ako bi kamatne stope u istoj meri porasle, riziko-margina bi se smanjila za 20%.<sup>20</sup> Studija koju je sproveo Britansko udruženje osiguravača pokazuje da bi, pri postojećoj stopi troškova kapitala od 6%, pad kamatnih stopa za 200 bazičnih poena doveo do udvostručenja riziko-margine.

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<sup>20</sup> David Rule, Solvency II one year in, 2017, <https://www.bankofengland.co.uk/speech/2017/solvency-2-one-year-in>, pristupljeno 5. 2. 2021.

Pri tome, što je veći nivo stope troškova kapitala, osetljivost riziko-margine na promene kamatnih stopa utoliko je veća.<sup>21</sup>

U kombinaciji s niskim kamatnim stopama, visoka i varijabilna riziko-margina pogađa prvenstveno životne osiguravače. Kao posledica, dolazi do promena u obimu i strukturi ponude osiguranja. Paralelno sa smanjivanjem obima garancija u tradicionalnim uslugama, životni osiguravači se postepeno okreću ka uslugama koje su manje osetljive na kamatne stope. Kao prvo, oni sve više promovišu riziko-osiguranje u odnosu na osiguranje sa štednom komponentom. Drugo, raste značaj unit-linked proizvoda koji osiguravačima omogućuju da transferišu rizik kamatne stope na osiguravanike. Učešće unit-linked usluga u ukupnoj premiji životnog osiguranja u EEA u prethodnoj deceniji povećano je za 5 procentnih poena.<sup>22</sup> Ta tendencija je pogotovo izražena u pojedinim zemljama. U Velikoj Britaniji, na primer, učešće unit-linked usluga u premiji životnog osiguranja poraslo je sa 37% u 1985. na 82% u 2018. godini. U istom periodu, premija unit-linked osiguranja u Nemačkoj beleži rast od čak 300%.<sup>23</sup> Ipak, otvara se pitanje zaštite interesa osiguravanih, jer nije logično očekivati da oni budu jednako kao profesionalni osiguravači sposobni da preuzmu na sebe rizike investiranja u dugom roku i da na adekvatan način upravljaju njima.<sup>24</sup> Takođe je uočeno da evropski osiguravači, nastojeći da umanje riziko-marginu, prenose sve veći deo portfelja kroz reosiguranje u one jurisdikcije u kojima ne važe pravila Solventnosti II (što se naročito odnosi na rizik od dugovečnosti).<sup>25</sup> Kao krajnji rezultat, smanjuje se konkurencija na tržištu, raste cena osiguranja, sužavaju se mogućnosti potrošačkog izbora za osiguravanike, osiguravači se podstiču na regulatornu arbitražu, a rizik od dugovečnosti u većoj meri prenosi na državu.

## **V. Moguća rešenja problema previsoke i kamatno osetljive riziko-margine**

Sprovedena analiza pokazuje da problem previsoke i kamatno osetljive riziko-margine proizlazi kako iz metode njenog obračuna tako i iz uslova u kojima

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<sup>21</sup> Association of British Insurers, Comments Template on Consultation Paper on EIOPA's second set of advice to the European Commission on specific items in the Solvency II Delegated Regulation, 2018, [https://register.eiopa.europa.eu/Publications/Comments/Association%20of%20British%20Insurers\\_01\\_03\\_18.pdf](https://register.eiopa.europa.eu/Publications/Comments/Association%20of%20British%20Insurers_01_03_18.pdf), pristupljeno 8. 2. 2021, str. 54.

<sup>22</sup> European Insurance and Occupational Pensions Authority (EIOPA), Financial Stability Report, 2013–2020, [https://www.eiopa.europa.eu/type-content-document/financial-stability-report\\_en](https://www.eiopa.europa.eu/type-content-document/financial-stability-report_en), pristupljeno 12. 2. 2021.

<sup>23</sup> International Association of Insurance Supervisors, *Global Insurance Market Report 2019*, Basel, 2020, str. 34.

<sup>24</sup> Marija Koprivica, Martin Balleer, „Prospects of the insurance sector in a low interest rate environment“, *Insurance Market After COVID-19* (editors Jelena Kočović, Tatjana Rakonjac-Antić, Biljana Jovanović Gavrilović, Branislav Boričić), Belgrade, 2020, str. 156.

<sup>25</sup> Andrew Bulley, The new Solvency II landscape, 2016, <https://www.bankofengland.co.uk/speech/2016/the-new-solvency-ii-landscape>, pristupljeno 8. 2. 2021.

se ta metoda primenjuje. Otuda moguća rešenja da se ovaj problem reši ili ublaži podrazumevaju kako zamenu postojeće metode obračuna alternativnim metodama, tako i njeno prilagođavanje aktuelnim okolnostima.

Imajući u vidu da je propisana stopa troškova kapitala relativno visoka, logičan predlog je da se ta stopa snizi do nivoa koji je realan za sektor osiguranja. Ključni argument u prilog takvom rešenju jeste činjenica da su kamatne stope danas na znatno nižem nivou nego što su bile kada su definisani parametri metodologije obračuna riziko-margine. Stopa troškova kapitala od 6% određena je na osnovama modela vrednovanja kapitala – CAPM (*Capital Asset Pricing Model*), u vidu proizvoda beta koeficijenta (kao mere sistematskog rizika sektora osiguranja) i tržišne premije za rizik. Pri tome je pretpostavljena vrednost beta koeficijenta od 1,20 i tržišna premija za rizik od 5%, uz nultu učešće duga u finansijskoj strukturi referentnog osiguravača.<sup>26</sup> Međutim, poslednja empirijska istraživanja pokazuju da je sektoru osiguranja primeren beta koeficijent bez finansijskog levridža (engl. *unlevered beta*) od 0,5.<sup>27</sup> Posledično, adekvatna stopa troškova kapitala pri obračunu riziko-margine bila bi  $0,5 \cdot 5 = 2,5\%$ . Uz nešto konzervativniju procenu, realno bi bilo pretpostaviti da ova stopa treba da iznosi 3%. Slično tome, do sada formulisani predlozi stope troškova kapitala kreću se u rasponu od 2%<sup>28</sup> do 4,5%.<sup>29</sup> Snižavanje stope troškova kapitala može doprineti rešavanju problema previsoke riziko-margine, ali ne i njene relativne osetljivosti na promene kamatnih stopa.

Druga mogućnost jeste zamena fiksne stope troškova kapitala varijabilnom stopom. Tako, na primer, stopa troškova kapitala može varirati u skladu s kretanjem bezrizičnih kamatnih stopa koje se koriste za diskontovanje projektovanih troškova kapitala. Time bi bio umanjen problem volatilnosti riziko-margine u dugoročnim vrstama osiguranja, jer bi promene stope troškova kapitala kompenzovale promene u diskontnim faktorima. Ipak, treba imati u vidu da takvo rešenje može dovesti do povećanja volatilnosti riziko-margine u kratkoročnim vrstama osiguranja, u kojima je ona značajno osetljivija na stopu troškova kapitala nego na diskontne faktore.<sup>30</sup>

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<sup>26</sup> Actuarial Association of Europe, A review of the design of the Solvency II risk margin, 2019, <https://www.actuary.eu/wp-content/uploads/2019/12/Solvency-II-Risk-Margin-FINAL-1.pdf>, pristupljeno 9. 2. 2021, str. 30.

<sup>27</sup> Aswath Damodaran, Betas by Sector, 2021, [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/Betas.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html), pristupljeno 9. 2. 2021.

<sup>28</sup> CRO Forum & CFO Forum, Comments Template on Consultation Paper on EIOPA's second set of advice to the European Commission on specific items in the Solvency II Delegated Regulation, 2018, [https://register.eiopa.europa.eu/Publications/Comments/CRO%20Forum%20and%20CFO%20Forum\\_01\\_03\\_18.pdf](https://register.eiopa.europa.eu/Publications/Comments/CRO%20Forum%20and%20CFO%20Forum_01_03_18.pdf), pristupljeno 12. 2. 2021, str. 53.

<sup>29</sup> Institute and Faculty of Actuaries, Solvency II Practical Review, 2019, <https://www.actuaries.org.uk/practice-areas/general-insurance/research-working-parties/solvency-ii-practical-review>, pristupljeno 12. 2. 2021, str. 11.

<sup>30</sup> Andy Pelkiewicz, Waqar Ahmed, Paul Fulcher, Katie Johnson, Stuart Reynolds, Richard Schneider, Andy Scott, A review of the risk margin – Solvency II and beyond, Institute and Faculty of Actuaries, London, 2019, str. 14.

Stoga stopa troškova kapitala može da varira i u zavisnosti od vrste osiguranja. Alternativno, stopa troškova kapitala može da opada s porastom ročnosti novčanog toka na koji se odnosi.

Predmet modifikacije u okviru postojeće metode troškova kapitala mogu biti i bezrizične kamatne stope po kojima se diskontuju troškovi kapitala. Njihovo povećanje putem mehanizama prilagođavanja koji se već primenjuju u svrhe obračuna najbolje procene doprinelo bi snižavanju riziko-margine i njene osetljivosti na kamatne stope. Prilagođavanja krive bezrizičnih kamatnih stopa sastavni su deo paketa mera za usluge s dugoročnim garancijama, uvedenog Omnibus II direktivom iz 2014. godine. Zbog usklađivanja dugoročnih obaveza s dugoročnim ulaganjima, kratkoročne fluktuacije cena aktive ne odražavaju stvarne promene u finansijskom položaju i izloženosti rizicima osiguravača. Stoga te mere treba da ublaže „veštačku“ volatilnost u bilansu stanja osiguravača, tako što se prilikom vrednovanja obaveza samo delimično uvažavaju stvarna tržišna kretanja. Prilagođavanje bezrizičnih kamatnih stopa ostvaruje se u vidu fiksnog dodatka na likvidni deo krive prinosa, koji se zatim ekstrapolira (*Volatility Adjustment*), ili u vidu paralelnog pomeranja celokupne krive prinosa naviše (*Matching Adjustment*).<sup>31</sup> Prema važećoj regulativi, te mere se primenjuju samo prilikom obračuna najbolje procene kod usluga s dugoročnim garancijama. Racionalno rešenje bilo bi da se njihova primena proširi i na obračun riziko-margine, kako bi se uticalo na umanjenje celokupnih tehničkih rezervi i njihove volatilnosti kod iste grupe usluga. Kao alternativno rešenje, Waszink (2013) predlaže da se bezrizične kamatne stope zamene većim stopama, koje bi bile jednake stopi troškova kapitala.

Radikalnija rešenja podrazumevaju da se uvede gornja granica riziko-margine (npr. kao definisani procenat od solventnosnog kapitalnog zahteva),<sup>32</sup> odnosno da se, umesto metode troškova kapitala, primeni druga metoda obračuna riziko-margine. Prema klasifikaciji Međunarodne asocijacije aktuara, sve definisane metode obračuna riziko-margine razvrstavaju se u jednu od četiri kategorije: kvantilne metode, metode troškova kapitala, metode zasnovane na konzervativnim pretpostavkama ili na diskontovanju budućih novčanih tokova.<sup>33</sup>

U okviru kvantilnih metoda, riziko-margina se određuje kao razlika između odgovarajućeg percentila raspodele verovatnoća obaveza iz osiguranja i najbolje

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<sup>31</sup> Directive 2014/51/EU of the European Parliament and of the Council of 16 April 2014 amending Directives 2003/71/EC and 2009/138/EC and Regulations (EC) No 1060/2009, (EU) No 1094/2010 and (EU) No 1095/2010 in respect of the powers of the European Supervisory Authority (European Insurance and Occupational Pensions Authority) and the European Supervisory Authority (European Securities and Markets Authority), *Official Journal of the European Communities*, 2014/51/EU, čl. 77b, 77d.

<sup>32</sup> Dick Rae, Aisling Barrett, Dylan Brooks, Meshali Chotai, Andy Pelkiewicz, Chen Wang, „A review of Solvency II: Has it met its objectives?“, *British Actuarial Journal*, 23(4), 2017, str. 17.

<sup>33</sup> International Actuarial Association, *Measurement of Liabilities for Insurance Contracts: Current Estimates and Risk Margins*, Ottawa, 2009, str. 71.

procene, kao očekivane vrednosti te raspodele. U date svrhe, obično se uzima 75. percentil raspodele obaveza iz osiguranja.<sup>34</sup> Na taj način postiže se da ukupne tehničke rezerve budu jednake vrednosti pod rizikom (*Value at Risk* – VaR) date raspodele na izabranom nivou poverenja (npr. 75%). Takav pristup je opravdan ukoliko je raspodela verovatnoća obaveza iz osiguranja relativno simetrična. U suprotnom, kod veoma asimetričnih raspodela, on može dovesti do potcenjenosti tehničkih rezervi. U takvim situacijama, adekvatnija je primena uslovne vrednosti pod rizikom (*Conditional Value at Risk* – CVaR), koja odražava prosek svih vrednosti obaveza koje prekoračuju VaR.

Postoje i takve metode kojima se do riziko-margine dolazi implicitno, na bazi konzervativnih pretpostavki koje treba da obezbede da iznos tehničkih rezervi bude veći od najbolje procene obaveza iz osiguranja. Takav je slučaj, na primer, sa izborom maksimalnih razvojnih faktora pri primeni *chain ladder* metode rezervisanja. Sličan efekat postiže se snižavanjem kamatnih stopa po kojima se diskontuju očekivani budući novčani tokovi na ime obaveza iz osiguranja. U tom slučaju, radi se o metodama zasnovanim na diskontovanju budućih novčanih tokova, kao specijalnom slučaju metoda zasnovanih na konzervativnim pretpostavkama. Pri takvom načinu vrednovanja obaveza iz osiguranja, ne bi postojala potreba za eksplicitnim izračunavanjem riziko-margine, jer bi ona već bila sadržana u ukupnoj vrednosti tehničkih rezervi osiguravača.

## VI. Zaključak

U dosadašnjoj primeni Solventnosti II izdvojilo se više područja koja zahtevaju poboljšanja, kako bi novi regulatorni režim za evropske (re)osiguravače bio efektivan i opravdao visoka ulaganja u njegov dugogodišnji razvoj. Jedan od najkontroverznijih segmenata režima jeste riziko-margina, kao element tehničkih rezervi osiguravača. Kao posledica neadekvatnih propisanih vrednosti parametara metode troškova kapitala, ali i aktuelnih uslova niskih kamatnih stopa, riziko-margina je isuviše visoka i varijabilna. Time se generišu visoki troškovi za osiguravače, povećava volatilnost njihovog bilansa stanja i kreiraju podsticaji za regulatornu arbitražu. Krajnji efekat je smanjenje tržišne konkurencije, povećanje cena osiguranja i sužavanje mogućnosti potrošačkog izbora za osiguranike.

U radu se daju konkretne preporuke za prevazilaženje ili ublažavanje problema previsoke i kamatno osetljive riziko-margine. Preporučena rešenja uključuju kako modifikacije postojeće metode troškova kapitala (snižavanjem i variranjem stope troškova kapitala, odnosno povećanjem bezrizičnih kamatnih stopa po kojima se diskontuju troškovi kapitala), tako i napuštanje ove metode i njenu zamenu drugim

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<sup>34</sup> Anthony Brown, *Demystifying the Risk Margin: Theory, Practice and Regulation*, 2012, <https://sias.org.uk/media/1191/demystifying-the-risk-margin-theory-practice-and-regulation.pdf>, pristupljeno 29. 1. 2021, str. 7.

metodama za obračun riziko-margine (kvantilnim metodama, metodama zasnovanim na konzervativnim pretpostavkama ili na diskontovanju budućih novčanih tokova).

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## ISSUES OF RISK MARGIN COMPUTATION UNDER SOLVENCY II REGULATORY REGIME

SCIENTIFIC PAPER

### Abstract

The paper deals with the issues of risk margin computation as an element of technical provisions of Insurers under the Solvency II regulatory regime. Due to a lack of regulatory method for the capital cost, in combination with the low interest rates, the risk margin is set too high and variable, which primarily affects life insurance companies. The paper includes particular proposals for overcoming or mitigating the problem of too high and rate-sensitive risk margin. The proposed solutions include both modifications to the existing capital cost method and abandonment and the replacement of this method by other risk margin computation methods.

**Key words:** *risk margin, Solvency II, capital cost rate, technical provisions*

### I. Introduction

Establishment of a stable and single insurance market to protect the interests of insurance beneficiaries based on legislation governing the insurance industry represents an important task of the regulatory authorities in the member states of the European Union (EU). A single regulatory framework for determining solvency of insurance companies in the named countries was formally established in the 1970s. In order to allow for the inflationary effect, minor amendments to the previous regime were made in 2002, when the Solvency I regime came into effect. In the meantime, the new and stronger effects occurred of the existing risks jeopardizing

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the Insurers, but significant progress has been made in the area of knowledge and instruments required to measure and manage the risks. The modern business environment is characterized by more complex insurance services and Insurers investment strategies, intensive consolidation and expansion of business to new markets and activities, which represents a kind of challenge for supervisors. In the significantly changed business circumstances at the beginning of the 21st century, the structural shortcomings of the Solvency I concept came to light and the need was observed for a risk-based approach to Insurers' solvency valuation.<sup>3</sup> After 15 years of development, starting from January 1, 2016, a new regulatory framework was established for Insurers and Reinsurers in the European Union - the Solvency II.

At the moment, Solvency II represents one of the most complex global insurance industry regulatory regimes. It is often referred to as the "golden standard" of insurance regulation, aimed at by other countries outside the EU.<sup>4</sup> The key novelties introduced by this regulatory regime comprise the explicit consideration of a larger number of risks in the computation of capital requirements of insurance companies, high standards of capital adequacy and risk management, prudential regulation instead of quantitative investment constraints, possible implementation of the in-house models of the Insurers for calculation of capital requirements and a switch from the *rules-based* supervision to the *principles-based* supervision.<sup>5</sup> Despite the obvious advantages, the new regulatory regime appeared to have some shortcomings as well, in the first years of implementation.

The subject-matter of the paper comprises the computation problems of risk-margin as an element of technical provisions of Insurers under the Solvency II regime. In addition to the fact that the computation of the risk margin using the capital cost method represents a kind of challenge for Insurers, it was noticed that, in the actual environment of low interest rates, the risk margin is too high and variable. The aim of this paper is to present particular proposals for resolving the problem of excessive risk margin sensitive to interest rates. The paper also includes a hypothetical example how to simplify the computation of the risk margin via the so-called proportional approach.

## **II. Risk Margin as an Element of Technical Provisions in Solvency II Concept**

Unlike the Solvency I regime, based on the book values of balance sheet items and, as such, insensitive to risks, the new regulatory regime for Insurers in

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<sup>3</sup> Jelena Kočović, Dejan Trifunović, Marija Jovović, „Risk Treatment in Solvency II and Basel III Concepts“, *Risk management in the Financial Services Sector* (editors: Jelena Kočović, Biljana Jovanović Gavrilović, Dejan Trifunović), Belgrade, 2016, pp. 5.

<sup>4</sup> Jean-Christophe Graz, *The Power of Standards*, Cambridge University Press, 2019, pp. 138.

<sup>5</sup> Jelena Kočović, Marija Koprivica, Blagoje Paunović, „Initial Effects of Solvency II Implementation in the European Union“, *Ekonomika preduzeća* No. 7–8, 2017, pp. 450.

the EU, introduces prospective valuation of assets and liabilities following the market principles and applying the fair value technique. The fair value of the Insurer's liabilities represents the price that would have to be paid to a third party who is willing to commit to settle the given liabilities.<sup>6</sup> However, the absence of a liquid secondary market of liabilities under insurance contracts complicates the problem of the economic valuation.<sup>7</sup>

Article 77 of the Solvency II Directive provides for two ways of valuation of the insurance liabilities. Provisions for liabilities where the cash outflows can be precisely replicated (hedged) by cash inflows from adequate financial instruments (as in the case of unit-linked products) are estimated based on the market value of the instruments. The fair value of liabilities that cannot be replicated by the investment portfolio equals the sum of the best valuation and the risk margin. This approach is based on the idea that insurance liabilities, with their value, should reflect both the expected value of future payments to the insured and the uncertainty associated therewith. The two key elements of technical reserves in the Solvency II regime stem therefrom.<sup>8</sup>

The best valuation corresponds to a weighted average present value of future cash flows required to settle insurance liabilities, where the probabilities of realization of the cash flows are used as weighting factors. In discounting, we use the adequate risk-free interest rate curve, as per maturity of each projected annual net cash flow. The best estimate is declared on a gross basis, and the corresponding reinsurance receivables should be declared separately, on the assets side of the Insurer's balance sheet and adjusted for expected losses by way of risk of uncollectibility.

Complying with the concept of the time value of money, we eliminate the implicit solvency margin that was contained in the technical provisions expressed by nominal value. At the same time, fair valuation increases the volatility of technical reserves. Thus, through the level of the best estimate, a risk margin is formed as an additional measure to secure the fulfilment of Insurers' obligations.

The risk margin corresponds to the amount for which we should increase the technical provisions up to such theoretical level (i.e. the fair value) that another, hypothetical ("reference") Insurer would require as compensation for the immediate assumption of liabilities under the given Insurer's portfolio.<sup>9</sup> For the reference insurer,

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<sup>6</sup> International Actuarial Association, *Measurement of Liabilities for Insurance Contracts: Current Estimates and Risk Margins*, Ottawa, 2009, pp. 8.

<sup>7</sup> Jelena Kočović, Marija Koprivica, Blagoje Paunović, „New Challenges for Insurance Companies – Solvency II and IFRS 17”, *Insurance in the Post-Crisis Era* (editors Jelena Kočović, Biljana Jovanović Gavrilović, Branislav Boričić, Mirjana Radović Marković), Belgrade, 2018, pp. 7.

<sup>8</sup> Danica Jović, Jelena Kočović, Marija Koprivica, „Valuation of Insurance Liabilities under Solvency II and IFRS 17”, *Quantitative Models in Economics* (editors Jelena Kočović, Jasmina Selimović, Branislav Boričić, Vladimir Kaščelan, Vesna Rajić), Belgrade, 2018, pp. 225.

<sup>9</sup> Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the Taking-up and Pursuit of the Business of Insurance and Reinsurance (Solvency II), *Official Journal of the European Communities*, 2009/138/EC, Art. 77.

the risk margin represents the “reward” for exposure to the risk of less favourable actual cash flows compared to the expected cash flows according to which one has defined the best valuation of technical provisions.<sup>10</sup>

In Solvency II regime, the risk margin is calculated using the capital cost method. According to this method, the risk margin is observed as the present value of the costs of holding capital to the amount equal to the Solvency Capital Requirement (SCR) for the reference Insurer during the entire period until the relevant insurance liabilities are settled. In this aspect, the capital requirements are defined in relation to the risks insured (among which the longevity risk dominates the life insurance), market risks that are not subject to hedging, credit risks and operational risk. Therefore, market risks with hedgable effects are excluded from the computation.

When calculating the risk margin, it is first required to project the amounts of the solvency capital requirement for all future years of the portfolio period. A uniform annual capital cost rate of 6% applies to any one of them. The costs of holding capital calculated in this way are discounted at the relevant risk-free interest rate, with regard to their maturity. The sum of discounted values for all covered years represents the risk margin of the insurance company:<sup>11</sup>

$$RM = \sum_{t \geq 0} CoC \cdot \frac{SCR_t}{(1 + p_{t+1})^{t+1}} \quad (1)$$

where  $CoC$  represents the rate of capital costs,  $SCR_t$  is the projected solvency capital requirement at the year end  $t$  and  $p_{t+1}$  is the risk-free interest rate for maturity  $t+1$  years. The obtained amount of risk margin should be allocated by individual lines of business, according to their relative contribution to the total solvency capital requirement of the Insurer.

The computation of the risk margin relies on the assumption that the reference insurer has had neither proprietary funds nor previous insurance liabilities.<sup>12</sup> At the portfolio assignment moment  $t=0$ , he provides for the eligible own funds to the amount of solvency capital requirement  $SCR_0$  that will suffice to support the settlement of assumed liabilities. Available funds are invested at risk-free interest

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<sup>10</sup> Marija Jovović, *Merenje rizika pri utvrđivanju solventnosti neživotnih osiguravača*, Doctoral Dissertation, Faculty of Economics, Belgrade, 2015, pp. 244.

<sup>11</sup> Commission Delegated Regulation (EU) 2015/35 Supplementing Directive 2009/138/EC of the European Parliament and of the Council on the Taking-up and Pursuit of the Business of Insurance and Reinsurance (Solvency II), *Official Journal of the European Union*, 2015/35, Art. 37.

<sup>12</sup> Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS), Final CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: Technical Provisions – Article 86(d) – Calculation of the Risk Margin, 2009, <https://register.eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-on-TP-Risk-Margin.pdf>, accessed on 5. 2. 2021, pp. 14.

rate, whereat the reference insurer requires an additional return on their investment to the amount of the annual rate of cost of capital  $CoC$ . In this way, at the end of the first year,  $t=1$ , his funds will increase to the level of  $SCR_0(1+p_1+CoC)$ . Then, the available capital must equal the capital requirement  $SCR_1$ , so that it would, in the next year i.e. in the moment  $t=2$ , grow to the amount of  $SCR_1(1+p_2+CoC)$ . The named procedure repeats during all the years until the expiration of liabilities under the acquired insurance portfolio. The cost of capital  $CoC$  rate serves as compensation to the reference insurer for the risk that they will not return the invested capital together with the interest defined at the risk-free interest rate.<sup>13</sup>

The most significant challenge in terms of the risk-margin computation itself is the forecast of the SCR amount for any one future year,  $t=1,2,\dots$  from the aspect of the moment  $t=0$ . Accurate computation would involve stochastic simulation of the portfolio until the expiry of its period, followed up by computation and discounting of the capital requirement for each simulation and at any moment  $t$ . In order to facilitate the definition of risk margin, simplifications are allowed when projecting future SCR amounts.<sup>14</sup> The proportional approach is most commonly applied in practice, and such approach approximates a solvency capital requirement at the end of the year  $t=1,2,\dots$  based on the best valuation of liabilities at the end of the very same year ( $BE_t$ ), pro rata the relation between two values at the moment  $t=0$ :

$$SCR_t = BE_t \cdot \frac{SCR_0}{BE_0}, t = 1, 2, \dots \quad (2)$$

In this way, it is ensured that the projected amount of SCR shall decrease over time in accordance with the expected run-off dynamics of liabilities under a given portfolio. The application of the proportional approach to the projection of future capital requirements in the computation of the risk margin can be illustrated by a hypothetical example of a portfolio with assumed period of four years. Let us take that the  $SCR_0=80$  of monetary units, and the best estimate of liabilities  $BE_0=500$  monetary units. We know the cumulative percentages of claims settled by individual years of the portfolio as well as the risk-free interest rates for given maturities (Table 1). We determine the value of  $SCR_t$  for  $t=1,\dots,4$  based on formula (2) and discount it to the time of computation of the risk margin  $t=0$ .

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<sup>13</sup> Hans Waszink, "Considerations on the Discount Rate in the Cost-of-Capital Method for the Risk Margin", *ASTIN Colloquium*, Hague, 2013, pp. 3.

<sup>14</sup> European Insurance and Occupational Pensions Authority (EIOPA), Guidelines on the Valuation of Technical Provisions, 2014, [https://www.eiopa.europa.eu/content/guidelines-valuation-technical-provisions\\_en](https://www.eiopa.europa.eu/content/guidelines-valuation-technical-provisions_en), accessed on 15. 1. 2021, pp. 21.

**Table 1. Proportional approach to projecting future SCR amounts**

Year $t$	Cumulative percentage of claims settled	Best valuation $BE_t$	Solvency capital requirement $SCR_t$	Risk-free interest rate $P_t$	Discounted solvency capital requirement $\frac{SCR_t}{(1 + p_{t+1})^{t+1}}$
0	0%	500	80	0.75%	79.21
1	40%	300	48	1.00%	47.05
2	60%	200	32	1.00%	30.83
3	80%	100	16	1.25%	15.07
4	100%	0	0	1.50%	0
				Total	172.16

Source: Adapted from Arthur J. Zaremba, How to Estimate Risk Margins under Solvency II, 2012, [https://www.casact.org/education/spring/2012/handouts%5CSession\\_4857\\_handout\\_407\\_0.pdf](https://www.casact.org/education/spring/2012/handouts%5CSession_4857_handout_407_0.pdf), accessed on 20. 1. 2021.

By applying formula (1) with the prescribed rate of costs of capital  $CoC=6\%$ , we arrive at the amount of risk margin in the below presented example:

$$RM=0,06 \cdot 172,16=10,33$$

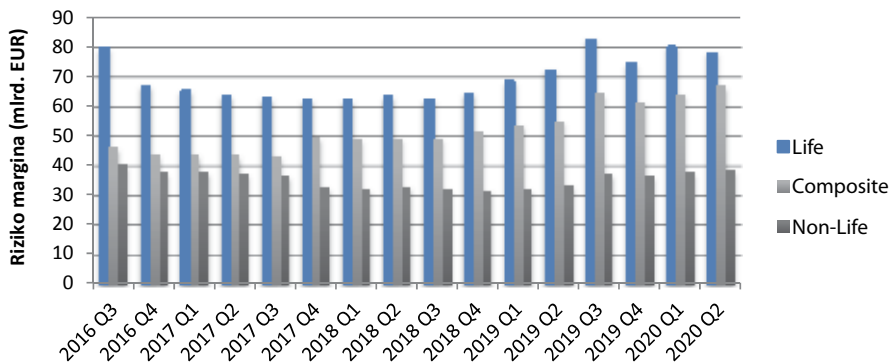
However, it is important to note that the existence of a multitude of simplified approaches to determining the risk margin opens up space for subjective reasoning. Thus, the problem of inconsistency in the valuation of technical reserves amongst insurers, which was already present in the Solvency I regime, has been maintained in the current regulatory regime of Solvency II.

### III. Problem of Too High Risk Margin

Risk margin is a theoretical concept that should enable an insolvent Insurer to assign their portfolio to another Insurer. Thus, it is not intended to cover expected claims (which are covered by the best estimate), nor the surplus of actual as opposed to the expected claims (which should cover the solvency capital requirement). Therefore, the intention of the developers of the Solvency II regime was not to make the risk margin significantly affect the balance sheet of insurers. However, it turned out that the risk margin was significantly higher than expected. According to the data from the second quarter of 2020, the total risk-margin of insurers operating in the European Economic Area (EEA) exceeds 200 billion euros.<sup>15</sup> About 79% of this amount relates to life and composite insurers, whereby the share increases over time (Figure 1).

<sup>15</sup> European Insurance and Occupational Pensions Authority (EIOPA), Insurance Statistics, [https://www.eiopa.europa.eu/tools-and-data/insurance-statistics\\_en#Balancesheet](https://www.eiopa.europa.eu/tools-and-data/insurance-statistics_en#Balancesheet), accessed on 20. 1. 2021.

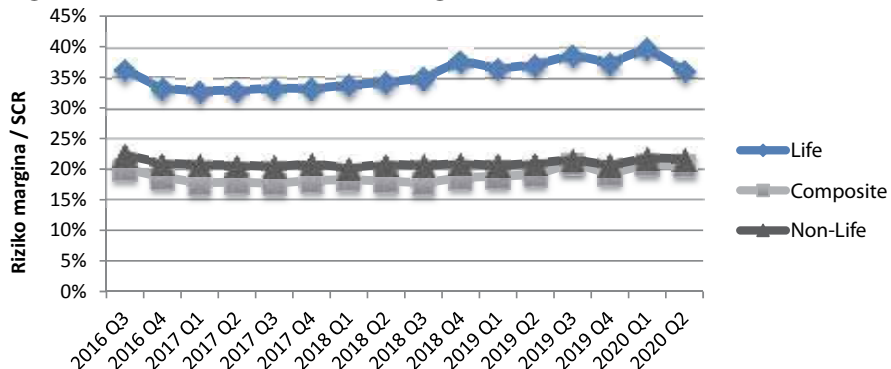
**Figure 1 Risk margin of Insurers at EEA level**



Source: Prepared on the basis of European Insurance and Occupational Pensions Authority (EIOPA), Insurance Statistics, [https://www.eiopa.europa.eu/tools-and-data/insurance-statistics\\_en#Balancesheet](https://www.eiopa.europa.eu/tools-and-data/insurance-statistics_en#Balancesheet)

The risk margin of European life insurers on average reaches 40% of their solvency capital requirement (Figure 2). In four countries (Germany, the Czech Republic, the Netherlands and Norway), the risk margin of life insurers exceeds the 50% of SCR and in ten countries (Estonia, Greece, Ireland, Liechtenstein, Lithuania, Poland, Slovakia, Spain and the Great Britain) it ranges between 40% and 50% of the SCR.<sup>16</sup>

**Figure 2: Ratio between the risk margin and SCR of insurers at the EEA level**



Source: Prepared on the basis of the European Insurance and Occupational Pensions Authority (EIOPA), Insurance Statistics, [https://www.eiopa.europa.eu/tools-and-data/insurance-statistics\\_en#Balancesheet](https://www.eiopa.europa.eu/tools-and-data/insurance-statistics_en#Balancesheet)

<sup>16</sup> Insurance Europe, Insurance Europe comments on the review of the Solvency II risk margin, 2017, <https://www.verzekeraars.nl/media/3673/insurance-europe-positionpaper-on-solvency-ii.pdf>, accessed on 12. 1. 2021, pp. 1.



The average share of the risk margin in the SCR for insurance groups at the EEA level amounts to 35%. In the case of particular insurance groups, the risk margin reaches or even exceeds the amount of the solvency capital requirement (Table 2).

**Table 2: Risk margin of selected European insurance groups in 2019**

	Risk margin (in bld.Eur)	Percentage share of risk margins in SCR
AXA	13.6	45.4%
BNP Paribas Cardif	41.3	70.9%
HDI	5.7	61.8%
KLP Group	12.9	91.1%
Munich Re Group	20.1	115.1%
NN Leaven	6.6	112.8%
Vienna Insurance Group	1.6	44.4%
Zurich	6.0	38.3%

Source: Prepared on the basis of the 2019 Report on Solvency and Financial Position for the mentioned insurance groups.

There are three possible reasons for high risk margin. First, the 6% rate of the costs of capital is relatively high. The Insurer with eligible own funds equalling the SCR and /or with a solvency ratio of 100%, as in the case of the reference insurer, has a corresponding credit rating of BBB.<sup>17</sup> Historically speaking, the credit spread of bonds with such rating ranged from 2 to 3%, which is significantly below 6%.<sup>18</sup> Of course, the assumption that one rate of costs of capital applies to the entire European insurance market is debatable, since this rate fluctuates between particular countries, lines of insurance<sup>19</sup> and the insurers themselves. Floreani (2011) marks that the very idea of the cost of capital of an insurer not being dependent upon their financial structure represents an interpretation of Modigliani and Miller's hypothesis on the irrelevance of the structure of capital that is based on unrealistic assumptions. Moreover, it is not logical for the rate of the costs of capital be fixed and not subject to revision under the fluctuating market conditions.

Second, at the time of defining the methodology for calculating the risk margin, valid macroeconomic conditions different from the present ones. After the

<sup>17</sup> Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS), Final CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: Technical Provisions – Article 86(d) – Calculation of the Risk Margin, 2009, pp. 25.

<sup>18</sup> Insurance Europe, Insurance Europe Comments on the Review of the Solvency II Risk Margin, 2017, pp. 6.

<sup>19</sup> David J. Cummins, Richard D. Phillips, „Estimating the Cost of Equity Capital for Property-Liability Insurers“, *Journal of Risk and Insurance*, 72(3), 2005, pp. 441–478.

2008 global economic crisis, there is a globally expressed phenomenon of dropping interest rates under the impact of monetary policy measures taken by leading central banks. Today, the interest rates are at a historically low level - close to zero, or even negative, depending on maturity and the country. When the interest rates are dropping, the present value of expected future cash flows from insurance liabilities increases. In other words, with a growing best valuation of liabilities, the solvency capital requirement based thereon and forming part of the computation of the risk margin, also grow. At the same time, the present value of projected capital costs is growing, since they are discounted at lower interest rates. Thus, record low interest rates affect the increasing risk margin on two grounds.

Third, the projected SCR is dominated by the capital requirement to cover the risk of longevity (because market risks are mostly not included in the computation), and this risk is projected for a huge number of years in the future, to which the risk extends. Therefore, high risk margin primarily affects insurers that offer multiannual services covered by guarantees.

The higher the amount of technical provisions, the greater the degree of certainty that insurance liabilities will be settled in full and within maturity dates. However, when the risk margin is too high, the insurers are forced to maintain financial assets that significantly exceed the expected costs of settling liabilities to the insured. This reduces the return for shareholders and increases the costs of capital for insurers, the burden of which is ultimately borne by the insured via higher insurance premiums.

#### **IV. Problem of Risk Margin Sensitive to Interest Rate**

Another problem related to the risk margin is that its level is sensitive to interest rate fluctuations to a much greater extent than is the best estimate of liabilities of the same portfolio. By introducing volatility to the balance sheet, the risk margin becomes a source of risk for insurers. Due to the method of its computation, the movement of the risk margin is inversely proportional to the movement of interest rates. In periods when interest rates are decreasing, the risk margin increases, and vice versa, in periods when the rates are increasing, the risk margin decreases.

However, it was noticed that the risk margin is more sensitive to the decline than to the growth of the interest rates. According to estimates of the Bank of England, a downfall in interest rates by 100 basis points increases the risk margin by 27%. If the interest rates were to rise to the same extent, the risk margin would be reduced by 20%.<sup>20</sup> A study conducted by the Association of British Insurers shows that, at the present 6% rate of cost of capital, a downfall in the interest rates by 200 basic points would lead to

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<sup>20</sup> David Rule, Solvency II one year in, 2017, <https://www.bankofengland.co.uk/speech/2017/solvency-2-one-year-in>, accessed on 5. 2. 2021.

doubling of the risk margin. At the same time, the higher the level of the rate of costs of capital, the higher the sensitivity of the risk margin to changes in interest rates.<sup>21</sup>

Combined with low interest rates, the high and variable risk-margin primarily affects life insurers. Consequentially, changes appear in the scope and structure of the insurance proposals. Simultaneously with the reduced scope of guarantees in traditionally provided services, life insurers are gradually turning to services that are less sensitive to interest rates. First, they are increasingly promoting risk insurance over insurance with a savings component. Second, there is a growing importance of unit-linked products that allow insurers to assign the interest rate risk to the insured. In the past decade, the share of unit-linked services in total life insurance premium in the EEA increased by 5 percentage points.<sup>22</sup> This tendency is especially prominent in certain countries. In the UK, for example, the share of unit-linked services in life insurance premiums increased from 37% in 1985 to 82% in 2018. In the same period, unit-linked insurance premiums in Germany grew by as much as 300%.<sup>23</sup> However, the issue has arisen of protecting the interest of the insured, because it is not logical to expect the insured to be able to assume the investment risks and adequately manage them in the long run, as do the professional insurers.<sup>24</sup> It has also been observed that the European insurers, trying to reduce the risk margin, assign an increasing part of the portfolio through reinsurance into those jurisdictions where the Solvency II rules do not apply (which especially refers to the risk of longevity).<sup>25</sup>

As a final result, market competition decreases, the price of insurance grows, consumer choice options for the insured narrow down, the insurers are encouraged to regulatory arbitrage and the risk of longevity is largely transferred to the government.

## **V. Possible Solutions to the Problem of Too High Risk Margins Sensitive to Interest Rates**

The conducted analysis shows that the problem of too high and interest-rate sensitive risk margin arises both from the method of its computation and from the

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<sup>21</sup> Association of British Insurers, Comments Template on Consultation Paper on EIOPA's second set of advice to the European Commission on specific items in the Solvency II Delegated Regulation, 2018, [https://register.eiopa.europa.eu/Publications/Comments/Association%20of%20British%20Insurers\\_01\\_03\\_18.pdf](https://register.eiopa.europa.eu/Publications/Comments/Association%20of%20British%20Insurers_01_03_18.pdf), accessed on 8. 2. 2021, pp. 54.

<sup>22</sup> European Insurance and Occupational Pensions Authority (EIOPA), Financial Stability Report, 2013–2020, [https://www.eiopa.europa.eu/type-content-document/financial-stability-report\\_en](https://www.eiopa.europa.eu/type-content-document/financial-stability-report_en), accessed on 12. 2. 2021.

<sup>23</sup> International Association of Insurance Supervisors, *Global Insurance Market Report 2019*, Basel, 2020, pp. 34.

<sup>24</sup> Marija Koprivica, Martin Balleer, „Prospects of the Insurance Sector in a Low Interest Rate Environment“, *Insurance Market After COVID-19* (editors Jelena Kočović, Tatjana Rakonjac-Antić, Biljana Jovanović Gavrilović, Branislav Boričić), Belgrade, 2020, pp. 156.

<sup>25</sup> Andrew Bulley, The new Solvency II landscape, 2016, <https://www.bankofengland.co.uk/speech/2016/the-new-solvency-ii-landscape>, accessed on 8. 2. 2021.

conditions in which the method has been applied. Therefore, possible solutions to solve or mitigate this problem include both the replacement of the existing method of computation with alternative methods, and its adaptation to current circumstances.

Having in mind that the prescribed rate of cost of capital is relatively high, it is only logical to propose to lower the rate to a level that is realistic for the insurance sector. The key argument in favour of such a solution is the fact that interest rates today are at a much lower level than at the time when the parameters of the risk-margin computation methodology had been defined. The 6% rate of capital cost was defined on the basis of the CAPM - Capital Asset Pricing Model, as a product of beta coefficient (a measure of systematic risk of the insurance sector) and market premium for the risk. Thereat, the assumed value of the beta coefficient is 1.20 and the market premium for the risk is 5%, with zero debt shares in the financial structure of the reference insurer.<sup>26</sup> However, recent empirical research shows that the beta coefficient without financial leverage (unlevered beta) of 0.5. is suitable for the insurance sector.<sup>27</sup> Consequently, an adequate rate of the cost of capital when calculating the risk margin would be  $0,5 \cdot 5 = 2,5\%$ . With a somewhat more conservative valuation, it would be reasonable to assume that this rate should amount to 3%. Similarly, the capital expenditure rate proposals formulated so far range from 2%<sup>28</sup> to 4.5%.<sup>29</sup> Lowering the rate of cost of capital may contribute to resolving the problem of too high risk margin, but not its relative sensitivity to fluctuations in interest rates.

Another possibility is to replace fixed rate of costs of capital with a variable one. Thus, for example, the rate of the costs of capital may vary according to the fluctuations of risk free interest rates used for discounting the projected costs of capital. This would reduce the problem of risk margin volatility in multiannual lines of insurance business, because the changes in the rate of costs of capital would compensate for fluctuations in the discount factors. However, it should be borne in mind that such a solution may lead to an increase in the volatility of the risk margin in short-term lines of business, where it is significantly more sensitive to the rate of capital costs than to discount factors.<sup>30</sup> Therefore, the rate of the costs of capital

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<sup>26</sup> Actuarial Association of Europe, A review of the design of the Solvency II risk margin, 2019, <https://www.actuary.eu/wp-content/uploads/2019/12/Solvency-II-Risk-Margin-FINAL-1.pdf>, accessed on 9. 2. 2021, pp. 30.

<sup>27</sup> Aswath Damodaran, Betas by Sector, 2021, [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/Betas.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html), accessed on 9. 2. 2021.

<sup>28</sup> CRO Forum & CFO Forum, Comments Template on Consultation Paper on EIOPA's second set of advice to the European Commission on specific items in the Solvency II Delegated Regulation, 2018, [https://register.eiopa.europa.eu/Publications/Comments/CRO%20Forum%20and%20CFO%20Forum\\_01\\_03\\_18.pdf](https://register.eiopa.europa.eu/Publications/Comments/CRO%20Forum%20and%20CFO%20Forum_01_03_18.pdf), accessed on 12. 2. 2021, pp. 53.

<sup>29</sup> Institute and Faculty of Actuaries, Solvency II Practical Review, 2019, <https://www.actuaries.org.uk/practice-areas/general-insurance/research-working-parties/solvency-ii-practical-review>, accessed on 12. 2. 2021, pp. 11.

<sup>30</sup> Andy Pelkiewicz, Waqar Ahmed, Paul Fulcher, Katie Johnson, Stuart Reynolds, Richard Schneider, Andy Scott, *A review of the risk margin – Solvency II and beyond*, Institute and Faculty of Actuaries, London, 2019, pp. 14.

may vary depending on the line of business, as well. Alternatively, the rate of costs of capital may decrease with increasing maturity of the cash flow to which it relates.

The subject-matter of modification within the existing method of costs of capital may also comprise the risk-free interest rates at which costs of capital are discounted. Their increase through adjustment mechanisms that are already applied for the purposes of calculating the best estimate would contribute to lowering the risk margin and its sensitivity to interest rates. The adjustments to the risk-free interest rate curve are an integral part of the package of measures for services with long-term guarantees, introduced by the 2014 Omnibus II Directive. Due to reaching compliance between the long-term liabilities with long-term investments, short-term fluctuations in asset prices do not reflect real changes in the financial position and risk exposure of insurers. Therefore, such measures should mitigate the “artificial” volatility in the balance sheet of insurers, so that when evaluating the liabilities, only partial market trends shall be taken into account. Adjustment of risk-free interest rates is realized in the form of a fixed addition to the liquid part of the yield curve, which is then extrapolated (*Volatility Adjustment*) or in the form of a parallel shift of the entire yield curves upwards (*Matching Adjustment*).<sup>31</sup> Under the valid regulations, these measures are applied only when calculating the best estimate for services with long-term guarantees. A rational solution would be to expand their application to the computation of the risk margin, in order to affect the reduction of the overall technical reserves and their volatility in the same group of services. As an alternative solution, Waszink (2013) suggests that risk-free interest rates be replaced by higher rates, which would be equal to the capital cost rate.

More radical solutions imply the introduction of the upper limit of risk-margin (e.g. as a defined percentage of the solvency capital requirement)<sup>32</sup> and/or that, instead of the capital costs method, another method of calculating the risk-margin be applied. According to the classification of the International Association of Actuaries, all defined methods of calculating the risk margin are classified into one of four categories: quantile methods, capital cost methods, methods based on conservative assumptions or on discounting future cash flows.<sup>33</sup>

Under quantile methods, the risk margin is determined as the balance between the corresponding percentile of the probability allocation of insurance

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<sup>31</sup> Directive 2014/51/EU of the European Parliament and of the Council of 16 April 2014 amending Directives 2003/71/EC and 2009/138/EC and Regulations (EC) No 1060/2009, (EU) No 1094/2010 and (EU) No 1095/2010 in respect of the powers of the European Supervisory Authority (European Insurance and Occupational Pensions Authority) and the European Supervisory Authority (European Securities and Markets Authority), *Official Journal of the European Communities*, 2014/51/EU, Art. 77b, 77d.

<sup>32</sup> Dick Rae, Aisling Barrett, Dylan Brooks, Meshali Chotai, Andy Pelkiewicz, Chen Wang, „A review of Solvency II: Has it met its objectives?“, *British Actuarial Journal*, 23(4), 2017, pp. 17.

<sup>33</sup> International Actuarial Association, *Measurement of Liabilities for Insurance Contracts: Current Estimates and Risk Margins*, Ottawa, 2009, pp. 71.

liabilities and the best estimate, as the expected values of such allocation. For this purpose, the 75th percentile of the allocation of insurance liabilities is usually taken.<sup>34</sup> In this way, we achieve that the total technical reserves equal the value at risk (*VaR*) of the given allocation at the selected level of confidence (e.g. 75%). Such an approach is justified if the probability allocation of insurance liabilities is relatively symmetrical. Otherwise, with very asymmetric allocations, it can lead to underestimation of technical provisions. In such situations, it is more appropriate to apply Conditional Value at Risk (*CVaR*), which reflects the average of all values of liabilities that exceed *VaR*.

Moreover, there are such methods by which the risk margin is reached implicitly, based on conservative assumptions that should ensure that the amount of technical provisions exceed the best estimate of insurance liabilities. Such is the case, for example, with the choice of maximum development factors when applying the *chain ladder* provisioning method. A similar effect is achieved by lowering interest rates at which the expected future cash flows are discounted by way of insurance liabilities. In this case, the methods base on discounting future cash flows, as a special case of methods based on conservative assumptions. With such a way of valuation of insurance liabilities, there would be no need for explicit computation of the risk margin because it would already be included in the total value of technical reserves of the insurers.

## VI. Conclusion

In the past implementation of Solvency II, several areas have been singled out that call for the improvement in order to make the new regulatory regime for European (re)insurers effective and justify high investments in its long-term development. One of the most controversial segments of the regime is the risk margin as an element of the technical provisions of insurers. As a consequence of inadequate prescribed values of the parameters of the capital cost method, but also of the actual low interest rates environment, the risk margin is set too high and is variable. This generates high costs for insurers, increases the volatility of their balance sheet and triggers the regulatory arbitrage. The final effect is a reduction in market competition, an increase in insurance prices and narrowing down of consumer choice for the insured.

The paper presents particular proposals for overcoming or mitigating the problem of risk margins which are set too high and are sensitive to interest rates. The proposed solutions include modifications to the current capital cost method (lowering and varying the capital cost rate, that is, increasing the risk-free interest

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<sup>34</sup> Anthony Brown, *Demystifying the Risk Margin: Theory, Practice and Regulation*, 2012, <https://sias.org.uk/media/1191/demystifying-the-risk-margin-theory-practice-and-regulation.pdf>, accessed on 29. 1. 2021, pp. 7.

rates at which capital costs are discounted), as well as abandoning this method and replacing it with other risk margin computation methods (quantile methods, methods based on conservative assumptions or on discounting future cash flows).

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