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Callable bonds: which SCR_{credit} calculation method, what is the impact on their use?

Key takeaways

- Bonds which include an early redemption clause - known as callable bonds - offer spreads which may be more advantageous than plain vanilla bonds. They represent most corporate debt, particularly in the high yield credit segment.
- The redemption and scheduled cashflows for callable bonds and perpetual bonds are not set at specific dates. This factor of uncertainty weighs on the capital required under Solvency 2 and therefore on the profitability of an investment compared to its cost of capital and ultimately on the interest paid by these types of assets in a portfolio.
- Specific tools are required to carry out these complex calculations, which have no stipulated methodology in the delegated acts, along with data and skills used to assume probable call dates and calculate the sensitivity of probable cash flows. This calculation may have a major impact on allocation models particularly in highly granular cases.

The SCR_{credit} shocks applied depend on rating and on sensitivity. In the case of callable bonds, sensitivity depends on calculation methods: next call date, maturity or any other date between the two. The regulations stipulate that the calculation must take into account the possibility of the call not being exercised, but without specifying terms. The resulting impact on SCR_{credit} is significant. It is twice as much for high yield credit, which has implications in terms of allocation.

Introduction

Regulatory credit risk applied to bonds depends on sensitivity and rating. A bond's sensitivity depends on its scheduled cashflows and the discount curve applied. In general, the cashflow schedule is a determining factor, which is clearly defined at the time of issue. However, redemption and cashflow schedules for callable and perpetual bonds are not set at a particular date. This factor of uncertainty weighs on the capital required under Solvency 2 and therefore on the profitability of an investment compared to its cost of capital and ultimately on the interest paid by these types of assets in a portfolio.

Regulations

Under Solvency 2, bonds are subject to several shocks in order to calculate the SCR market module. For example, convertible bonds denominated in foreign currencies are also subject to equity and forex shocks in addition to interest rate and spread shocksⁱ.

Bond cashflow schedules are included in calculating interest rate and credit shocks. For the interest rate risk calculation (Articles 165 - 167 of the delegated act) bonds must be revalued taking into account the discount curve and the risk-free interest rate curve published periodically by the EIOPAⁱⁱ. The credit risk calculation (Articles 175 and onwards) indirectly takes these factors into account by assessing a shock in terms of the percentage of the value of the bond: *"The risk factor stress_i shall depend on the modified duration of the bond or loan i denominated in years (dur_i). dur_i shall never be lower than 1"*. It is reflected in the tablesⁱⁱⁱ as a function of the bond category (covered, infrastructure, etc.) sensitivity in years and rating.

Sensitivity calculation depends on coupon amounts and payment dates and reimbursement. However, the precise calculation method is not described in the delegated act. Sensitivity may therefore vary immensely as a function of assumptions which may be simplified for calculation purposes. For example, for a 10-year A rated bond with a CQS of 2^{iv}, callable in one year's time, a calculation using a call date for reimbursement gives sensitivity of close to 1 and SCR_{credit} of 1.4%. For a calculation at maturity, sensitivity is close to 9, giving an SCR_{credit} of 10.5%, i.e. a ratio of 1 to 7.5.

The most rigorous calculation is relatively complex and this point was identified very early on by market professionals who requested formal authorisation to use simplifications. In a report following a public consultation^v, the EIOPA acknowledged this suggestion but immediately specified guidelines stating that no further simplifications would be tolerated beyond those defined in the technical implementing measures^{vi}. The report also reiterated that the possibility of the call not being exercised must be taken into account if the borrower's credit deteriorates, or if spreads widen or if interest rates increase. Lastly, a specific appendix refers to the calculation of bond duration and sensitivity. It details the calculation method with classic discount factors for future cashflows. When payments are uncertain, probability must be assessed (referred to as stochastic flows) and probable cashflow must be included as cashflow amount \times probability. At each call date, nominal flows must be replaced by Nominal \times call probability at this date. Probable coupons must of course be taken into account in the same way.

The question of interpreting sensitivity (modified duration) arose at later consultations, for example with Question 977 in June 2018^{vii}. The position adopted by the EIOPA remains unchanged, i.e. the possibility of the non-exercise of the call must be taken into account.

Market practices

In practice, not all investors possess tools capable of calculating probable future cashflows from callable or perpetual bonds. Certain investors therefore use simplified assumptions which generally lead to shock estimations. For example, they do not classify perpetual

bonds as bonds, as these instruments may structurally never be redeemed. They therefore apply type 2 equity shock to these instruments. Others use bond maturity to calculate SCR_{credit} . The calculation assumes that there is no early redemption option. This calculation can have a highly negative impact, causing SCR_{credit} to potentially double, particularly in the high yield bonds segment (see examples below). Furthermore, perpetual bonds pose another problem, in that the use of the maturity dates included in some systems is highly questionable. One major market data provider sets the “virtual” maturity date in 2169, which is not that distant in time, all other things being equal. Some quarterly reports input a maturity date set in 9999^{viii}. This position is understandable for investors who on account of their comfortable SCR coverage ratio, are able to use such an approximation. The EIOPA is unlikely to reproach these investors from determining a heavier SCR.

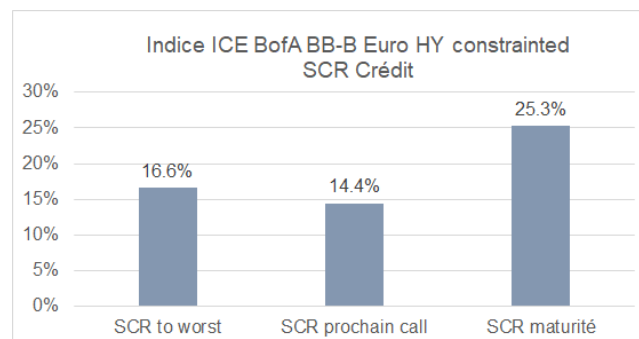
Conversely, other investors systematically consider the first call date as the most realistic. This position is more difficult to defend as we have already seen, as it can lead to the SCR being significantly underestimated for the securities concerned and the regulator may disagree. This simplification is potentially defensible, if the solvency ratio is satisfactorily covered and the securities concerned represent only a small proportion of the balance sheet. The principle of materiality may be invoked, but with no guarantee of approval.

The ideal situation is to use suitable tools, data and skills to assume probable call dates and calculate the sensitivity of probable cashflows. This calculation may have a major impact on allocation models, particularly in highly granular cases.

Impact on allocation

Over 11% of the Bloomberg Barclays Euro Aggregate^{ix} index is composed of callable bonds, most of which are credit bonds. The impact of the calculation method on SCR_{credit} is around 30bps: 2.4% on a calculation at the next call date and 2.7% on a calculation at maturity. If we focus on the corporate bonds in this same index, 10% of securities are callable and the various methods provide highly different results: 7.4% at the first call date, 9.2% at maturity and 8.7% under a

stochastic approach (to worst). In the high yield segment^x, the proportion of callable bonds increases to 77%, with respective SCR_{credit} of 14.4%, 16.6% and 25.3%!



Source: Bloomberg, January 2021. Ostrum calculations

The assumptions used for the SCR calculation will therefore have a major impact on investments as securities may be less attractive from a risk-return viewpoint. With calculation at the next call date, the high yield asset class could be generally attractive, whereas with a calculation at maturity, the SCR may weigh on the attractiveness of the HY segment for investing insurance institutions. As an illustration, let us consider the following target allocation:

	Portfolio exposure
Sovereign	40%
Corporate	40%
Equity	10%
Real estate	10%
Forex	5%

Considering three levels of shareholders' equity giving a global SCR coverage ratio^{xi} of 110%, 150% and 250% to illustrate the different situations in terms of solvency and varying the call date taken into account for the calculation of the credit SCR, we achieve the following results:

	Weak shareholders' equity	Standard shareholders' equity	Strong shareholders' equity
At call date	110%	150%	250%
At maturity date	108%	147.2%	245.4%
Fall in coverage ratio	-2.0%	-2.8%	-4.6%

Although overall solvency is not altered extensively, the impact is clearly significant.

ALM analysis

Under an asset liability management (ALM) approach, care must be taken to take real redemption dates into account in the backing process, if early redemption of the principal of a tranche is expected at a given date due to the security being called. The callable character makes liabilities backing more complex. Taking volatility into account in the stochastic approach may cause the SCR to vary sharply in the event of a major shock in the market triggering the postponement of the most likely call date. On the other hand, the call creates opportunity risk incurred by reinvestment if the security is redeemed early. This will effectively lead to the problem of the interest rate context for an earlier reinvestment than planned. As the existence of a classic call means that the security may be redeemed at par, there is a high chance that the call exercise conditions are linked to a fall in interest rates / spreads and therefore represents a period during which it would be preferable not to receive inflow to then reinvest. Diversified call dates are therefore preferable, in order to manage these risks and avoid a situation including a large number of securities with a high probability of being called at the same date.

Conclusion

Callable securities may offer an attractive spread compared to other securities of the same maturity. They represent most corporate debt, particularly in the high yield credit segment. Although stochastic SCR approaches should be prioritised, the calculation method chosen by investors will take into account their technical resources, balance sheet structure and regulatory coverage ratio, balanced between calculation precision, precautionary principles and materiality principles. Furthermore, diversified call dates are preferable, accompanied by stringent monitoring of the specific risks associated with these investments.

Text completed in May 2021

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ⁱ Source : Délégated Act : Commission Delegated Regulation (EU) 2015/35 of 10 October 2014 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) Text with EEA relevance, link :

http://data.europa.eu/eli/reg_del/2015/35/oj

Interest rate risk sub-module: Articles 165 - 165 of the delegated act, Articles 175 and onwards for spread risk

ⁱⁱ Latest curve calculation methodology publication: EIOPA-BoS-19/408. 12 September 2019. Technical documentation of the methodology to derive the EIOPA's risk-free interest rate term structures, https://www.eiopa.europa.eu/sites/default/files/risk_free_interest_rate/12092019-technical_documentation.pdf

ⁱⁱⁱ See the Directive or

<https://www.ostrum.com/sites/default/files/2020-01/SII%20SCR%20Market%20Instruments%20Review%20Ostrum%20Final%20site.pdf>

^{iviv} The credit quality step (CQS) is a valuation scale which is independent from the ratings agencies.

^v EIOPA-BoS-14/174 27 November 2014

^{vi} Implementing measures, or under their full name: technical implementing measures (TIMs)

^{vii} Question 977 submitted on 21/06/2018:

https://www.eiopa.europa.eu/content/977_en

^{viii} Quarterly Reporting Template (QRT)

^{ix} Source Bloomberg end December 2020. Ostrum SCR spread calculations

^x ICE Bofa BB-B Euro HY Constrained Index, January 2021. Ostrum SCR spread calculations.

^{xi} The coverage ratio is defined by available financial resources divided by solvency capital requirements (AFR / SCR)

Additional notes

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