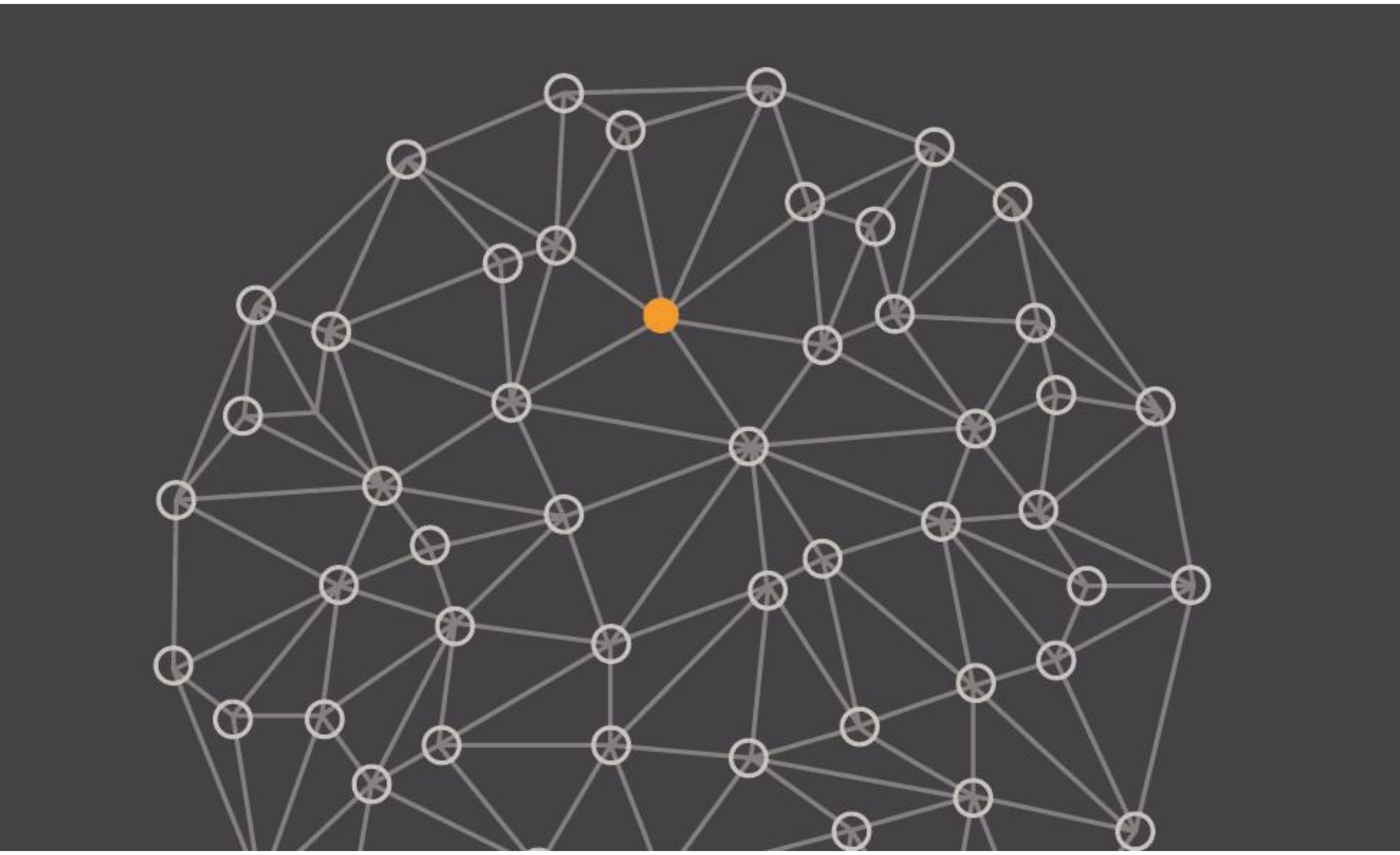
MILLIMAN RESEARCH REPORT

Analysis of Luxembourg insurers' Solvency and Financial Condition Reports

Year-end 2016

January 2018

Kurt Lambrechts, MSc, IABE
Moussa Ouedraogo, PhD
Kamiel van Langen, MSc, AAG
Simon Cureton, Drs, AAG, CERA
Peter Franken, Drs, AAG



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Management Summary

In May 2017 the first Solvency and Financial Condition Reports (SFCRs) were published for year-end 2016. The SFCRs contain a significant amount of information, including details of the company's performance over the reporting period, systems of governance, risk profile, valuation basis and capital requirements.

In this report a summary is provided of the SFCRs of the main players in the life and non-life insurance business in Luxembourg. The report focusses on the largest insurance entities in Luxembourg as well as some large reinsurance entities. Note that the group of reinsurance captives is not covered in this report.

This report includes an overview of the factors determining the Solvency Capital Requirement (SCR) ratio. An overview is given of the composition of the SCR and own funds as well as an analysis of the SCR ratio. The report also shows the sample of life and non-life insurers. In terms of gross written premiums, the sample of insurers covers approximately 85% of the life insurers' market and approximately 75% of the non-life insurers' market. It is important to realise that the Luxembourg insurance market is dominated by cross-border activities. According to the 2016 annual report of the Luxembourg supervisor Commissariat aux Assurances (CAA), 91% of written premiums is for cross-border activities.

Our sample of Luxembourg life insurers is well capitalised, having an average Solvency II (SII) ratio of 178%, with no life insurer having a Solvency II ratio lower than 100%. On aggregate level the sample of life insurers has €4.8 billion eligible own funds to cover €2.7 billion Solvency II required capital.

The Luxembourg non-life insurers in our sample are also very well capitalised, with an average Solvency II ratio of 264%. One non-life insurer has a Solvency II ratio below 100% and half of our sample has a ratio above 200%. On aggregate, our sample of non-life insurers has €5.5 billion of eligible own funds covering €2.1 billion Solvency II required capital.

The assets, liabilities and underwriting for non-life and life business in Luxembourg are also considered in this report. The analysis of assets shows a strong preference of Luxembourg insurers for government and corporate bonds.

We hope you enjoy reading this report.

Introduction

BACKGROUND

Under Solvency II, European insurers are required to publish their Solvency and Financial Condition Reports (SFCRs) for the first time in May 2017,[1] with the valuation date year-end 2016. The SFCRs contain a significant amount of information, including details of the company's performance over the reporting period, systems of governance, risk profile, valuation basis and capital requirements. In addition, the SFCRs also include a number of Quantitative Reporting Templates (QRTs) providing details of the companies' financial positions under Solvency II.

The main basis for this analysis has been the information included in the QRTs. However, we have also reviewed the SFCRs to supplement the quantitative analysis. The objective of this analysis is to compare the information provided in the QRTs and SFCRs to see whether we can draw any conclusions on the balance sheets and risk exposures of Luxembourg insurers.

COMPANIES INCLUDED IN THIS ANALYSIS

In selecting the companies included in this analysis, we focussed on a subset of insurers in the Luxembourg market. Our focus was on life and non-life insurers: in total, 25 life insurers and 21 non-life insurers. Within the group of non-life insurers, 15 are primary non-life insurers and six are reinsurers focussing on non-life business. Note that these reinsurers are not the captive type of reinsurers; the category of captive reinsurers is not treated in this report. In Appendix 1 a table is provided with an overview of the companies included in our analysis. In terms of gross written premiums the sample of insurers covers approximately 85% of the life insurers' market of Luxembourg and approximately 75% of the non-life insurers' market.

UNDERLYING DATA

The analysis underlying this report focusses on the quantitative information contained in the public QRTs. Where relevant we have also studied the SFCRs to gain some additional insights into some companies, in particular when they displayed characteristics that differed from the market average.

[1] The publication date for solo entity SFCRs was 20 May 2017 while group SFCRs were subject to a later publication date of 1 July 2017.

Analysis of the Luxembourg insurance market

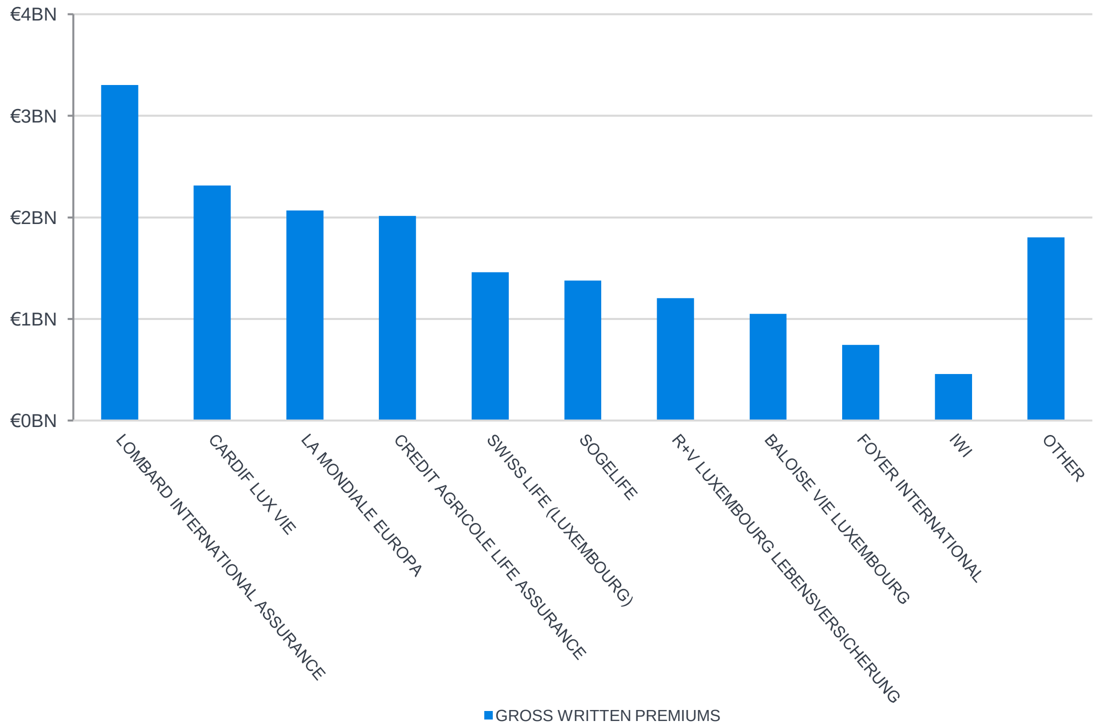
In Luxembourg, life and non-life business is written in different legal entities. It is useful to realise that the Luxembourg insurance market is dominated by cross-border activities. According to the 2016 annual report[2] of the Luxembourg authority responsible for the supervision of the insurance sector (the Commissariat aux Assurances, or CAA), 91% of written premiums is for cross-border activities. For nondomestic activities the life business is slightly higher than the non-life business. Despite the large cross-border activities, Luxembourg is still the seventh country in the world in terms of yearly written premium per resident for domestic business.

In Figure 1 and Figure 2 an overview is given of the gross written premium for life and non-life companies. In Figure 3 and Figure 4 an overview is given of the level of assets and technical provisions per undertaking. From these figures it is clear that Lombard International Assurance is the largest of the life insurance companies in terms of gross written premium of our sample (19% market share in terms of gross written premiums).

In our sample we have covered 85% of the life insurance market[3] in terms of premiums (25 companies) and 75% of the non-life insurance market (21 companies). Given the relative small size of Luxembourg the insurance density is high. Moreover, it is noteworthy to mention that the level of assets compared to premium volume differs significantly within the sample. In addition, as expected, non-life insurers typically have a higher premium volume relative to their total assets compared to life insurers.

The three largest life insurers in terms of total assets are Lombard International, Cardif Life and Credit Agricole. The largest non-life insurer in terms of total assets is Swiss Re Europe. Note that this is the European headquarters of Swiss Re, so the business shown here is not primarily business that covers activities in Luxembourg. Compared to Swiss Re the other non-life insurers are relatively small.

FIGURE 1: GROSS WRITTEN PREMIUM PER LIFE INSURER

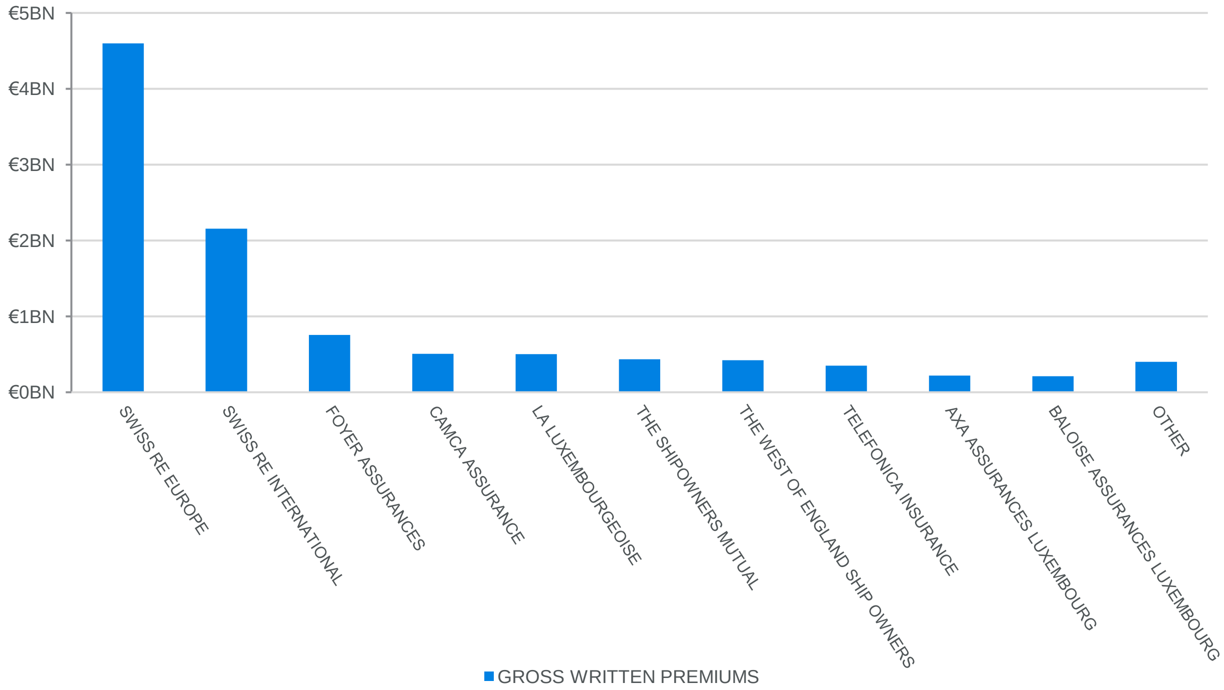


Note: The 10 largest companies in terms of gross written premium are shown. The other 15 life insurers form our sample are in the category 'other'.

[2] The 2016 annual report of the Luxembourg authority competent for the supervision of the insurance sector can be found at http://www.commassu.lu/fr/statistiques/default.asp.

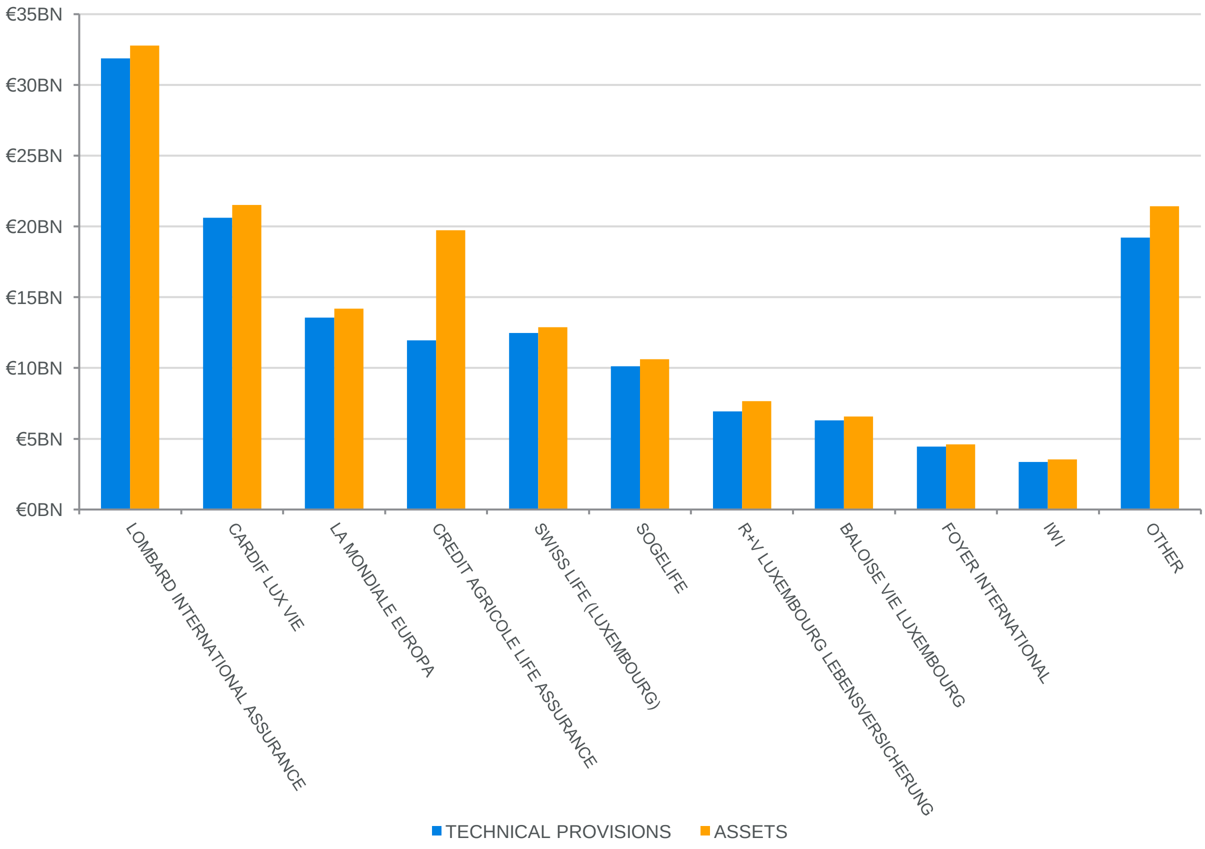
[3] The statistics of the Luxembourg market for year-end 2016 are provided by the Luxembourg authority competent for the supervision of the insurance sector at http://www.commassu.lu/fr/statistiques/default.asp.

FIGURE 2: GROSS WRITTEN PREMIUM PER NON-LIFE INSURER



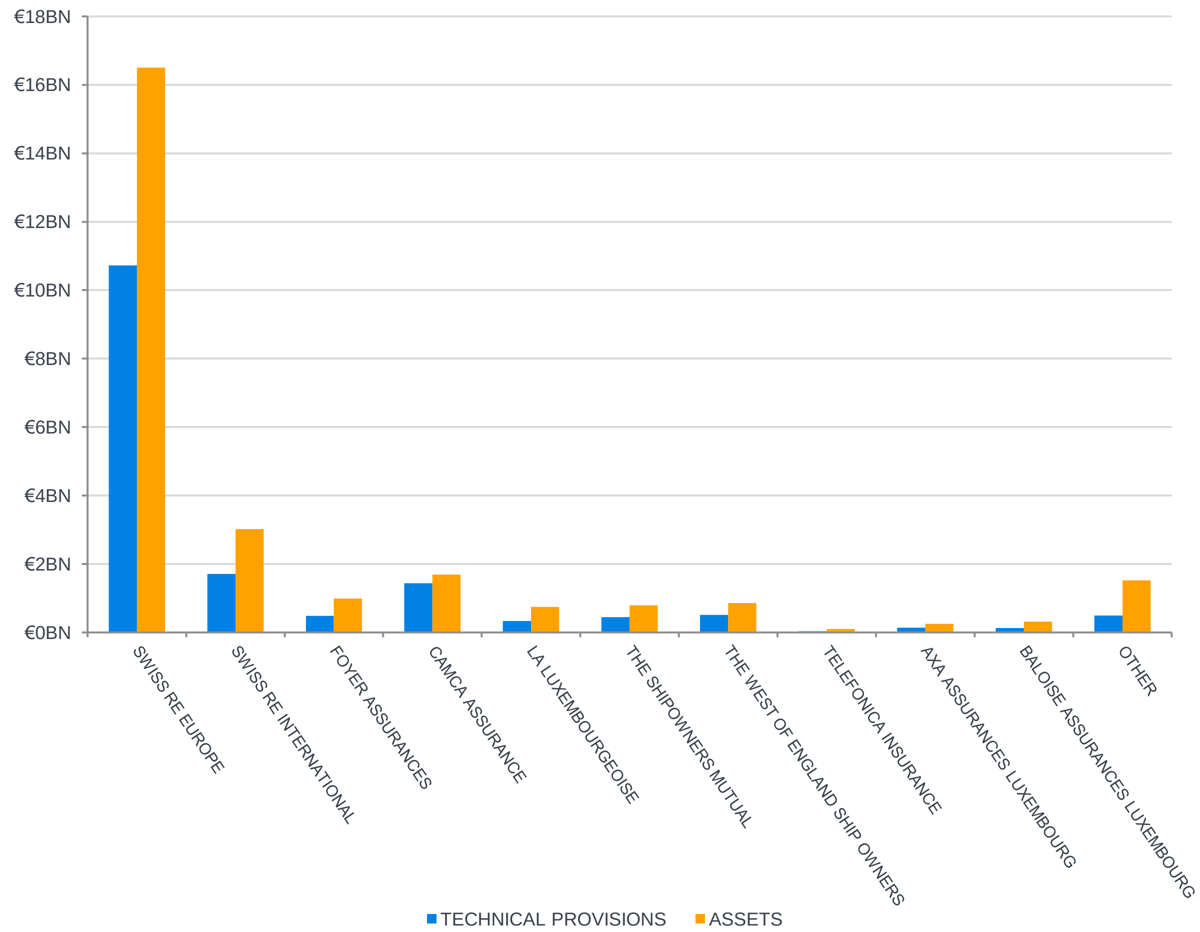
Note: Only the 10 largest companies in terms of gross written premium are shown. The other 11 non-life insurers are in the category 'other'.

FIGURE 3: GROSS TECHNICAL PROVISIONS AND TOTAL ASSETS PER LIFE INSURER



Note: Only the 10 largest life companies in terms of gross written premiums are shown. The other 15 life insurers in our sample are in the category 'other'.

FIGURE 4: GROSS TECHNICAL PROVISIONS AND TOTAL ASSETS PER NON-LIFE INSURER



Note: The 10 largest non-life companies in terms of gross written premiums are shown. The other 11 non-life insurers in our sample are in the category 'other'.

On an aggregate level, life insurance undertakings from our sample are well capitalised, with an average solvency coverage ratio (eligible own funds / Solvency Capital Requirement) equal to 178% (Figure 5) and an average Minimum Capital Requirement (MCR) ratio of 485%. None of the life insurers have a Solvency II ratio below 100%. Based on these numbers, Generali (345%), ERGO Life (300%), Vitis Life (276%) and R+V Luxembourg (248%) have the highest Solvency II ratios of the life insurers, compared to Raffeisen Vie (130%) and Euresa Life (106%), with the lowest Solvency II ratios.

The average Solvency II ratio of the non-life insurers (Figure 6) is fairly high, with 262%. The average MCR ratio is 642%. Of the non-life insurers, Swiss Re International (379%), Baloise (305%), The West of England Ship Owners (301%) and Spandilux (299%) have the highest Solvency II ratios. CAMCA Assurance (130%) and Telefonica Insurance (73%) have the lowest Solvency II ratios.

Moreover, it is useful to note that only the insurers Swiss Re Europe and Swiss Re International do not apply the standard formula for their capital calculations but use a full internal model (FIM). All other Luxembourg companies apply the standard formula.

FIGURE 5: SOLVENCY II FIGURES, LUXEMBOURG LIFE INSURERS AT YEAR-END 2016 (€ MILLIONS)

NAME	ELIGIBLE OWN FUNDS TO SCR	SCR	SCR RATIO	MCR RATIO	RANK SCR
LOMBARD INTERNATIONAL ASSURANCE	512	392	130%	290%	23
CARDIF LUX VIE	544	375	145%	311%	20
LA MONDIALE EUROPA	427	294	145%	509%	19
CREDIT AGRICOLE LIFE ASSURANCE	342	147	233%	932%	5
SWISS LIFE (LUXEMBOURG)	271	151	179%	389%	13
SOGELIFE	392	207	189%	645%	11
R+V LUXEMBOURG LEBENSVERSICHERUNG	642	259	248%	991%	4
BALOISE VIE LUXEMBOURG	134	65	206%	459%	9
FOYER INTERNATIONAL	106	69	153%	328%	16
IWI	101	64	157%	350%	15
THE ONE LIFE COMPANY	147	90	164%	390%	14
GENERALI LUXEMBOURG	100	29	345%	1379%	1
NN LIFE LUXEMBOURG	24	17	141%	313%	21
LA LUXEMBOURGEOISE VIE	262	124	211%	673%	8
FWU LIFE INSURANCE LUX	84	58	146%	583%	18
FOYER VIE	353	190	186%	681%	12
VITIS LIFE LUXEMBOURG (KBC)	76	27	276%	613%	3
AXA ASSURANCES VIE LUXEMBOURG	99	44	225%	499%	7
ERGO LIFE	79	26	300%	666%	2
AME LIFE LUX	16	10	151%	335%	17
IPTIQ LIFE	37	18	204%	454%	10
ASPECTA ASSURANCE INTERNATIONAL	22	17	134%	537%	22
ZURICH EUROLIFE	8	3	226%	203%	6
RAIFFEISEN VIE	32	24	130%	518%	24
EURESA LIFE	9	9	106%	244%	25
ALL	**4,817**	**2,711**	**178%**	**485%**	

FIGURE 6: SOLVENCY II FIGURES, LUXEMBOURG NON-LIFE INSURERS AT YEAR-END 2016 (€ MILLIONS)

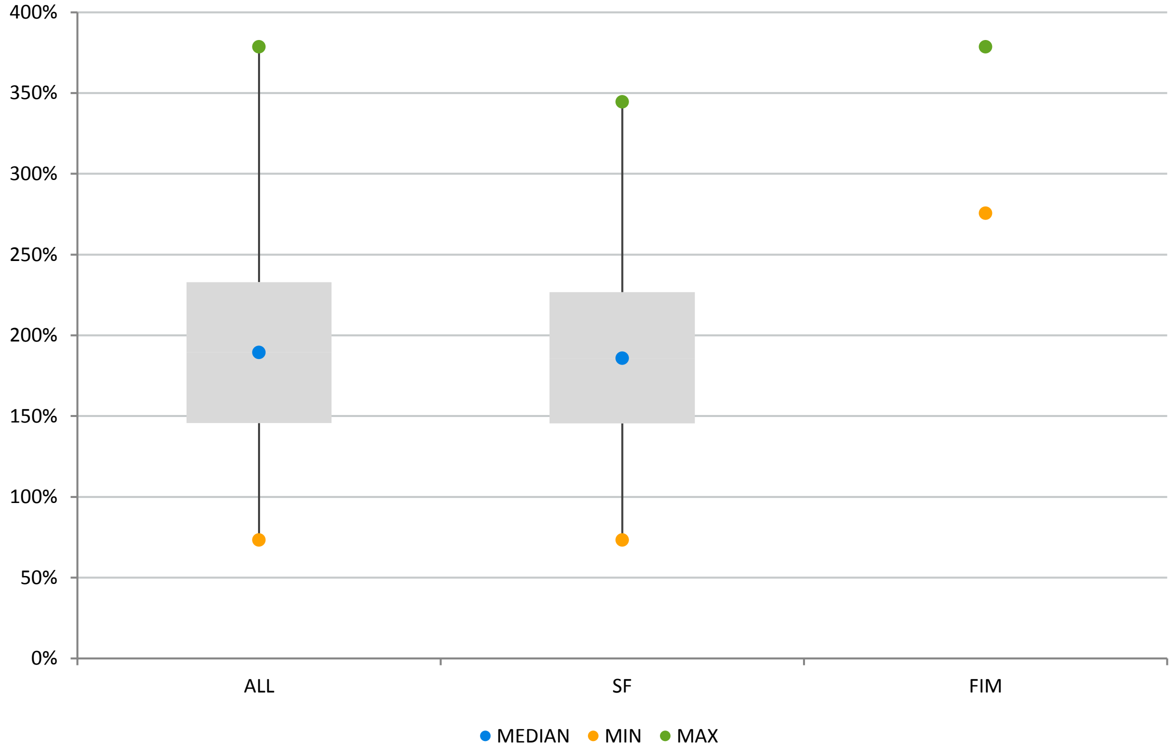
NAME	ELIGIBLE OWN FUNDS TO SCR	SCR	SCR RATIO	MCR RATIO	RANK SCR
SWISS RE EUROPE	2,679	972	276%	605%	7
SWISS RE INTERNATIONAL	486	128	379%	840%	2
FOYER ASSURANCES	252	130	194%	489%	12
CAMCA ASSURANCE	185	142	130%	289%	20
LA LUXEMBOURGEOISE	271	179	151%	604%	17
THE SHIPOWNERS MUTUAL	333	137	244%	776%	8
THE WEST OF ENGLAND SHIP OWNERS	347	116	301%	1002%	4
TELEFONICA INSURANCE	30	41	73%	252%	21
AXA ASSURANCES LUXEMBOURG	69	34	203%	451%	11
BALOISE ASSURANCES LUXEMBOURG	96	32	305%	677%	3
GLOBALITY	26	19	139%	556%	18
INTERNATIONAL SHIPOWNERS RE	160	75	215%	455%	10
FOYER SANTÉ	20	12	172%	690%	14
D.K.V. LUXEMBOURG	31	11	284%	1138%	6
LA COLONNADE	24	18	136%	364%	19
FOYER ARAG	12	7	168%	473%	15
CAMCA REASSURANCE	482	47	1029%	2636%	1
FOYER RÉASSURANCE	14	7	190%	381%	13
D.A.S. LUXEMBURG	5	3	162%	197%	16
CGPA EUROPE	4	2	228%	117%	9
SPANDILUX	24	8	299%	667%	5
ALL	**5,520**	**2,107**	**262%**	**642%**	

Analysis of SCRs and own funds

In this analysis, 46 insurance companies are covered, 25 life insurers and 21 non-life insurers (of which six are reinsurers). Figure 7 shows how the SCR ratio is distributed within the sample of insurers. There is a wide range of SCR ratios for undertakings. Nineteen show SCR ratios of over 200%, with Swiss Re International having the highest, 379%. Only one of the undertakings in this sample has an SCR ratio below 100% (Telefonica Insurance, 73%).

All but two insurers in the Luxembourg market use the standard formula (SF) to calculate their SCRs. The average SCR ratio of Swiss Re Europe and Swiss Re International using a FIM is higher than the average of the non-life insurance companies using the standard formula. The maximum ratio reported is Swiss Re International and it is remarkable that this company is using a FIM in their capital calculations. The maximum SCR ratio of 1,029% (not reported in Figure 5 above) is observed for the non-life reinsurer Camca Reinsurance. This one is left out of that analysis as it is a unique outlier that would not add additional information to the analysis.

FIGURE 7: SCR RATIO FOR ALL INSURERS IN SAMPLE (ALL), FOR INSURERS APPLYING THE STANDARD FORMULA INCLUDING UNDERTAKING-SPECIFIC PARAMETERS (SF) AND FOR INSURERS USING A FULL INTERNAL MODEL (FIM)



ANALYSIS OF SCR AND MCR: STANDARD FORMULA

Luxembourg

Undertakings are required to cover all risks that can affect their balance sheets, i.e., their solvency positions. In Figure 8 the breakdown of the SCR is shown on an aggregate basis. The intangible asset risk is not reported, as all undertakings from the sample have reported 'zero' for this risk. Market risk is the highest risk as it covers 104% of the overall SCR. The second-highest risk is life underwriting, which covers 55%, followed by non-life risk (18%). Diversification benefit accounts for 37% of total SCR.

FIGURE 8: BREAKDOWN OF SCR BY RISK MODULE ON AN AGGREGATE BASIS

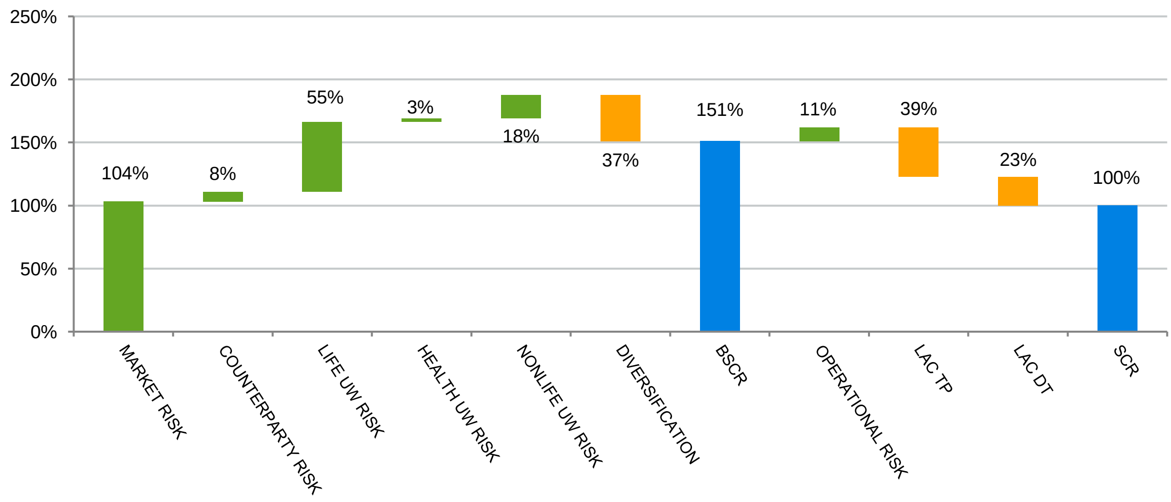
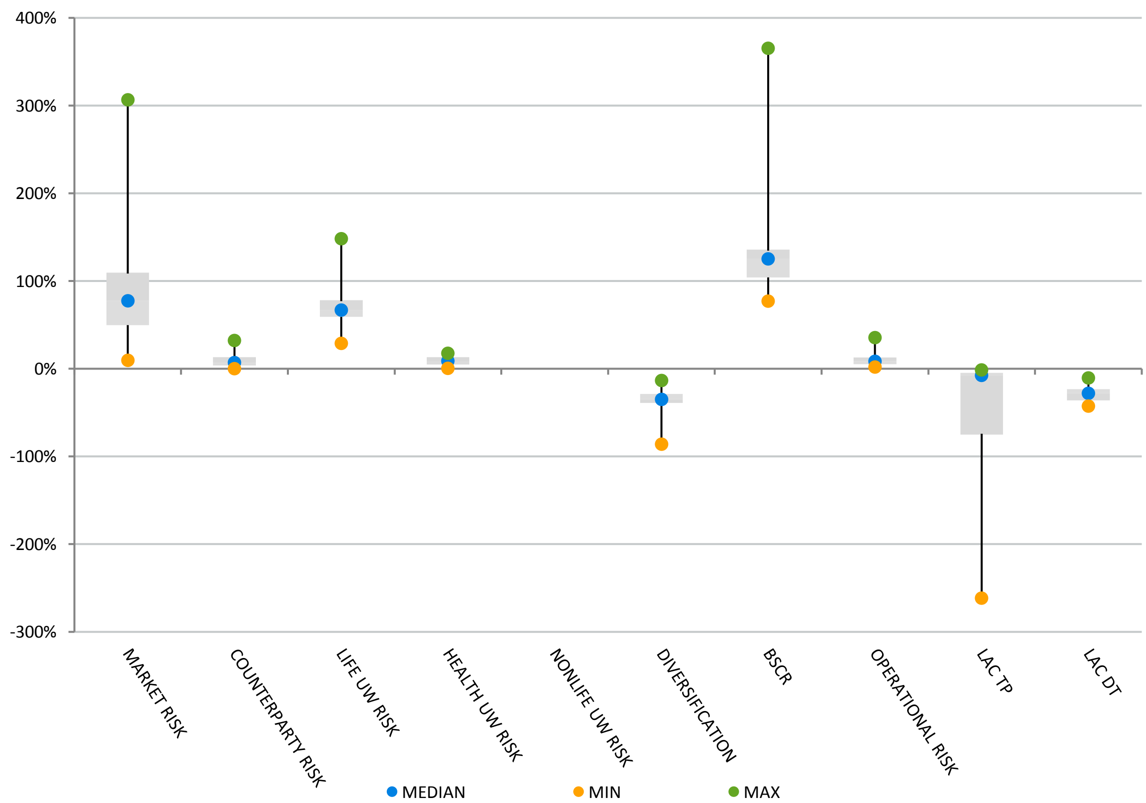


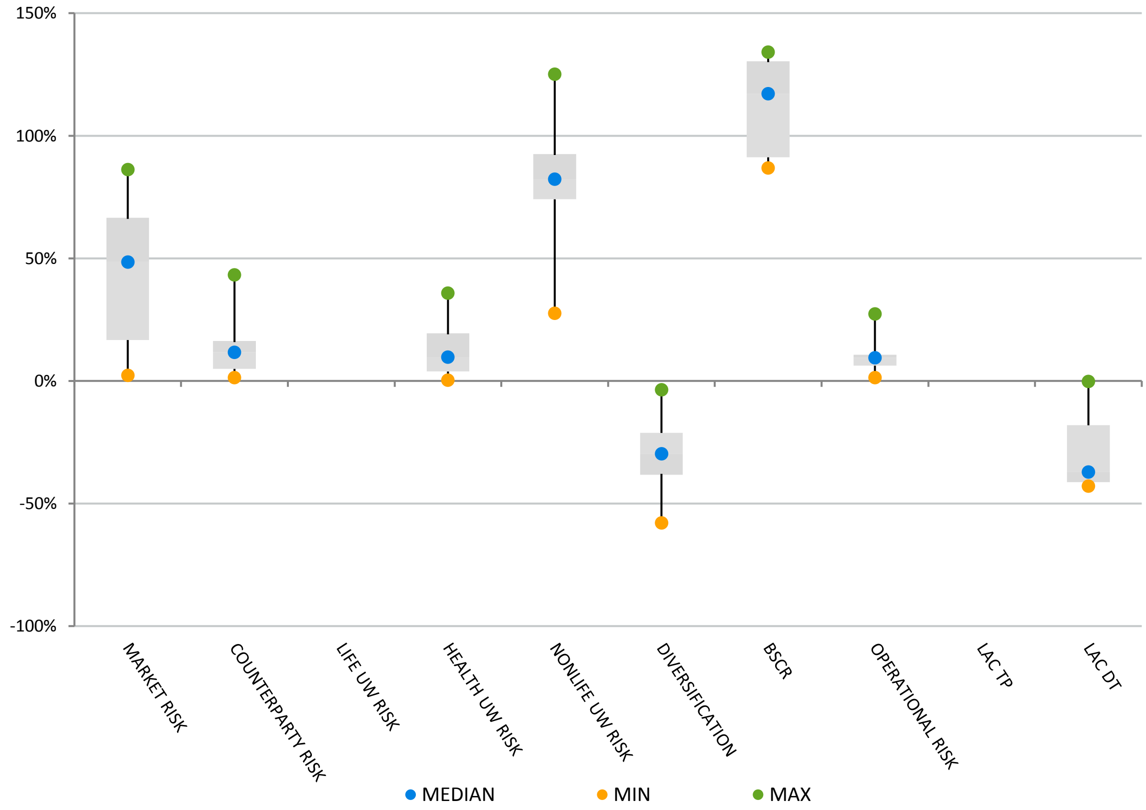
Figure 9 and Figure 10 show some descriptive statistics about each risk driver for our sample. As mentioned in the paragraph above, market risk and life underwriting risk are clearly the highest risk drivers, and moreover they show the widest ranges (i.e., differences among insurers). In Luxembourg the loss-absorbing capacity of technical provisions (LAC TP) is relatively high (39%), as a large portion of life business has discretionary profit sharing. Further, we observe that the loss-absorbing capacity of deferred taxes (LAC DT) is capped to the deferred tax liability (DTL). No allowance is made for future profits in determining the LAC DT factor. On average, the LAC DT is however still relatively high, which is due to the high DTL position. LAC DT is equal to 23% of the SCR.

FIGURE 9: SPLIT OF SUB-MODULES WITHIN SII STANDARD FORMULA IN SAMPLE FOR LIFE COMPANIES APPLYING STANDARD FORMULA



Note: A detailed overview of these numbers can be found in Appendix B.

FIGURE 10: SPLIT OF SUB-MODULES WITHIN SII STANDARD FORMULA IN SAMPLE FOR NON-LIFE COMPANIES APPLYING STANDARD FORMULA



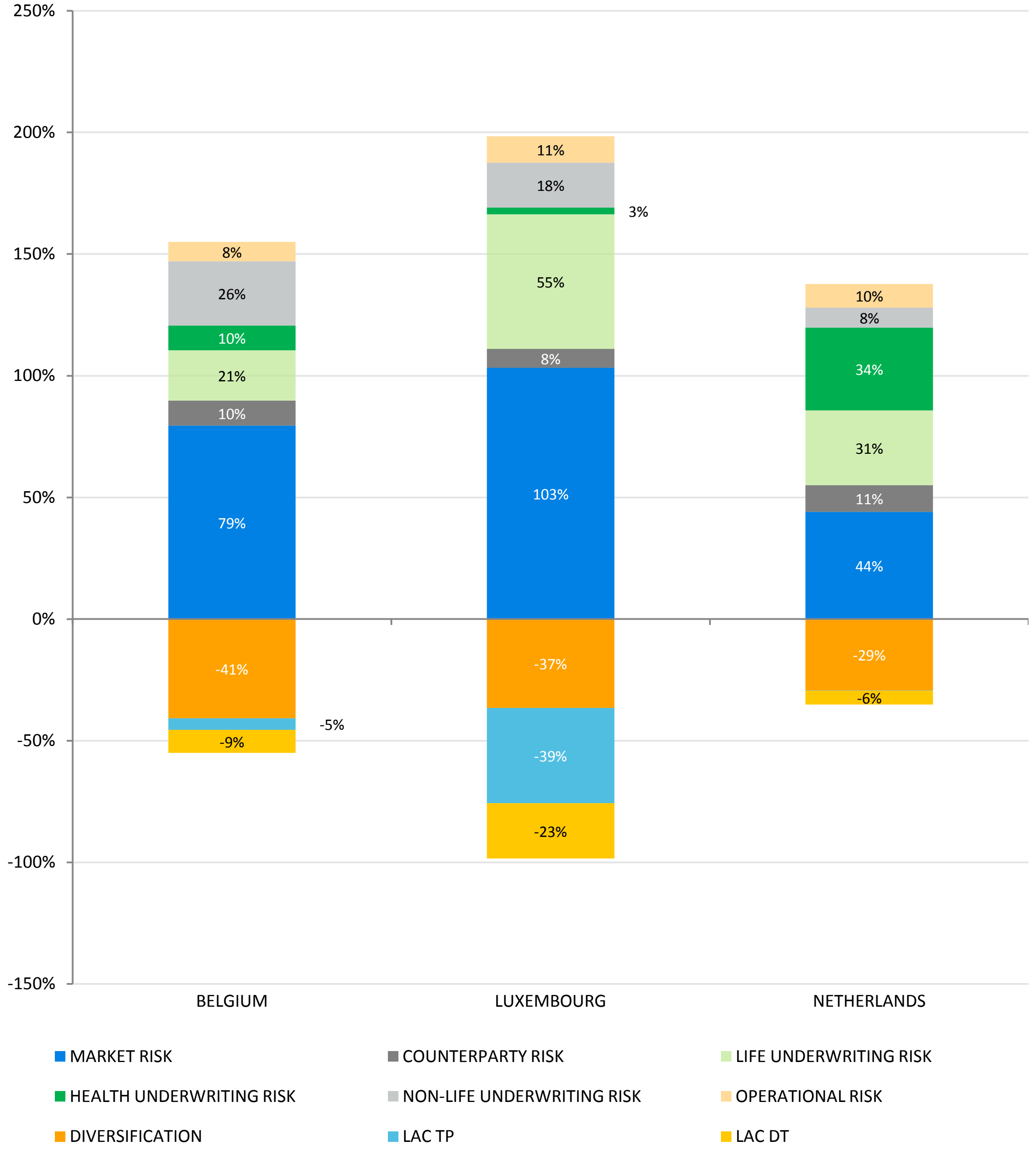
Note: A detailed overview of these numbers can be found in Appendix B.

Comparison to Belgium and the Netherlands

Comparing the breakdown of risks of the sample of Luxembourg insurers with the breakdown of risks observed in Belgium and the Netherlands (see Figure 11), we can draw the following conclusions:

- Market risk is the highest risk of the SCR for all countries. Luxembourg shows specific characteristics as its market risk represents more than 100% of the SCR (considering market risk prior to diversification). Market risk for Luxembourg insurers (103%) and Belgian insurers (79%) is far higher than for insurers in the Netherlands (44%). The SFCRs do not provide a breakdown of market risks so it is difficult to draw any conclusions as to the reasons behind these differences. However, it is noteworthy that market risk indicates investments in more risky assets with upward potential of an insurer in terms of results. It is interesting to see there are large differences among these European countries.
- In Luxembourg (and the Netherlands), we observe that the non-life underwriting risk is significantly lower than the life underwriting risk. The life underwriting risks are relatively large in both the Netherlands and Luxembourg due to the large portion of savings business in these countries.
- The level of health risk in the Netherlands (34%) is far higher than in Belgium (10%) or Luxembourg (3%), which is due to the obligatory basic health insurance coverage for all citizens in the Netherlands, through which the premium volumes for health are relatively very large.
- Diversification represents approximately 40% of the SCR for Belgium and Luxembourg while it is approximately 10% lower in the Netherlands. Because most of the Belgian undertakings pursue both life and non-life activities, we would expect diversification to be significantly higher in Belgium compared to Luxembourg. However, the Luxembourg insurers benefit from the fact that they have a relatively higher diversification between market and total underwriting risk compared to Belgium.
- The high LAC DT in Luxembourg is caused by a high DTL position compared to Belgium and the Netherlands. The LAC TP in Luxembourg is quite high, expectedly, due to a large amount of discretionary profit sharing partly offsetting the high market risk exposure.

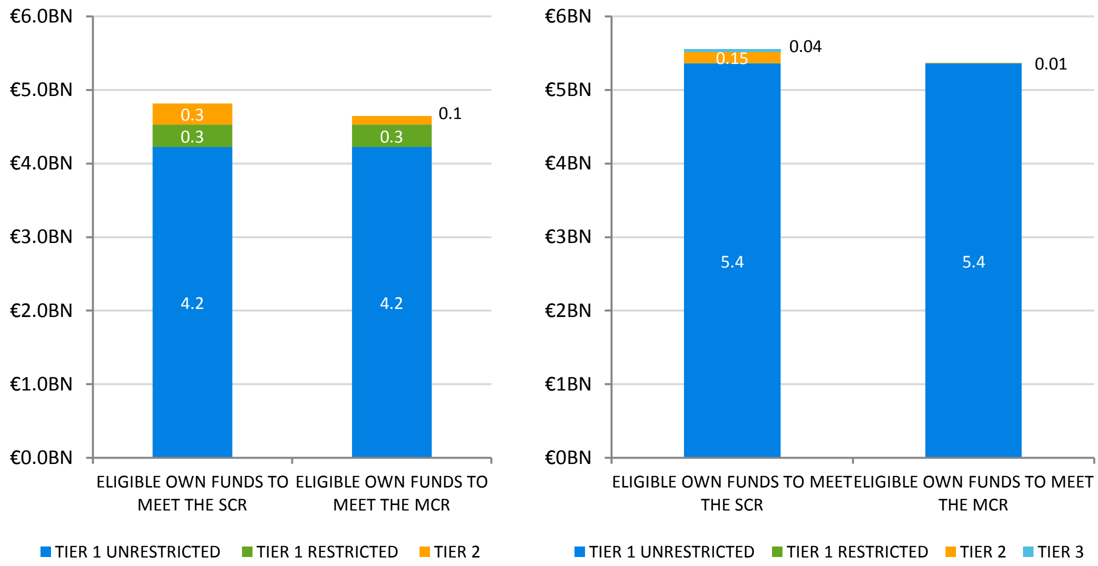
FIGURE 11: SCR BREAKDOWN BY RISK MODULE FOR UNDERTAKINGS USING STANDARD FORMULA IN BELGIUM, LUXEMBOURG AND THE NETHERLANDS



ANALYSIS OF OWN FUNDS AND TIERING

Own funds are divided into three tiers based on their quality. Tier 1 capital is the highest ranking with the greatest loss-absorbing capacity, such as equity or bonds. Tier 2 own funds are composed of hybrid debt and Tier 3 of other capital. As shown in Figure 12, insurers' own funds are considered of good quality, with over 90% classified in Tier 1 (life insurers slightly lower, non-life insurers higher). Note that the higher capital eligible for SCR compared to eligible capital for MCR is caused by more Tier 2 and Tier 3 capital to cover the SCR.

FIGURE 12: TIERING OF ELIGIBLE OWN FUNDS TO MEET SCR AND MCR (LEFT: LIFE, RIGHT: NON-LIFE)



In Figure 13 the allocation of own funds in basic and ancillary own funds by type is given. It appears that for non-life companies basic funds mainly consist of the reconciliation reserve (76%), followed by ordinary share capital (23%) and deferred tax asset (DTA), at 1%. For life companies, basic own funds consist of the reconciliation reserve (60%), ordinary share capital (31%) and subordinated liabilities (9%).

FIGURE 13: DISTRIBUTION OF OWN FUNDS TIERING FOR THE COMPANIES IN THE SAMPLE (LEFT: LIFE, RIGHT: NON-LIFE)

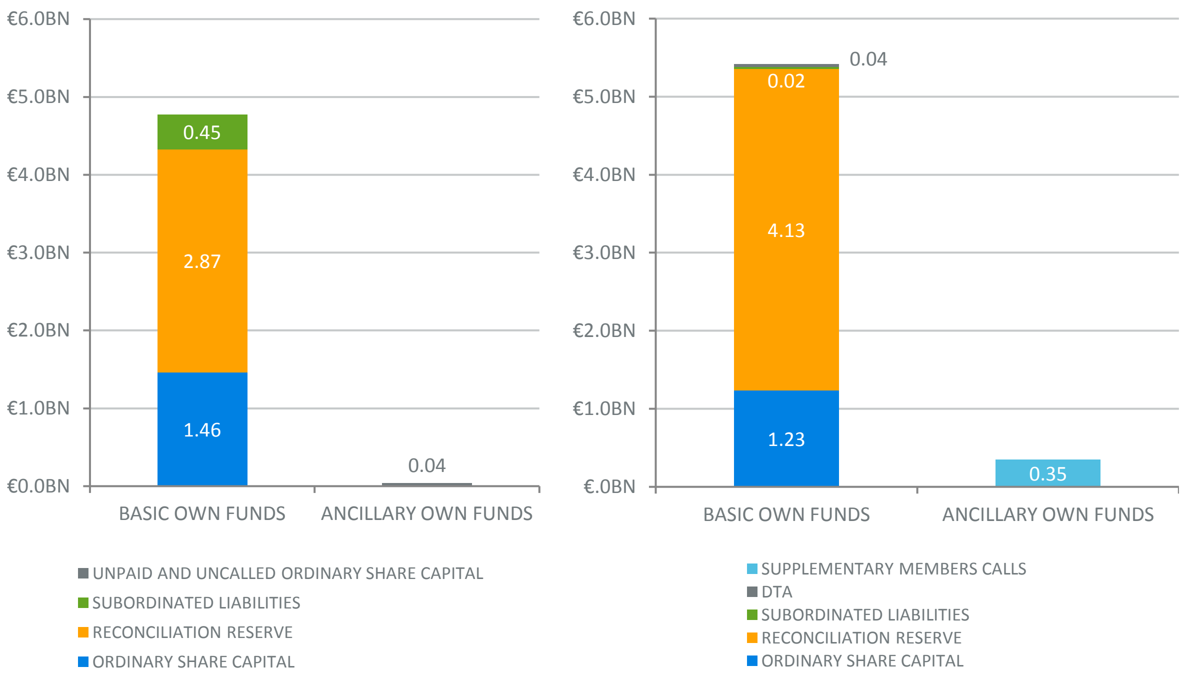
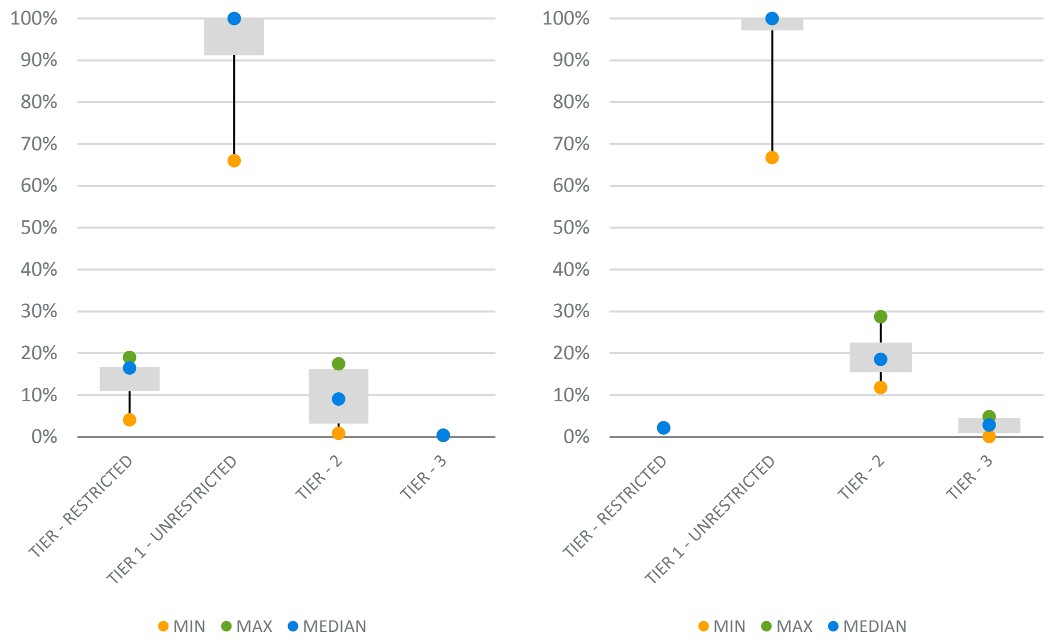


Figure 14 gives more descriptive statistics about the tiering for our sample of insurers. On average, over 90% of the undertakings own funds are classified as Tier 1, unrestricted. Four life undertakings (Credit Agricole, Cardif, La Mondiale Europa SA, Sogelife SA) have far smaller than average own funds classified in Tier 1. For these undertakings, the remaining own funds are equally split between Tier 1, restricted, and Tier 2.

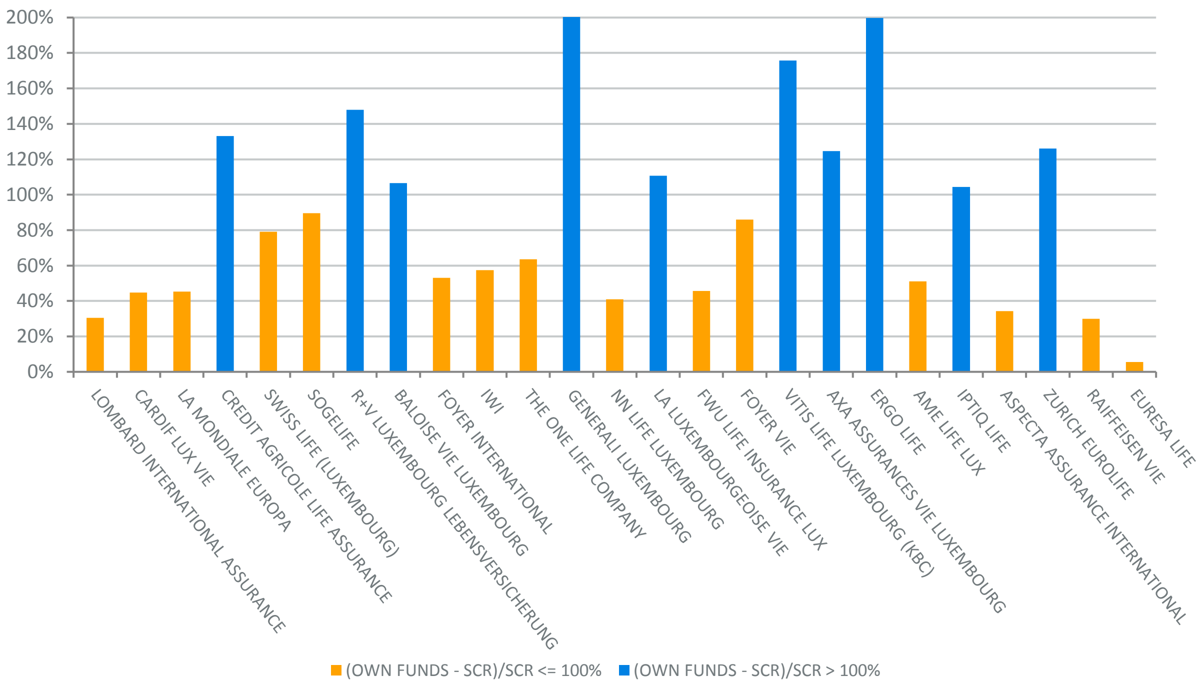
FIGURE 14: COMPOSITION OF BASIC OWN FUNDS AND ANCILLARY OWN FUNDS (LEFT: LIFE, RIGHT: NON-LIFE)



STRESS TEST SCR

The Solvency Capital Requirement (SCR) is calibrated such that the probability that the undertaking can meet its obligations to policyholders and beneficiaries over the following 12 months is equal to 99.5%. If a shock the size of the SCR should occur, 10 out of 25 life insurance firms from our sample would see their solvency coverage ratios remain above 100%, as shown in Figure 15, implying a starting solvency coverage ratio above 200%. We can note that three additional firms (Baloise Vie, La Luxembourgeoise vie and IptiQ Life) have ratios between the remaining own funds and SCR that is within the interval (100% to 115%}. Moreover, 15 out of 25 firms have solvency coverage ratios below 100%, of which Euresa Life will have the lowest solvency coverage ratio after an SCR shock.

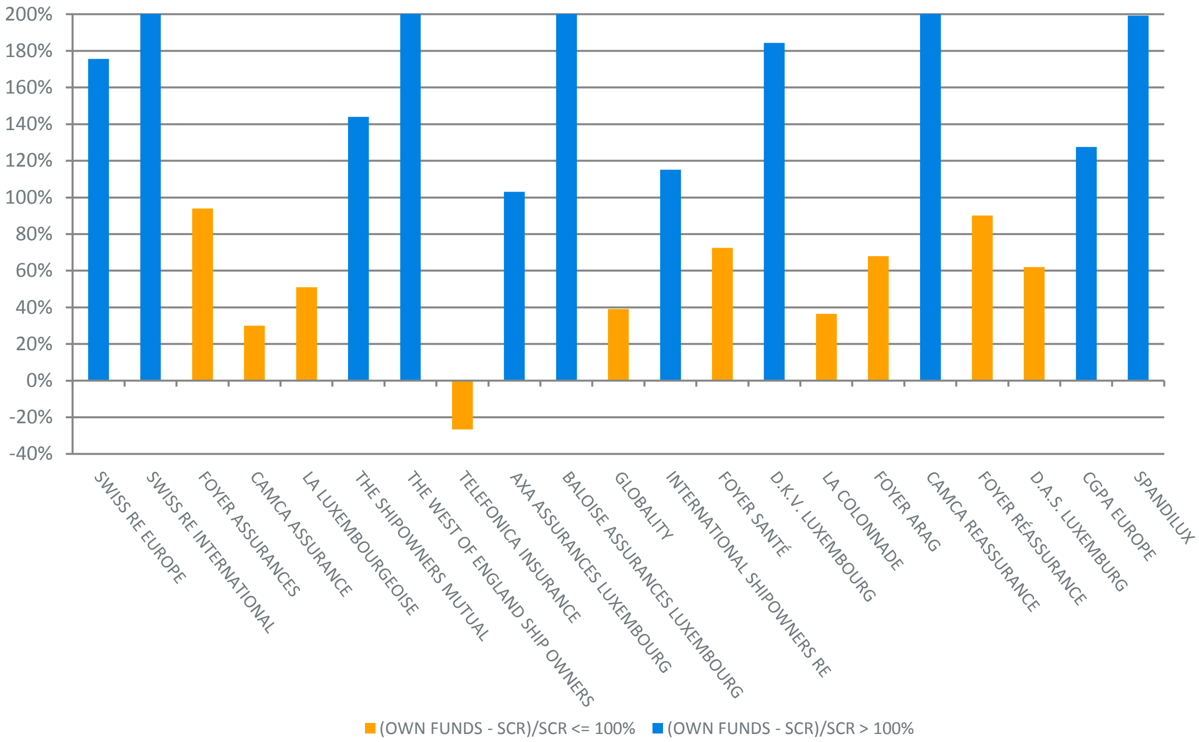
FIGURE 15: SOLVENCY COVERAGE RATIO AFTER A LOSS EQUAL TO THE SCR FOR LIFE COMPANIES.



Note: The total bar shows the solvency coverage ratio [= own funds / SCR]. The Ratio axis is cut off at 200%.

Figure 16 shows that nine out of 25 non-life insurers would see their own funds below the SCR after a shock equal to the SCR. Telefonica would see its Solvency II ratio decrease below zero. Even after an SCR-sized shock, eight non-life insurers remains very soundly capitalised, above 140%. For these companies the option of showing profits after a shock may lead to opportunities, should the regulator allow for a higher LAC DT than the available DTL as currently prescribed by the European Insurance and Occupational Pensions Authority (EIOPA).

FIGURE 16: SOLVENCY COVERAGE RATIO AFTER A LOSS EQUAL TO SCR FOR NON-LIFE COMPANIES



Note: The Ratio axis is cut off at 200%.

Analysis of assets

The investment strategy of undertakings in Luxembourg is clearly marked by a preference for government bonds, which account for 45% of the total investments (Figure 17 and Figure 18). Corporate bonds account for 12% of total investments for life companies and 32% for non-life companies. Thus, corporate and government bonds still largely dominate the companies' portfolios, accounting for more than 57% of total investments for life companies and more than 77% for non-life companies. Beyond their attractive structures—regular payments allowing insurers to match the future claims payments—they are also less expensive in terms of capital than more volatile assets such as equities.

FIGURE 17: ALLOCATION OF INVESTMENTS BY ASSET CLASS FOR LIFE COMPANIES

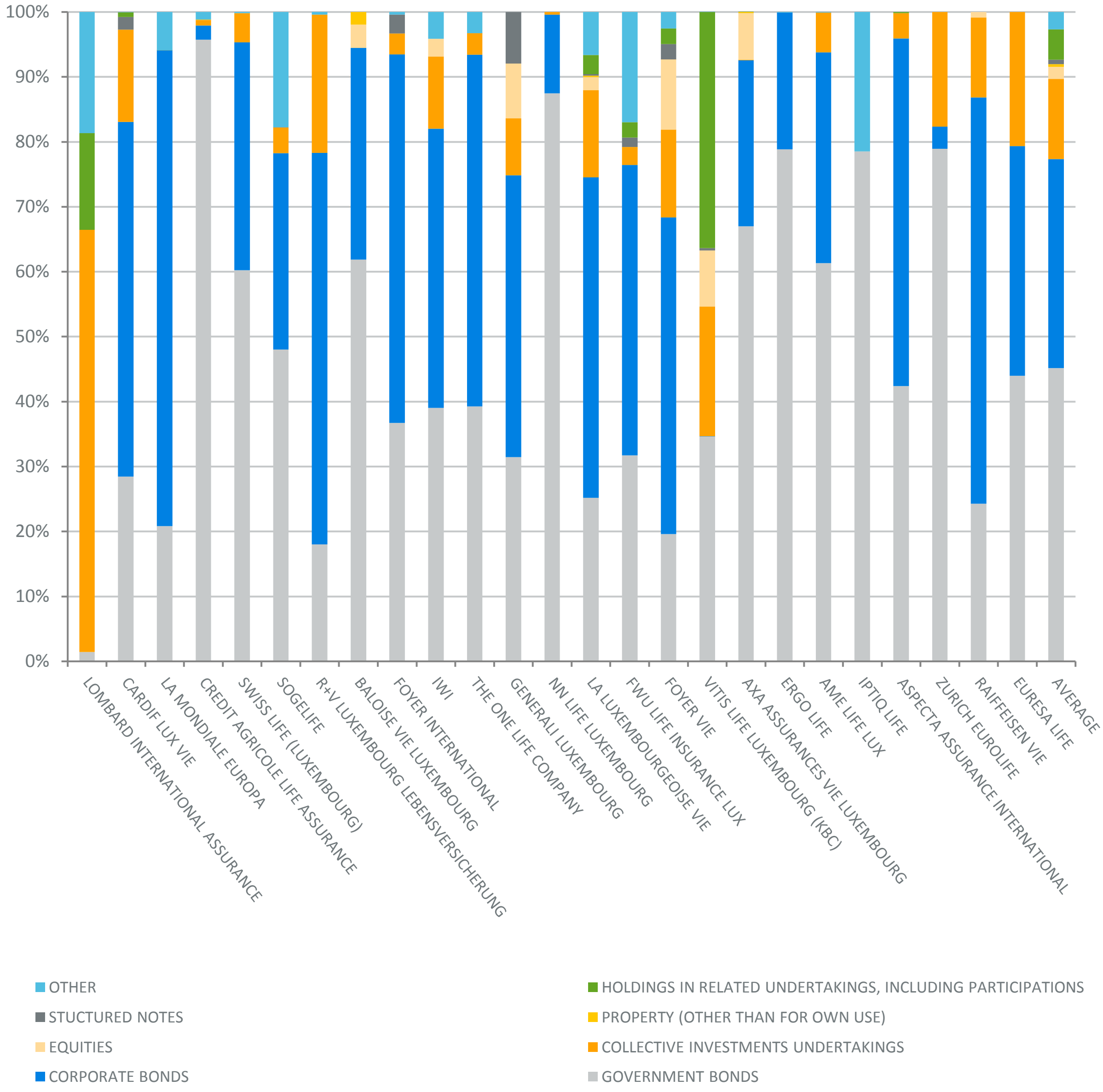


FIGURE 18: ALLOCATION OF INVESTMENTS BY ASSET CLASS FOR NON-LIFE COMPANIES

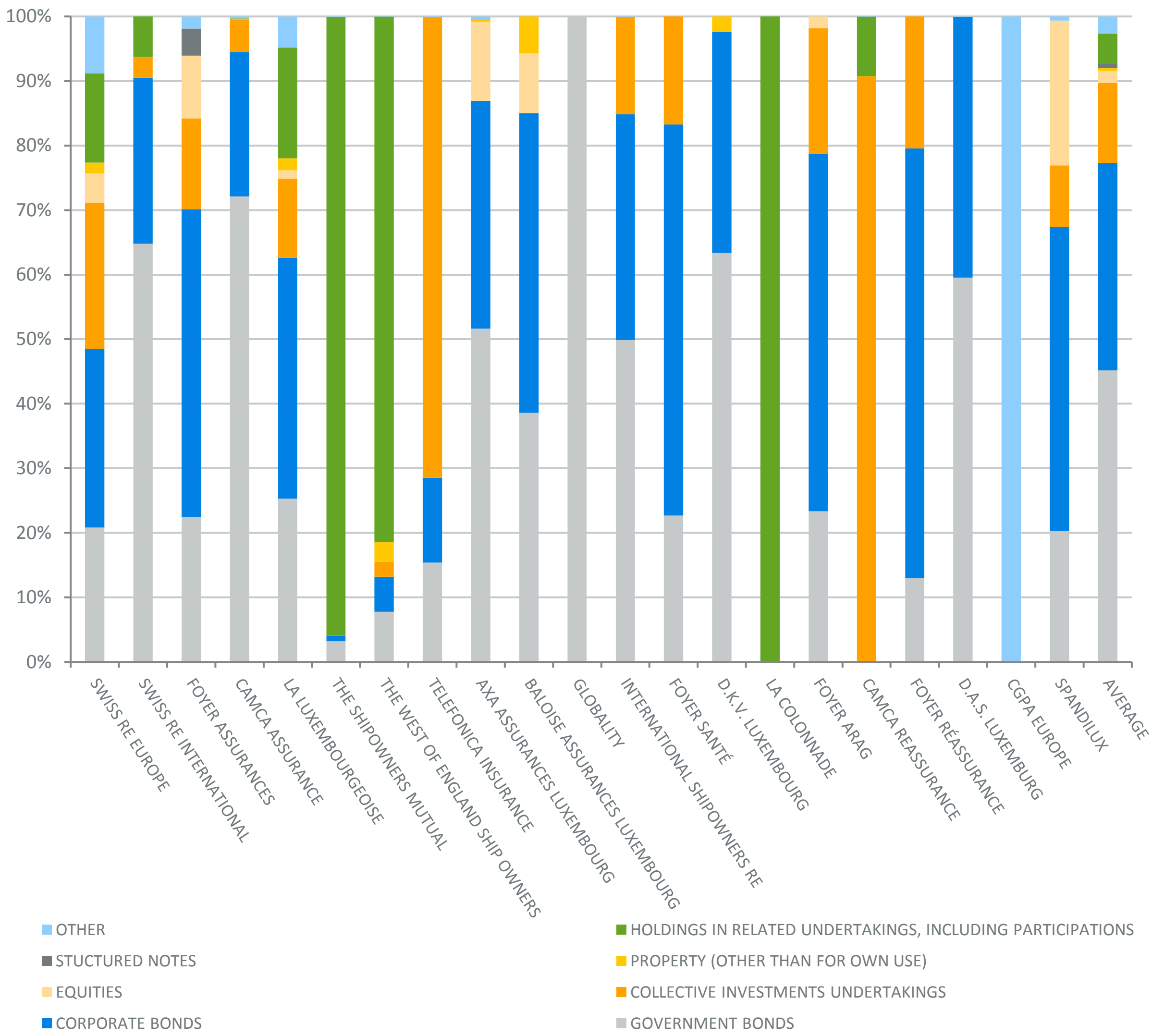


Figure 19 shows the range and statistics for investment share of each asset class. The wide ranges of percentages for government bonds and corporate bonds highlight greater differences in investment strategies than observed on aggregate. Lombard International has a far smaller total bond portfolio than the average observed in the market. This is due to a high level of collective investments. It does the highest percentage of investments in collective investments (65%). All undertakings show limited interest in equities, which account for an average of 2% of total investments. The same counts for investments in property and other investment classes.

FIGURE 19: DISTRIBUTION OF INVESTMENTS BY ASSET CLASS FOR LIFE COMPANIES

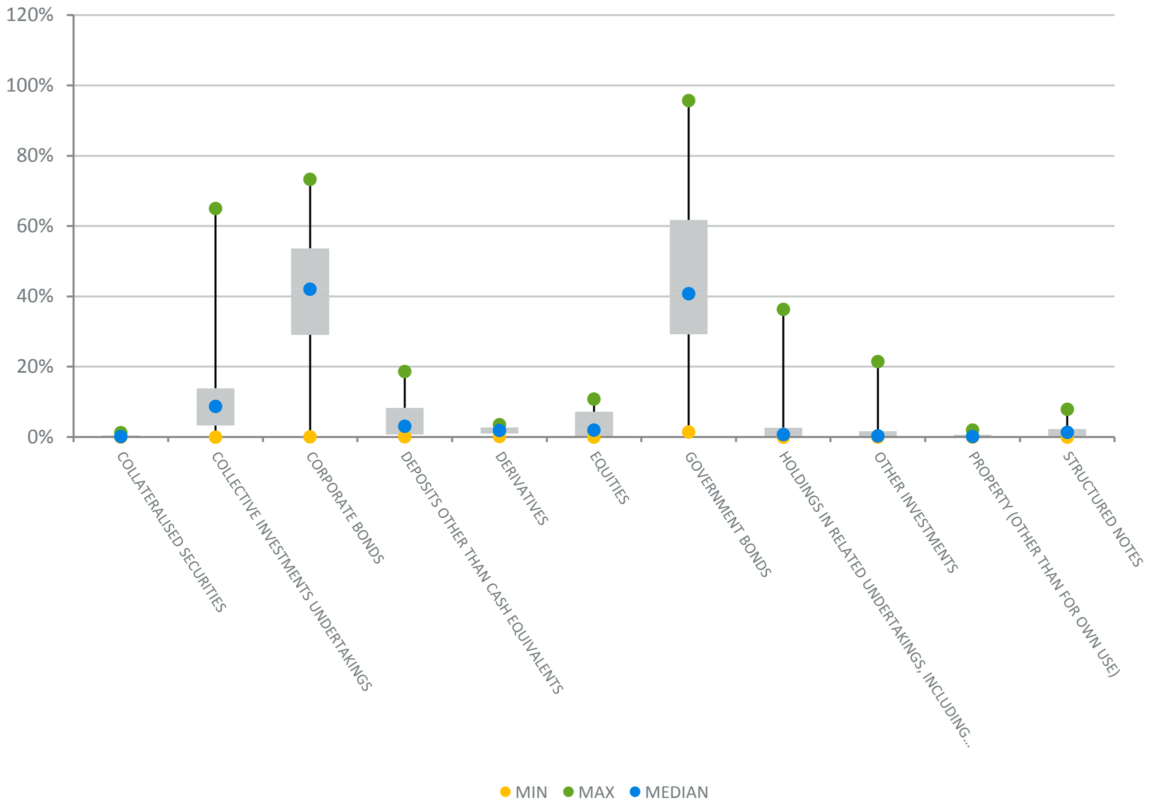
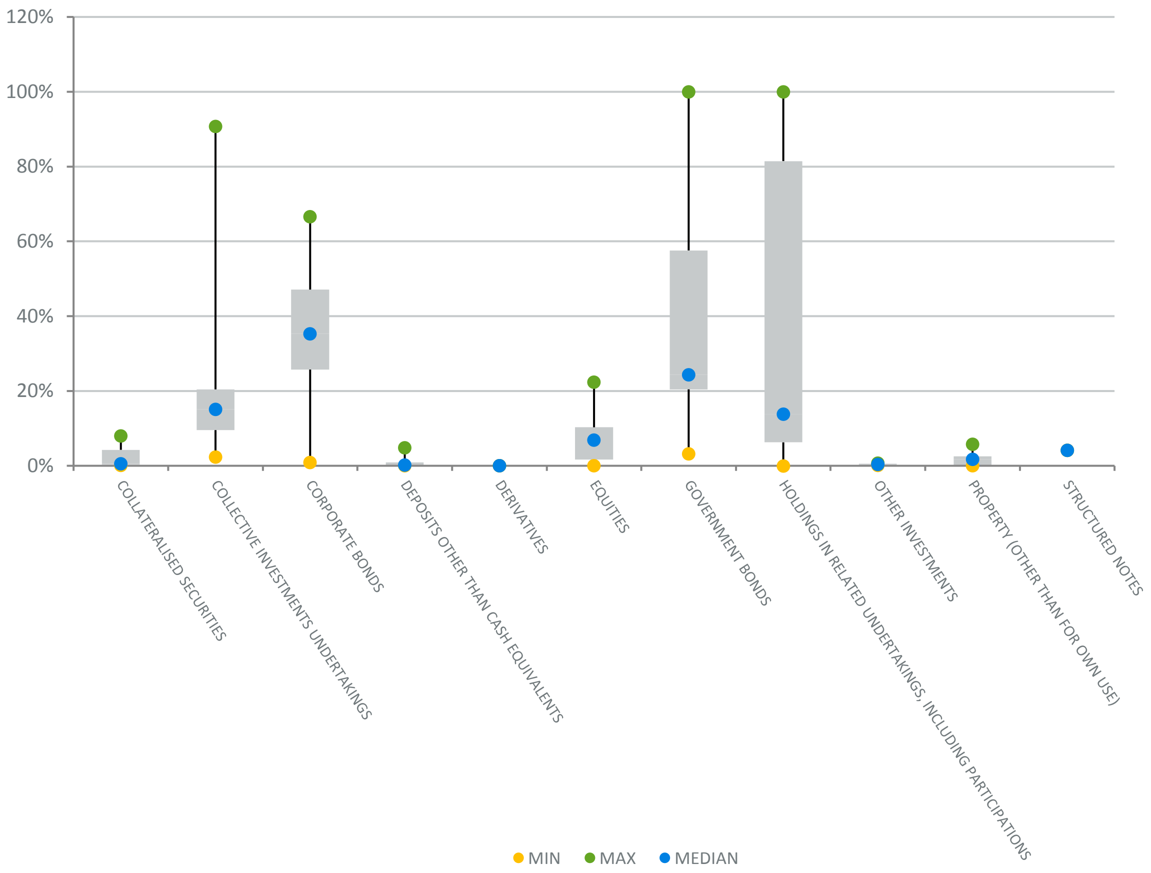


FIGURE 20: DISTRIBUTION OF INVESTMENTS BY ASSET CLASS FOR NON-LIFE COMPANIES

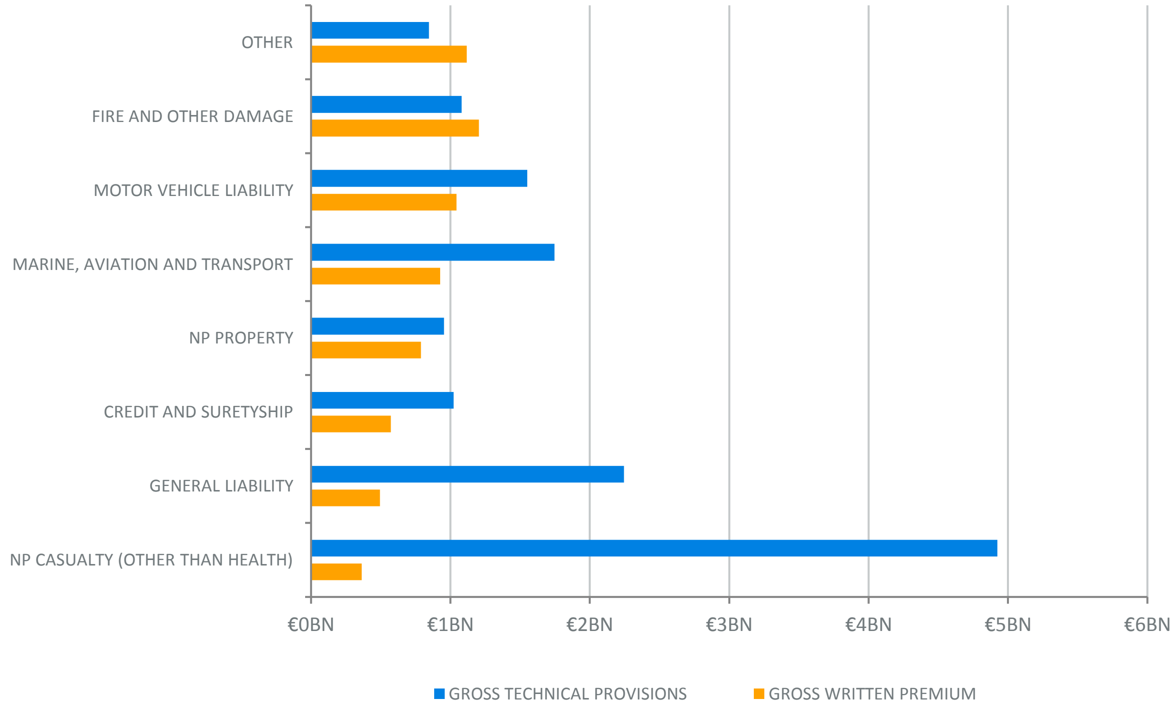


Analysis of liabilities and underwriting

NON-LIFE: TECHNICAL PROVISIONS

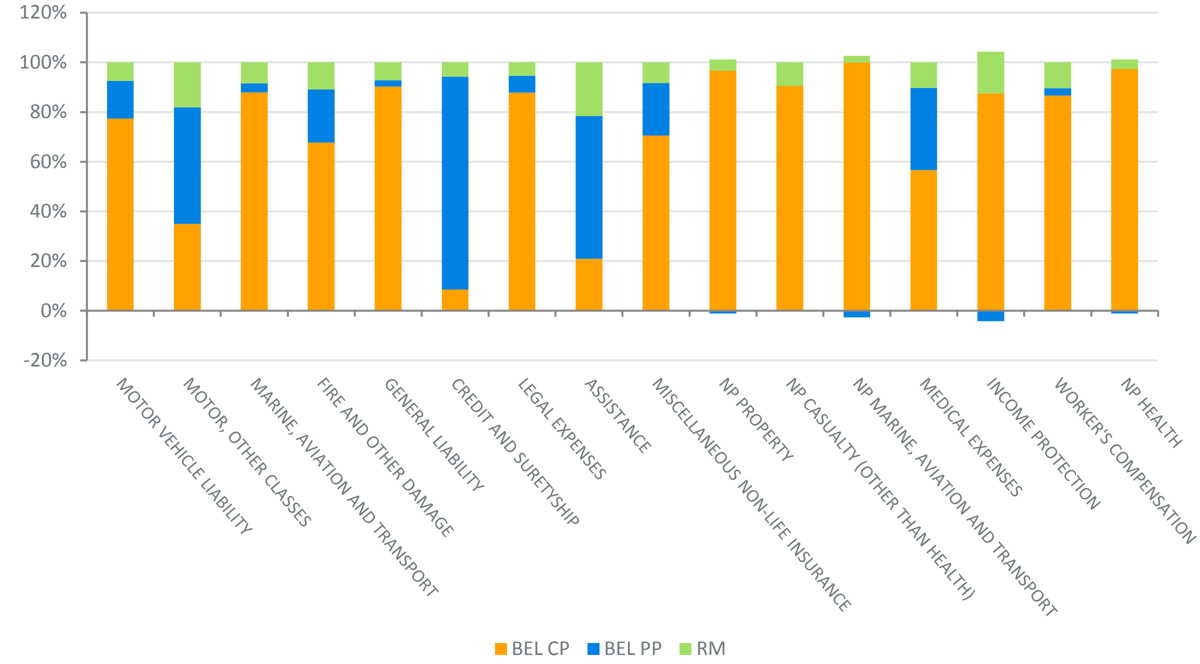
Figure 21 shows the allocation of gross technical provisions and gross written premiums across non-life lines of business as at year-end 2016. The undertakings included in our sample have reserved almost €15 billion of technical provisions. Around one-third of the reserves are related to NP Casualty, other than health, while only 6% of the gross premiums are written in this line of business. Therefore this line probably shows a longer duration than other non-life products.

FIGURE 21: GROSS TECHNICAL PROVISIONS AND GROSS WRITTEN PREMIUMS SPLIT BY LINE OF BUSINESS



In Figure 22 the best estimate of claims provisions is illustrated, which represents the largest part of the Solvency II technical provisions. The premium provision under Solvency II is composed of two main components: premiums already received but not yet earned (the unearned premium) and the expected profits or losses in existing contracts. This reserve component of expected profit or losses can be both positive (loss) or negative (profit). The lines of business non-proportional property (NP property), non-proportional marine, aviation and transport, NP health and income protection show negative premium provision best estimates, whereas the line of business motor, other, shows a best estimate premium provision similar to the best estimate of claims provisions. Credit and suretyship show a high premium provision compared to claims provision. This is probably caused by a longer contract period or more lump sum/annual payments compared to other lines of business (for instance several years for mortgage guarantee business), during which the undertaking still bears the risk of default.

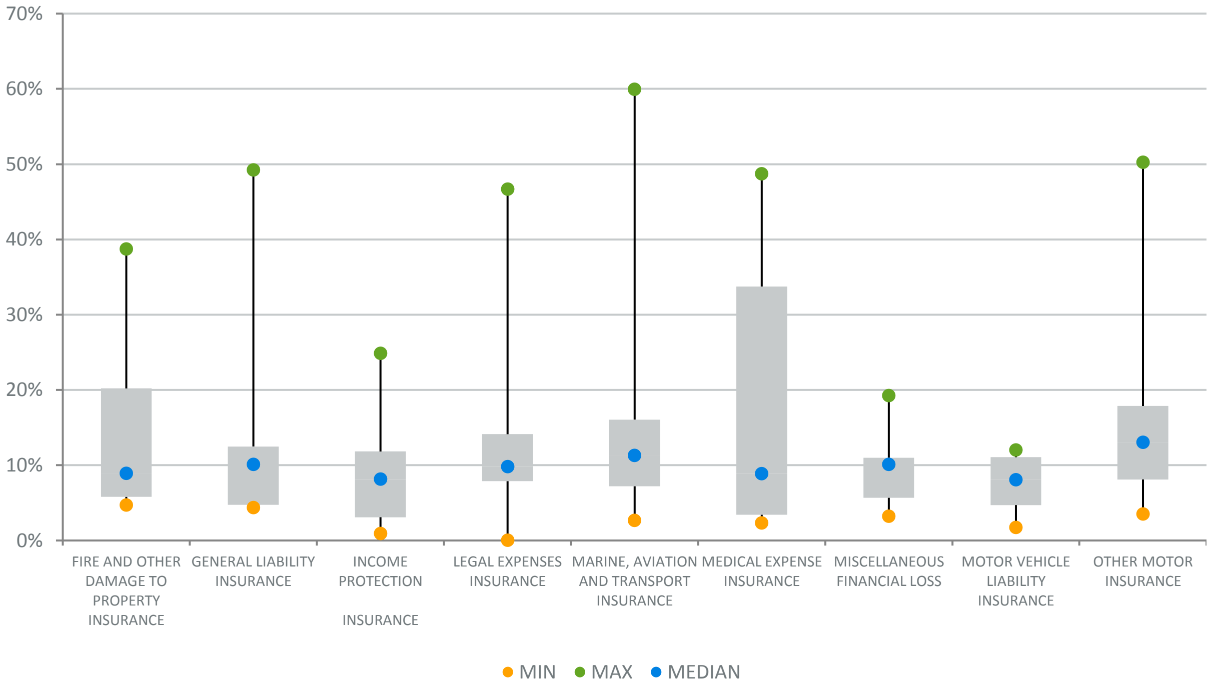
FIGURE 22: COMPONENTS OF NET TECHNICAL PROVISIONS



The Risk Margin (RM) is added to the best estimate of claims and premiums provisions to form the technical provisions to be held by the company. The concept as well as the methodology used to assess this Risk Margin has been a much debated topic over the past few years. On an aggregated basis the Risk Margin represents approximately 8% of the net technical provisions.

Figure 23 shows the distribution of RM and the net technical provisions as proportions of the total net technical provisions by line of business. Note that whereas the RM shows significant deviation among different insurers, the average RM as a proportion of net technical provisions is approximately 10% for almost all business lines.

FIGURE 23: DISTRIBUTION OF RISK MARGIN AS PROPORTION OF THE TOTAL NET TECHNICAL PROVISION BY LINE OF BUSINESS

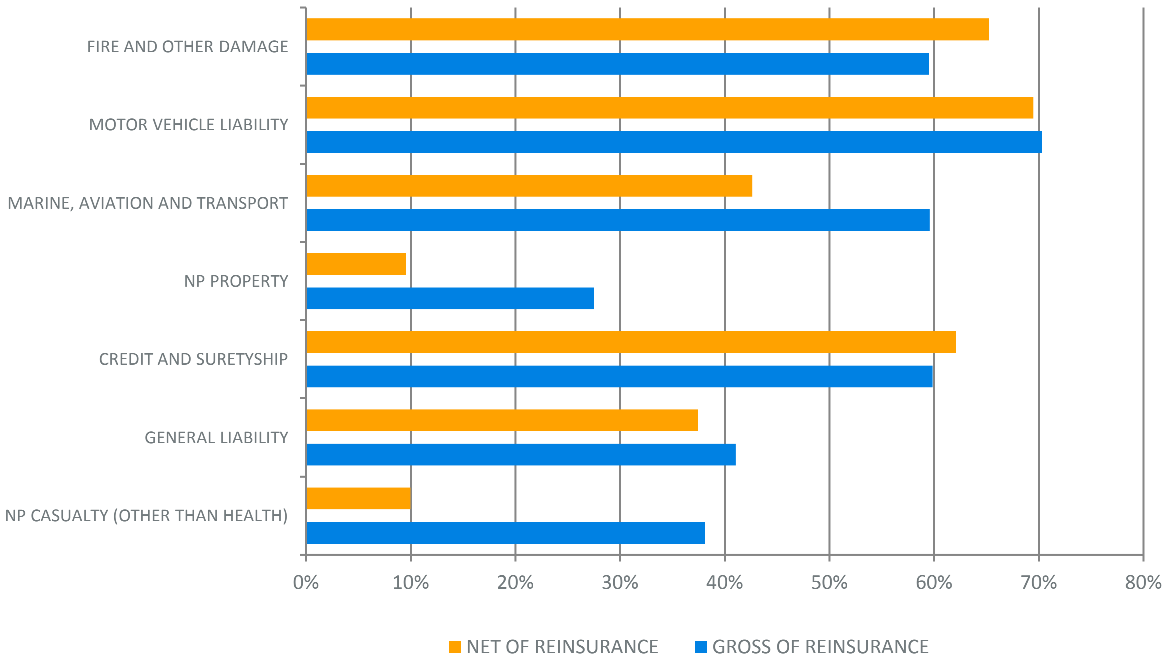


NON-LIFE: ANALYSIS OF UNDERWRITING

In 2016, the undertakings in our sample wrote approximately €6.5 billion of gross premiums, of which 19% relates to fire and other damages business. The motor liability and general liability lines make up to €1.9 billion of the gross written premiums. In Figure 24 we show the gross loss ratios and loss ratios net of reinsurance by line of business.

Figure 24 shows some descriptive statistics about loss ratios by Solvency II line of business. Only the lines of business relating to direct business and proportional reinsurance are considered for analysis. This is motivated by the limited number of undertakings and the immateriality of the premiums observed in the lines of business relating to non-proportional reinsurance. The loss ratios of the lines of business NP property, NP casualty and marine, aviation and transport are affected most positively by reinsurance. However, the loss ratios of the lines of business credit and suretyship and fire and other damage are negatively affected by reinsurance.

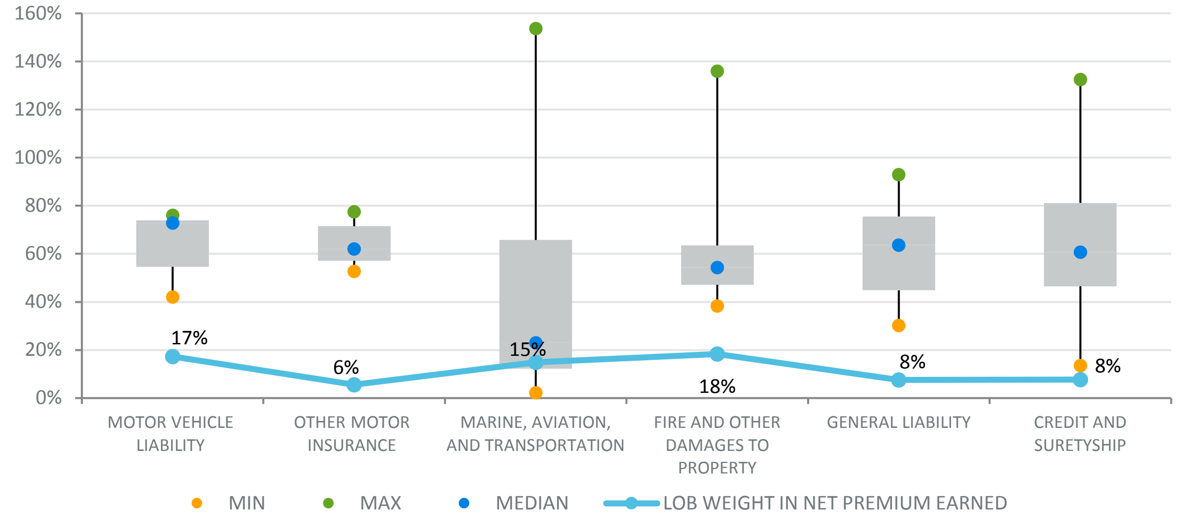
FIGURE 24: GROSS AND NET LOSS RATIOS BY LINE OF BUSINESS



Note: The business lines in this graph cover 82% of gross written premium of the sample of the non-life analysis. The loss ratio is defined as the claims incurred divided by the premium earned.

In Figure 25 statistics regarding volatility in loss ratio are shown. The lines of business fire and other damages to property represent 19% of the total premium earned. The range of loss ratios for the undertakings in our sample for this line of business is relatively high compared to other business lines. Motor vehicle liability and marine, aviation and transportation show respectively the second- and the third-highest percentages of the total premium earned of 17% and 15%, respectively. Although the line of businesses motor liability and fire and other damages show relatively high percentages of the total net premium earned, the average loss ratios are also high (above 65%). Nevertheless, the observed volatility in loss ratio between insurers is also high and therefore loss ratios are company-dependent.

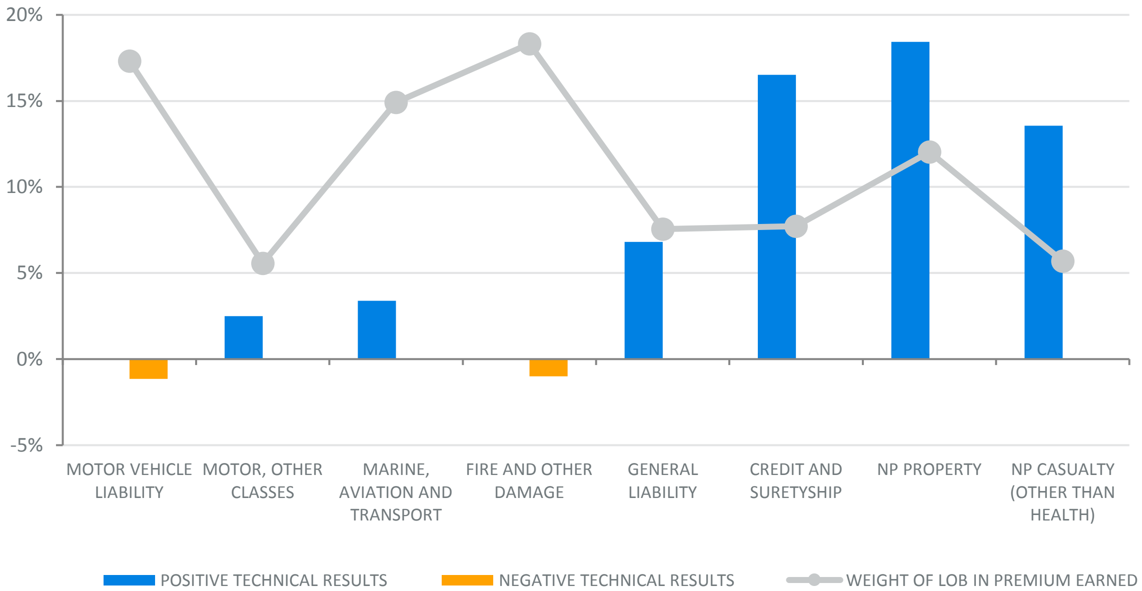
FIGURE 25: DISTRIBUTION OF LOSS RATIOS BY LINE OF BUSINESS



In Figure 26 the technical result for some lines of business[4] are shown on an aggregate basis for the undertakings included in the sample. The technical result is defined (and derived) as (net earned premium – net incurred – expenses incurred) / (gross earned premium). The technical result, as defined, includes movements in prior year reserves (part of the net incurred) but does not include investment income.

Figure 26 indicates that two lines of business exhibit a negative technical result, namely motor vehicle liability and fire and other damage. The most important in terms of gross premium earned are motor, fire and marine, showing on aggregate a small positive technical result. The two motor categories show a slightly positive technical result. The line of business fire shows a slightly negative technical result.

FIGURE 26: TECHNICAL RESULT BY SOLVENCY II LINE OF BUSINESS



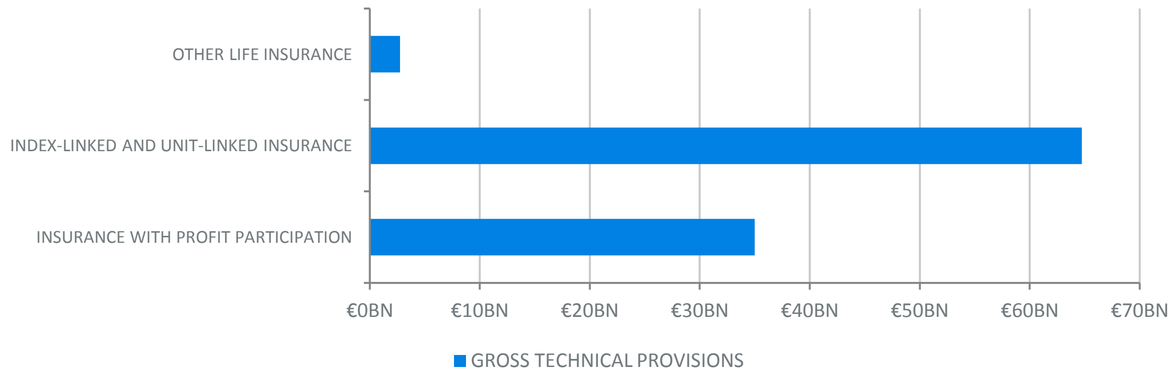
Note: Only the major business lines are shown in this figure. Therefore the relative weights do not add to 100%.

[4] Note that the technical results of non-proportional health (NP health) and non-proportional marine, aviation and transport lines of business (LoBs) are not reported, as only one undertaking has activities in these LoBs. Moreover, the technical results are unusually high due to negative net claims incurred.

LIFE: TECHNICAL PROVISIONS

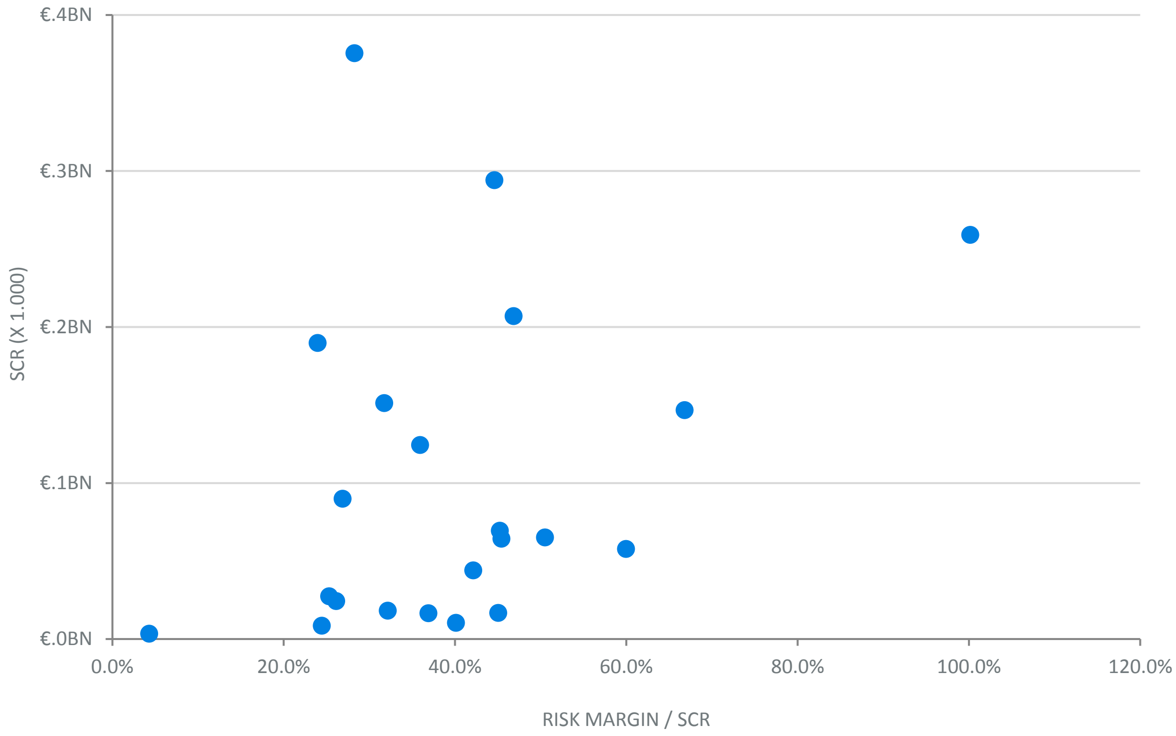
Figure 27 shows the allocation of technical provisions to type of product. Index-linked and unit-linked business is by far the largest part of Luxembourg life insurance business, representing 62% of total technical provisions. With profit participation, insurance represents 34% of technical provisions.

FIGURE 27: TECHNICAL PROVISIONS LIFE BY TYPE OF PRODUCT



The Risk Margin (RM) is added to the best estimates to form the technical provisions to be held by the companies. The average RM expressed in SCR equals 40% and for most insurers RM is between 20% and 60%. Two outliers are Zurich Life with a relatively low RM (4% of SCR) and R+V Luxembourg with a relatively high RM (100% of SCR).

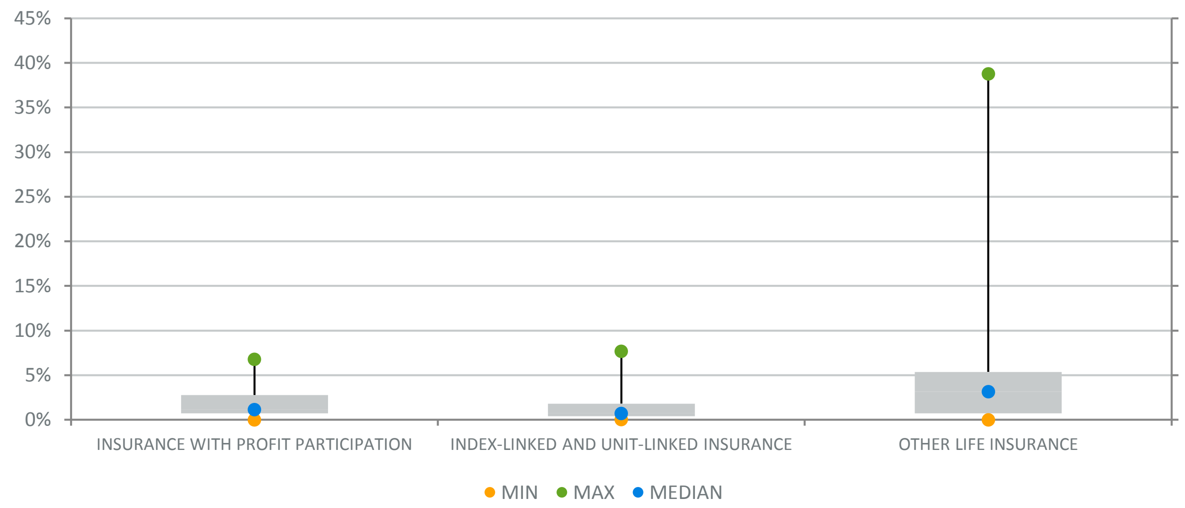
FIGURE 28: RISK MARGIN AS A PERCENTAGE OF SCR RELATIVE TO VALUE OF SCR



LOB SII	RM/BEL
INSURANCE WITH PROFIT PARTICIPATION	0.98%
INDEX-LINKED AND UNIT-LINKED INSURANCE	0.73%
OTHER LIFE INSURANCE	3.66%
ANNUITIES STEMMING FROM NON-LIFE INSURANCE CONTRACTS AND RELATING TO INSURANCE OBLIGATION OTHER THAN HEALTH INSURANCE OBLIGATIONS	0.94%
ACCEPTED REINSURANCE	2.99%
TOTAL	0.99%

Figure 29 shows the distribution of the RMs of the undertakings of our sample for the three main lines of business. On aggregate, RM represents approximately 2% of technical provision. The RM is relatively low for the line of business of index-linked and unit-linked insurance (representing on an aggregate level of 62% of the technical provisions). That is probably because the SCR is relatively low for these products as the risks (market and underwriting) remain with the participant instead of the insurer. For the second-largest group insurance with profit participation, the corresponding RM is relatively higher. The minor group of other life insurance shows relatively the highest RM, but volatility in RM there is also highest.

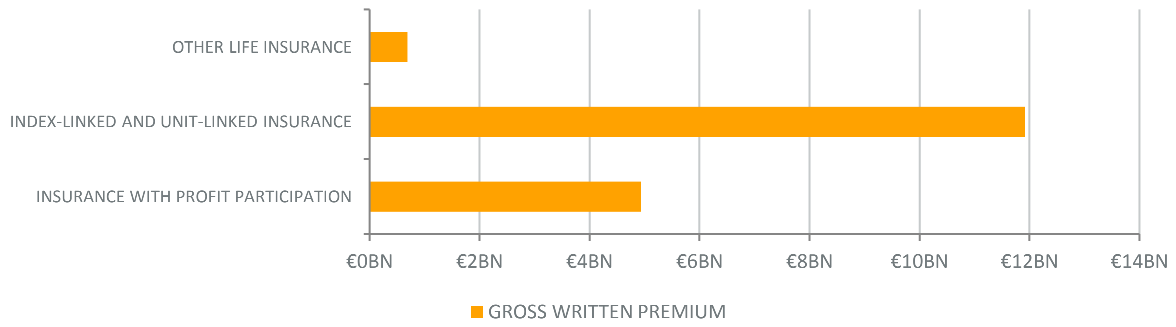
FIGURE 29: DISTRIBUTION OF RISK MARGINS AS PERCENTAGE OF TECHNICAL PROVISION BY LINE OF BUSINESS



LIFE: ANALYSIS OF UNDERWRITING

Figure 30 shows that the life insurance undertakings in our sample wrote approximately €18 billion of gross premiums in 2016, of which more than 67% is related to the line of business index-linked and unit-linked Insurance. Insurance with profit participation is the second most important line of business, with nearly 28% of the total gross premium written.

FIGURE 30: GROSS WRITTEN PREMIUMS IN 2016 IN LIFE BUSINESS



Reliances and limitations

In carrying out our analysis and producing this research report, we relied on the data and information provided in the SFCRs and QRTs of our sample companies. We have not audited or verified this data or other information. If the underlying data or information is inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete.

We performed a limited review of the data used directly in our analysis for reasonableness and consistency and have not found material defects in the data. It should be noted that in some cases errors were spotted in the underlying data. We made minor adjustments to the data to correct known errors such as inconsistencies across QRTs in order to better inform our analysis. However, we have not made any material changes to the underlying data. We have not made any changes to the data to reflect additional information or changes following the reporting date.

This research report is intended solely for educational purposes and presents information of a general nature. The underlying data and analysis have been reviewed on this basis. This report is not intended to guide or determine any specific individual situation and persons should consult qualified professionals before taking specific actions.

Appendix A: List of the Luxembourg undertakings analysed

In the Luxembourg insurance market section, all listed insurers are included. In the table in Figure 31 one could find which are included for the remaining analysis in this report. In total, 46 insurers are included, of which 25 are life insurers, 15 are primary non-life insurers and six are non-life reinsurers. Note that insurers with the indication 'health' are included in the non-life sample as well.

FIGURE 31: LUXEMBOURG UNDERTAKINGS ANALYSED

FORMAL NAME	NAME IN REPORT	LIFE OR NON-LIFE	INDICATION REINSURER (Y/N)	SCR RATIO
SWISS RE EUROPE S.A.	SWISS RE EUROPE	NON-LIFE	Y	276%
LOMBARD INTERNATIONAL ASSURANCE	LOMBARD INTERNATIONAL ASSURANCE	LIFE	N	130%
CARDIF LUX VIE	CARDIF LUX VIE	LIFE	N	145%
SWISS RE INTERNATIONAL	SWISS RE INTERNATIONAL	NON-LIFE	Y	379%
LA MONDIALE EUROPA SA	LA MONDIALE EUROPA	LIFE	N	145%
CREDIT AGRICOLE LIFE ASSURANCE	CREDIT AGRICOLE LIFE ASSURANCE	LIFE	N	233%
SWISS LIFE (LUXEMBOURG) SA	SWISS LIFE (LUXEMBOURG)	LIFE	N	179%
SOGELIFE SA	SOGELIFE	LIFE	N	189%
R+V LUXEMBOURG LEBENSVERSICHERUNG S.A.	R+V LUXEMBOURG LEBENSVERSICHERUNG	LIFE	N	248%
BALOISE VIE LUXEMBOURG	BALOISE VIE LUXEMBOURG	LIFE	N	206%
FOYER ASSURANCES	FOYER ASSURANCES	NON-LIFE	N	194%
FOYER INTERNATIONAL S.A.	FOYER INTERNATIONAL	LIFE	N	153%
CAMCA ASSURANCE	CAMCA ASSURANCE	NON-LIFE	N	130%
LA LUXEMBOURGEOISE SA	LA LUXEMBOURGEOISE	NON-LIFE	N	151%
IWI S.A.	IWI	LIFE	N	157%
THE SHIPOWNERS MUTUAL PROTECTION AND INDEMNITY ASSOCIATION (LUXEMBOURG)	THE SHIPOWNERS MUTUAL	NON-LIFE	N	244%
THE WEST OF ENGLAND SHIP OWNERS MUTUAL INSURANCE ASSOCIATION (LUXEMBOURG)	THE WEST OF ENGLAND SHIP OWNERS	NON-LIFE	N	301%
THE ONE LIFE COMPANY S.A.	THE ONE LIFE COMPANY	LIFE	N	164%
TELEFONICA INSURANCE S.A.	TELEFONICA INSURANCE	NON-LIFE	N	73%
GENERALI LUXEMBOURG	GENERALI LUXEMBOURG	LIFE	N	345%
AXA ASSURANCES LUXEMBOURG SA	AXA ASSURANCES LUXEMBOURG	NON-LIFE	N	203%
BALOISE ASSURANCES LUXEMBOURG SA	BALOISE ASSURANCES LUXEMBOURG	NON-LIFE	N	305%
NN LIFE LUXEMBOURG	NN LIFE LUXEMBOURG	LIFE	N	141%
LA LUXEMBOURGEOISE VIE	LA LUXEMBOURGEOISE VIE	LIFE	N	211%
FWU LIFE INSURANCE LUX S.A.	FWU LIFE INSURANCE LUX	LIFE	N	146%
FOYER VIE	FOYER VIE	LIFE	N	186%
GLOBALITY SA	GLOBALITY	NON-LIFE	N	139%
AXA ASSURANCES VIE LUXEMBOURG SA	AXA ASSURANCES VIE LUXEMBOURG	LIFE	N	225%
ERGO LIFE S.A. (PREVIOUSLY VORSORGE LUXEMBURG LEBENSVERSICHERUNG S.A.)	ERGO LIFE	LIFE	N	300%
INTERNATIONAL SHIPOWNERS RE	INTERNATIONAL SHIPOWNERS RE	NON-LIFE	Y	215%

FIGURE 31: LUXEMBOURG UNDERTAKINGS ANALYSED

FORMAL NAME	NAME IN REPORT	LIFE OR NON-LIFE	INDICATION REINSURER (Y/N)	SCR RATIO
AME LIFE LUX SA	AME LIFE LUX	LIFE	N	151%
FOYER SANTÉ	FOYER SANTÉ	NON-LIFE	N	172%
D.K.V. LUXEMBOURG SA	D.K.V. LUXEMBOURG	NON-LIFE	N	284%
IPTIQ LIFE S.A.	IPTIQ LIFE	LIFE	N	204%
ASPECTA ASSURANCE INTERNATIONAL LUXEMBOURG S.A.	ASPECTA ASSURANCE INTERNATIONAL	LIFE	N	134%
LA COLONNADE	LA COLONNADE	NON-LIFE	N	136%
FOYER ARAG	FOYER ARAG	NON-LIFE	N	168%
ZURICH EUROLIFE S.A.	ZURICH EUROLIFE	LIFE	N	226%
RAIFFEISEN VIE SA	RAIFFEISEN VIE	LIFE	N	130%
CAMCA REASSURANCE	CAMCA REASSURANCE	NON-LIFE	Y	1029%
FOYER RÉASSURANCE S.A.	FOYER RÉASSURANCE	NON-LIFE	Y	190%
D.A.S. LUXEMBURG	D.A.S. LUXEMBURG	NON-LIFE	N	162%
CGPA EUROPE S.A.	CGPA EUROPE	NON-LIFE	N	228%
SPANDILUX S.A.	SPANDILUX	NON-LIFE	Y	299%
EURESA LIFE S.A.	EURESA LIFE	LIFE	N	106%
VITIS LIFE LUXEMBOURG (KBC)	VITIS LIFE LUXEMBOURG (KBC)	LIFE	N	276%

Appendix B: Some figures by undertaking

In the table in Figure 32 the relative size of the risk capitals are shown as percentages of total SCR. Note that only the nine composites insurers applying the standard formula are included in this overview. The two composites with internal models are left out (two Swiss Re entities). Therefore, the number of non-life insurers amounts to 19 (instead of the 21 in other figures of this report).

FIGURE 32: RISKS AND OTHER FIGURES BY UNDERTAKING

	MARKET RISK	COUNTER PARTY RISK	LIFE UW RISK	HEALTH UW RISK	NONLIFE UW RISK	DIVERSIFI CATION	OPERATIONAL RISK	LAC TP	LAC DT
LOMBARD INTERNATIONAL ASSURANCE	71%	4%	86%			-35%	2%		-28%
CARDIF LUX VIE	207%	5%	56%			-39%	12%	-128%	-14%
LA MONDIALE EUROPA	158%	4%	64%			-40%	20%	-96%	-10%
CREDIT AGRICOLE LIFE ASSURANCE	49%	4%	148%			-33%	35%	-75%	-29%
SWISS LIFE (LUXEMBOURG)	110%	7%	48%			-32%	8%	-5%	-36%
SOGELIFE	307%	20%	125%			-86%	17%	-262%	-20%
R+V LUXEMBOURG LEBENSVERSICHERUNG	50%	0%	102%	18%		-39%	7%		-38%
BALOISE VIE LUXEMBOURG	86%	15%	79%			-44%	8%	-1%	-43%
FOYER INTERNATIONAL	81%	5%	76%			-36%	2%		-28%
IWI	77%	4%	78%			-36%	5%	-6%	-24%
THE ONE LIFE COMPANY	58%	6%	60%			-29%	5%		
GENERALI LUXEMBOURG	47%	24%	70%			-38%	30%		-35%
NN LIFE LUXEMBOURG	71%	2%	62%			-29%	12%		-18%
LA LUXEMBOURGEOISE VIE	121%	1%	43%			-26%	5%	-5%	-39%
FWU LIFE INSURANCE LUX	62%	13%	84%			-38%	7%		-28%
FOYER VIE	120%	2%	29%			-20%	3%	-8%	-27%
VITIS LIFE LUXEMBOURG (KBC)	81%	32%	59%			-47%	4%		-30%
AXA ASSURANCES VIE LUXEMBOURG	113%	7%	78%			-43%	9%	-22%	-41%
ERGO LIFE	37%	23%	67%			-33%	8%	-3%	
AME LIFE LUX	92%	2%	60%			-32%	13%	-35%	
IPTIQ LIFE	10%	10%	71%	0%		-13%	23%		
ASPECTA ASSURANCE INTERNATIONAL	62%	12%	77%			-37%	12%	-4%	-23%
ZURICH EUROLIFE	42%	19%	45%			-29%	23%		
RAIFFEISEN VIE	78%	7%	38%			-26%	3%		
EURESA LIFE	45%	10%	61%			-28%	12%		
FOYER ASSURANCES	85%	9%		10%	74%	-45%	10%		-43%
CAMCA ASSURANCE	21%	4%			82%	-15%	27%		-19%
LA LUXEMBOURGEOISE	49%	9%		3%	83%	-32%	5%		-16%

FIGURE 32: RISKS AND OTHER FIGURES BY UNDERTAKING

	MARKET RISK	COUNTER PARTY RISK	LIFE UW RISK	HEALTH UW RISK	NONLIFE UW RISK	DIVERSIFI CATION	OPERATIONAL RISK	LAC TP	LAC DT
THE SHIPOWNERS MUTUAL	66%	15%			36%	-27%	10%		0%
THE WEST OF ENGLAND SHIP OWNERS	67%	17%			28%	-25%	13%		
TELEFONICA INSURANCE	19%	13%			73%	-17%	13%		
AXA ASSURANCES LUXEMBOURG	48%	11%		36%	92%	-58%	10%		-40%
BALOISE ASSURANCES LUXEMBOURG	61%	20%		5%	87%	-43%	12%		-42%
GLOBALITY	54%	13%		54%		-30%	10%		
INTERNATIONAL SHIPOWNERS RE	41%	17%			102%	-31%	8%		-37%
FOYER SANTÉ	76%	6%		59%		-32%	8%		-18%
D.K.V. LUXEMBOURG	108%	6%		39%		-27%	13%		-39%
LA COLONNADE	2%	12%		18%	89%	-22%	1%		
FOYER ARAG	56%	1%			95%	-30%	5%		-28%
CAMCA REASSURANCE	76%	16%		0%	82%	-41%	4%		-37%
FOYER RÉASSURANCE	11%	5%		21%	125%	-29%	10%		-43%
D.A.S. LUXEMBURG	3%	3%			106%	-4%	7%		-15%
CGPA EUROPE	4%	43%			59%	-16%	10%		
SPANDILUX	86%	5%			81%	-37%	7%		-41%

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CONTACT

Kurt Lambrechts
kurt.lambrechts@milliman.com

Moussa Ouedraogo
moussa.ouedraogo@milliman.com

Kamiel van Langen
kamiel.vanlangen@milliman.com

Simon Cureton
simon.cureton@milliman.com

Peter Franken
peter.franken@milliman.com