Amending the Solvency II volatility adjustment to promote good risk management

Use of Solvency II's volatility adjustment (VA) causes hard-to-explain movements in own funds and perverse incentives for hedging and risk management. In this paper, Richard Plat proposes an alternative approach to solve these issues

Introduction

Solvency II, the risk-based supervisory framework for the insurance sector that came into effect on 1 January 2016, requires insurers to determine a solvency capital requirement (SCR) that it is sufficient to cover any losses in a one-year horizon with 99.5% confidence.

Insurers can choose whether they use the standard formula or an internal model to determine the SCR. The standard formula consists of pre-defined shocks for the relevant risk types and a relatively simple aggregation methodology. By using an internal model, or a partial internal model, insurers can develop their own methodology for determining the SCR.

Insurer that choose to apply the volatility adjustment (VA) find it plays a key role in establishing the Solvency II balance sheet and the SCR.

Volatility Adjustment

The VA is an adjustment to the yield curve used for calculating technical provisions on the Solvency II balance sheet. The aim of the VA is to avoid pro-cyclical investment behaviour of insurers when bond prices deteriorate due to low liquidity of bond markets or exceptional expansion of credit spreads. The adjustment has the effect of stabilising the capital resources of insurers during periods of market volatility and will be regularly determined and published by the European Insurance and Occupational Pensions Authority (Eiopa).

The VA at time t is determined as follows[1]:

$$VA(t) = 65\% * \left\{ w_{gov}\left(S_{gov}^+(t) - RC_{gov}^+(t)\right) + w_{corp}\left(S_{corp}^+(t) - RC_{corp}^+(t)\right) \right\}$$

where S_{gov}, S_{corp}, w_{gov} and w_{corp} are respectively the average government and corporate spreads and the government and corporate weights of the currency representative portfolio, and x^+ means max(x,0). RC is the risk correction, which is the portion of the spread that corresponds to expected and unexpected credit losses. The risk correction is published monthly by Eiopa per maturity for each government and for each combination of corporate category (financial or non-financial), rating and maturity.

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[1] For further information, see EIOPA's document 'Technical documentation of the methodology to derive EIOPA's risk-free interest rate term structures'. Note that we will ignore the Country specific increase of the VA in the remainder of this article.

The VA is kept constant until the last liquid point (20 years for euro), after which it converges slowly to zero as a result of the Solvency II II extrapolation technique. Note that in practice this means that the VA is applied to the full duration of the liabilities regardless of whether the credit spread can be earned on the assets for such a long period.

The currency representative portfolio is based on insurance market data for the specific currency. High level characteristics of this portfolio are given by Eiopa. In this article we will focus on the euro currency: the representative portfolio is given in figure 1.

Note that the percentages do not add up to 100%, because the representative portfolio also contains assets that do not generate a credit spread (for example, equity investments). The market value weighted duration of the bond portfolio is 7.4 years.
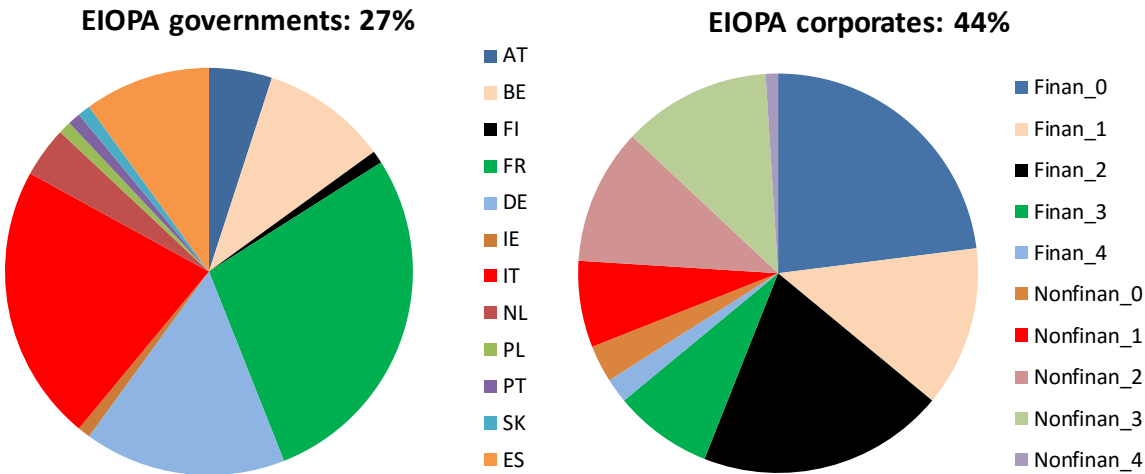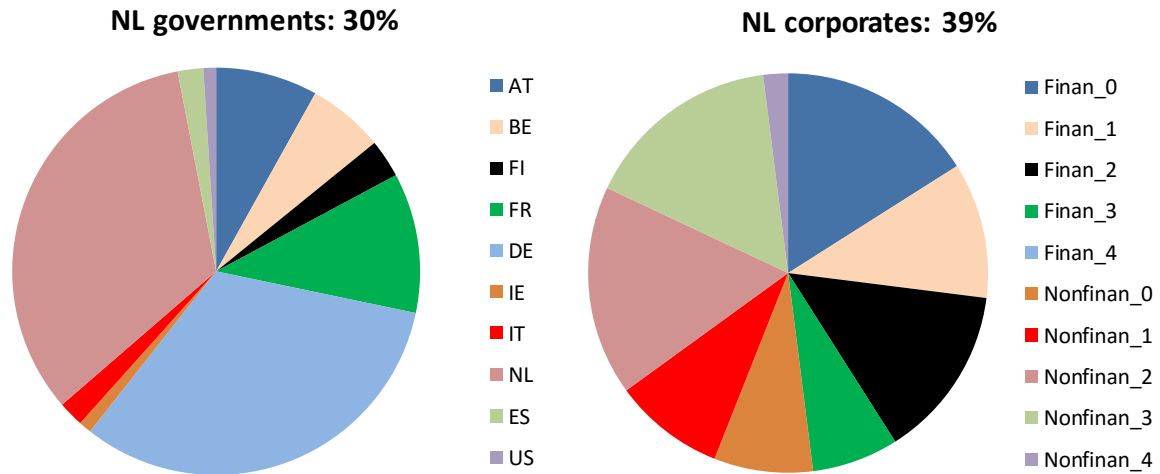

Figure 1: representative portfolio Euro currency

The figure shows that a large part of the government bond portfolio comprises AA rated French government bonds and BBB rated Italian government bonds. Furthermore, two-thirds of the corporate bond portfolio is financials, which have had large historical spread movements compared to other bond categories.

In the context of the SCR based on internal models, there is no Eiopa guidance on whether the VA should remain unchanged ('static VA') when credit spreads change in generated scenarios or that it changes depending on the generated credit spread changes ('dynamic VA'). Instead, local supervisors have discretion on this issue. For example, Dutch insurers are allowed to use a dynamic VA approach under certain requirements, while for UK insurers this is currently not permitted.

Problems with the VA

The current specification of the VA can result in difficult-to-explain movements in the own funds (assets minus liabilities) and perverse incentives for hedging and risk management. This will be shown in the example below. Let's assume that a fictive insurer holds the representative portfolio of the Dutch insurance market. The high-level characteristics of this portfolio are also given by Eiopa and are shown in figure 2.

NL governments: 30%

Legend: AT, BE, FI, FR, DE, IE, IT, NL, ES, US

NL corporates: 39%

Legend: Finan_0, Finan_1, Finan_2, Finan_3, Finan_4, Nonfinan_0, Nonfinan_1, Nonfinan_2, Nonfinan_3, Nonfinan_4

Figure 2: representative portfolio Dutch insurance market

The figure shows that the majority of the government bond portfolio comprises German and Dutch government bonds, which are both AAA rated. The corporate bond portfolio contains about 50% financials and 50% non-Financials. Further note that the Dutch portfolio contains 5% less corporates bonds and 3% more government bonds compared to the euro representative portfolio, and therefore the total portfolio has 2% less bonds (69% versus 71%). The market value weighted duration of the bond portfolio is 9.2 years.

Further assume that the liabilities have a duration of 12 and a market value of €1bn. Given this information and historical credit spread data in the period 2000-2015, for each historical month we have approximated the changes (deltas) in the value of the assets, liabilities and in the Solvency II own funds of the fictive insurer over the preceding 12 months. The result is given in figure 3.
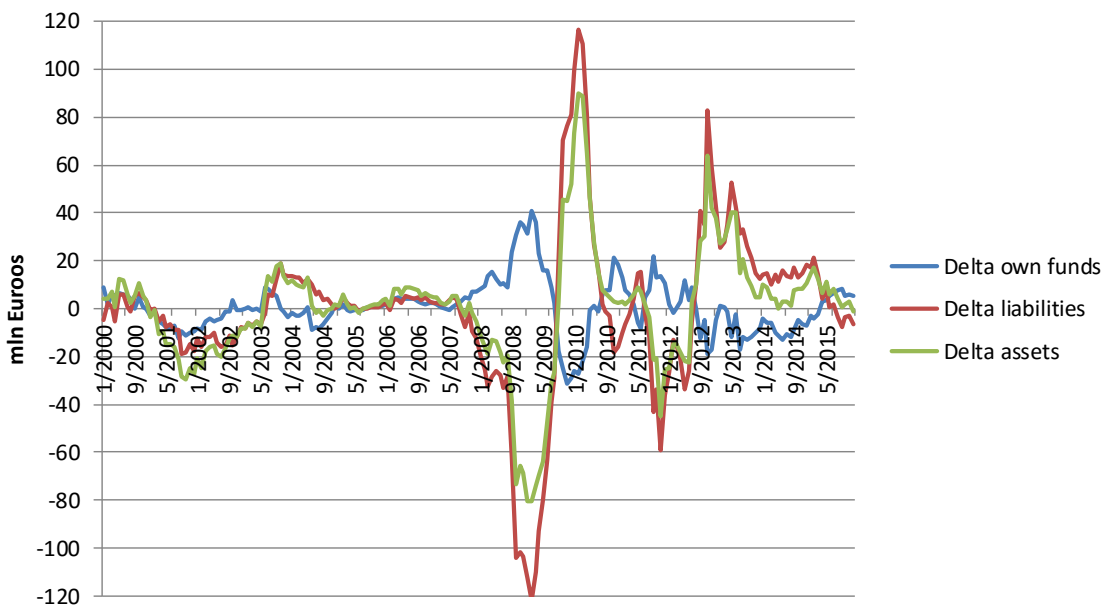
Figure 3: historical delta assets, liabilities and own funds of fictive insurer – current legislation

The figure shows that if the Eiopa VA approach would have been used in the period 2000-2015, that the largest historical *profit* (increase of own funds) would have been observed during the period 04/2008 – 03/2009, so during the credit crisis. The largest historical loss would have been observed in the year after that, when credit spread decreased significantly.

In other words, the Eiopa VA approach results in profits in worst-case scenarios for this insurer. As can be seen from the figure, this is due to the liabilities decreasing more significantly than the assets. The reason for this is that:

- The euro representative bond portfolio is more aggressive than the Dutch bond portfolio (more corporate bonds, government bonds largely in Italy and France);
- The VA is applied to the liabilities with duration 12 years, while the duration of the assets is 9.2 years.

This does not adequately reflect the financial state of the insurer, and requires the insurer to regularly explain the illogical movements in own funds.

Besides this, the Eiopa VA approach also gives perverse hedging incentives. The fictive insurer could *reduce* its risk by investing more in long-maturity financials and BBB rated Italian government bonds (instead of AAA rated Dutch and German government bonds). Therefore, the current legislation regarding the VA does not support one of the original goals of Solvency II to promote proper risk management.

These issues are also the reason that local supervisors provide different guidance on whether a dynamic VA is allowed in the context of determining the SCR.

Time for a change

Given the problems described above and the inconsistency in guidance between the different local supervisors, the current legislation is not sustainable. In this article a change in approach is proposed which is relatively simple and solves the current problems. This involves the following five steps:

1. Define the VA on the same level of granularity as the risk correction (per maturity for each government and for each combination of corporate category, rating and maturity);
2. Insurers can map their own bond portfolios to these combinations of category, rating and maturity;
3. The approach to aggregate the VAs for the whole portfolio of an insurer should be prescribed by Eiopa. Aggregation could for example be performed by weighting the VAs with market value of the bonds or with market value times duration;
4. The VA should be related to, or only applied for, the duration of the assets instead of for the full duration of the liabilities, for example by applying the quotient (duration assets / duration liabilities) to the VA. Note that this should be combined with an evaluation of the application ratio (currently 65%); and
5. In the context of determining the SCR using a dynamic VA, explicit guidance can be provided by Eiopa regarding the change in risk correction and whether the impact of a possible change in credit risk adjustment (CRA) should also be included.

Given this approach, for each historical month we again have approximated the changes (deltas) in the value of the assets, liabilities and in the own funds of the fictive insurer over the preceding 12 months. Note that we excluded any impact from the risk correction and the CRA in this example. The result is given in figure 4.
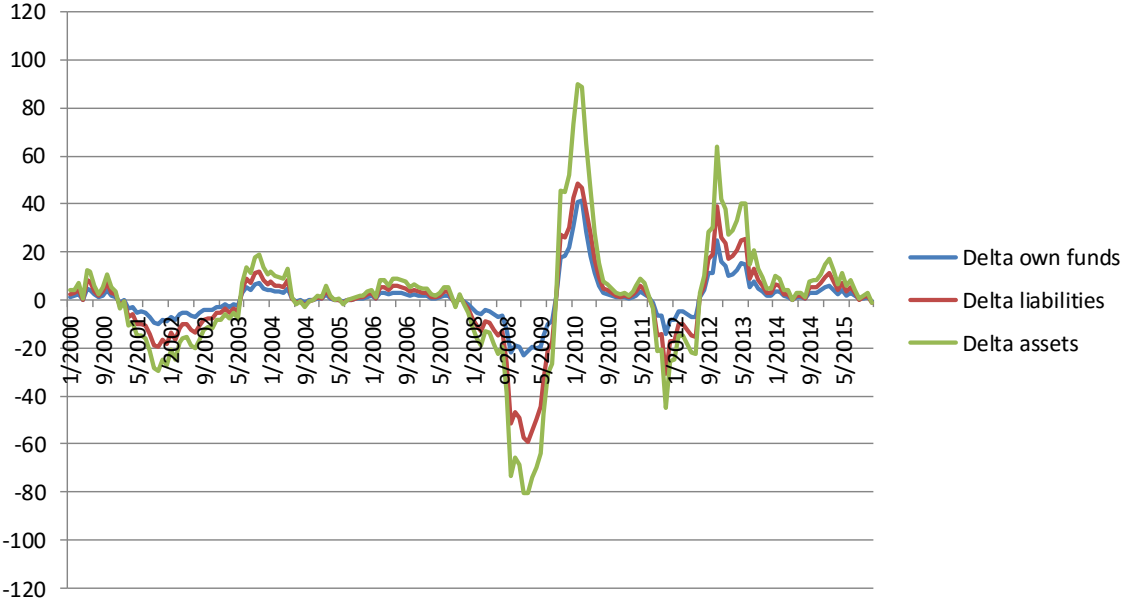
Figure 4: historical delta assets, liabilities and own funds of fictive insurer – proposed approach

The figure shows that if the proposed approach would have been used in the period 2000-2015, that the largest historical *loss* would have been observed during the period 01/2008 – 12/2008, so during the credit crisis. The change in liabilities compensates for the change in assets at any time. Therefore, the proposed approach supports the original aim of the VA to avoid pro-cyclical investment behaviour and stabilising the capital resources of insurers. Furthermore, applying a dynamic VA in the context of determining the SCR in the proposed manner will produce plausible results, which would remove the current inconsistency in guidance on the dynamic VA by local supervisors.

Points of attention

The proposed approach comes with two points of attention: the relationship with the matching adjustment (MA) and how to treat the possible impact if the current methodology is changed.

The requirements in terms of matching for applying a MA are strict and as such, the benefit for the insurer should be higher compared to the use of a VA. The proposed approach for the VA has similar characteristics (but lesser requirements) as the MA, but due to the application ratio the VA should lead to lower benefits for the insurer. However, note that in the context of calculating the SCR the change in risk correction preferably should be prescribed and consistent for the MA and VA.

Of course, changing the methodology for the VA could have a direct significant impact on the value of the insurance liabilities. However, transitional measures could be applied to gradually transition to the new VA approach.

Conclusion

The current legislation regarding the VA leads to several issues for insurers and does not support one of the original goals of Solvency II: to promote proper risk management. The proposed alternative approach solves these issues with little additional work by insurers and supervisors, and realigns the VA with the objective of Solvency II to establish a harmonised and risk-based regime for insurance supervision.

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