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Overview

How to Incorporate Convertible Bonds in a Portfolio Context

Convertible Bonds 101

Convertible Bonds: A Strategic Allocation

- Even a small strategic allocation to convertible bonds has historically improved the risk-return profile for investment portfolios, both multi-asset and pure fixed income portfolios.
- Convertible bonds can give rise to a favourably asymmetric risk profile, offering the possibility of capturing more upside than downside.
- Convertible bonds may be capital efficient as they can offer exposure to equities with a lower Solvency II capital charge.

In this paper, we examine how to incorporate convertible bonds into an investment portfolio from a strategic asset allocation standpoint. To this end, we explain the need for selecting the right convertible bond index exposure and also highlight how convertible bonds may be an option for insurers seeking equity-like returns but wishing to lower Solvency II capital requirements (SCR). To support our views, we conduct a risk attribution analysis for including convertible bonds in a multi-asset portfolio.

Convertible bonds used as part of a strategic (core) allocation within investment portfolios have the potential to improve risk-return efficiency as well as risk capital efficiency, in particular for insurers. Convertible bonds not only can help mitigate drawdowns in multi-asset portfolios but also capture more equity upside than downside, by virtue of their asymmetrical risk profile, in conventional fixed income portfolios.

Convertible bonds resemble conventional bonds, except they have an underlying option that allows investors to convert the bond into an equity at a pre-specified conversion price. For this reason, convertible bonds exhibit a risk-return profile that resembles a hybrid of both bonds and equities. Like their conventional counterparts, convertible bonds provide a series of pre-set cashflows that can help diversify away equity returns and mitigate drawdowns during periods of market turmoil. This “shock absorbing” capacity, which leads to positive convexity, is a key feature of convertible bonds.

Given their relationship to underlying equities, by virtue of the embedded option value, convertible bonds offer investors the potential to participate in stock market rallies.

The positive convexity in convertible bonds makes them suitable as return enhancers and portfolio diversifiers

While convertible bonds are exposed to credit and interest rate risks (which are also risks faced by conventional bonds), they are also exposed to equity market risk. That being said, convertible bonds are often subject to a lower level of interest rate risk than their high yield and investment grade corporate bond counterparts. In summary, convertible bonds offer features that can act as return enhancers as well as portfolio diversifiers.

To illustrate the mechanics of convertible bonds, Figure 1 shows how the value of convertible bonds changes with equities. When the underlying equity price of a convertible bond is below the conversion price, its behaviour resembles that of a conventional bond of the issuer and investors benefit by not participating in the market decline; in this example, the option to convert into equity is abandoned.

However, when the underlying equity price rises above the conversion price, the value of the convertible bond increases and converges to that of the issuer's equity and the amount of participation to equity performance increases as the stock moves higher. Sure enough, the hybrid nature of convertible bonds can make them a useful addition to investment portfolios but, like all investments, it may also be necessary to consider their valuation before incorporating them into the portfolio. Purchasing any investment asset at a high valuation may lead to performance that is below expectations. Typical valuation measures for these bonds include equity delta, premium to bond floor and optionality cost (implied versus realised volatility) (see Camissar and Lesné,¹ 2019).

Figure 1
Behaviour of Convertible Bonds with Changes in Underlying Equity Price

■ Convertible Price
■ Value of Equity
■ Bond Floor

Price of Shares < Conversion Price

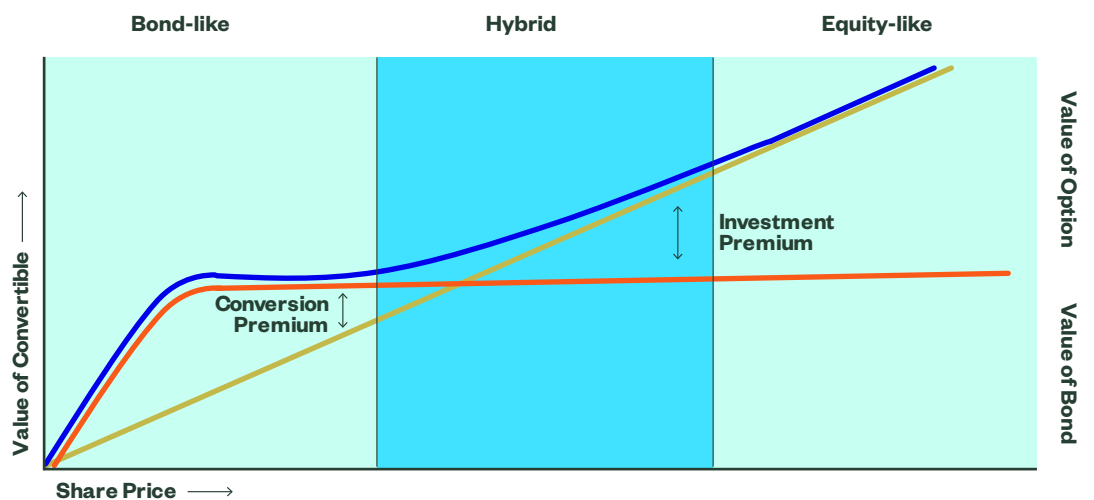
- Convertibles trade just like a bond
- Bond acts as a price floor to the investment
- No equity sensitivity
- **Out of the Money**

Price of Shares = Conversion Price

- Convertible behaving like a hybrid of equity and bond
- This is the most risky position as it is most sensitive to changes in price
- **At the Money**

Price of Shares > Conversion Price

- Convertibles trade like equity
- Equity sensitivity is the highest
- **In the Money**



Source: State Street Global Advisors, as of October 2020. The above diagram is for illustrative purposes only.

Assessing The Role of Convertible Bonds in Portfolios

Convertible bonds can improve risk-return profile of portfolios

Incorporating convertible bonds in investment portfolios can enhance risk-return efficiency, mitigate drawdowns and improve capital efficiency for insurers.

Potential to enhance risk-return efficiency

Our aim here is to assess whether incorporating convertible bonds² historically improved the risk-return profile of investment portfolios. To do this, we added varying levels of convertible bonds to a typical 60% global equities, 40% global fixed income portfolio and conducted the analysis for the period 2003 to 2020. To ensure a robust analysis, we examined the performance of the portfolio over the entire sample period as well as during two sub-periods. Figure 2a shows that, **as the multi-asset portfolio increased its allocation to convertible bonds over the entire period, the risk-adjusted return rose and the efficient frontier shifted to the upper left hand side.**

Looking closely at each of the sub-periods, the performance of the multi-asset portfolio also held up quite well with the inclusion of convertible bonds.³ **The improvement in risk-adjusted return appears to be even more compelling for pure fixed income portfolios** where the efficient frontier moved upwards significantly (see Figure 2b). One reason for this is that convertible bonds have a lower correlation to conventional bonds and delivered stronger diversification benefits in the fixed income portfolio (see Figure 2b).

Regardless of whether the portfolio invests in one asset class or more, the analysis suggests that there may be a case for allocating a higher proportion into this hybrid asset class to enhance portfolio return, especially in the context that institutional investors generally allocate no more than 3%⁴ of convertible bonds into their portfolios.

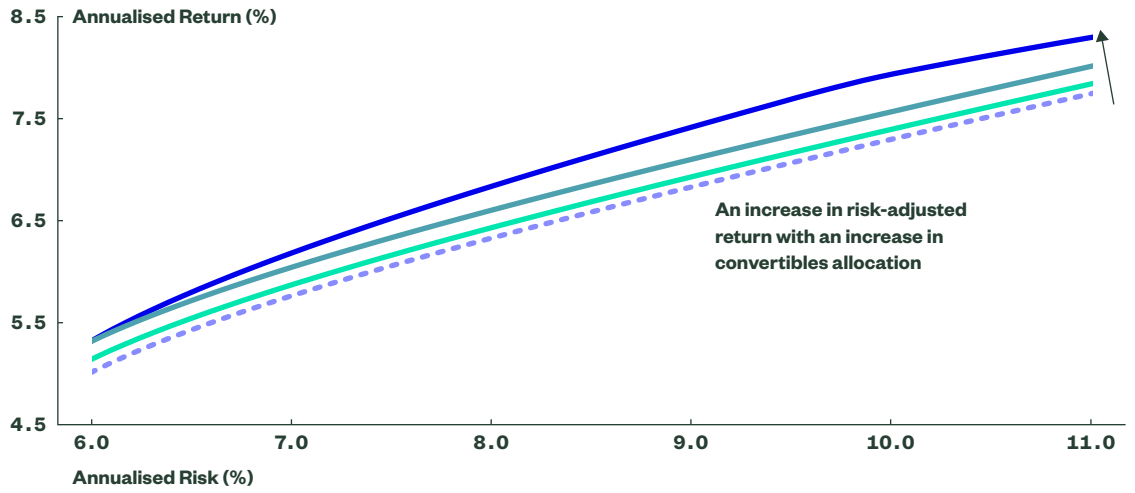
However, before deciding on the type of convertible bond exposures to target, it is important to stress that **not all convertible bonds are equal**. Including the Global Qualified Convertible Bond Index historically improved risk-return efficiency. But, if we were to repeat the same analysis using the Global Focus Convertible Index,⁵ which is most often used by the active management community, the risk-return efficiency would actually decrease. One of the reasons for this is that the Focus Index excludes certain convertible bonds on set criteria (such as price and implied option premia) in order to achieve balanced equity-bond portfolio characteristics.

On the other hand, the Qualified Index, which is the focus of this paper, does not have such a requirement and targets a wider range of convertible exposures. This broader coverage has historically often given the Qualified Index an edge over its Focus equivalent because it also includes bonds with both strong in-the-money and out-of-money option characteristics.

Figure 2
Efficient Frontier
Analysis of
Investment Portfolios
with Convertible
Bonds

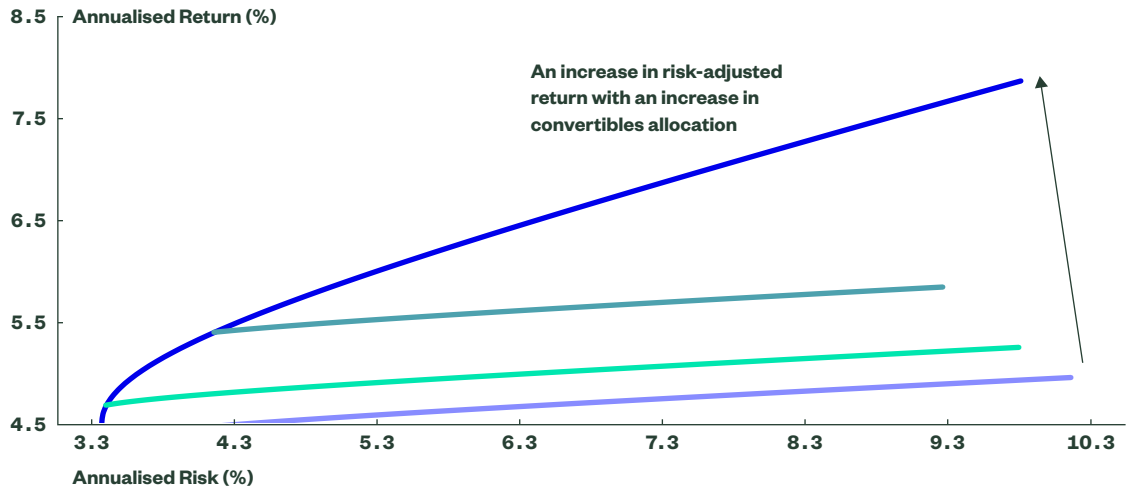
Multi-Asset Portfolios

- Global Equity/Global Fixed Income/Convertibles (Unconstrained USD — Theoretical)
- Global Equity/Global Fixed Income (Unconstrained)/Convertibles 10% (Fixed) USD
- Global Equity/Global Fixed Income (Unconstrained)/Convertibles 30% (Fixed) USD
- Global Equity/Global Fixed Income (Unconstrained) USD



Pure Fixed Income Portfolios

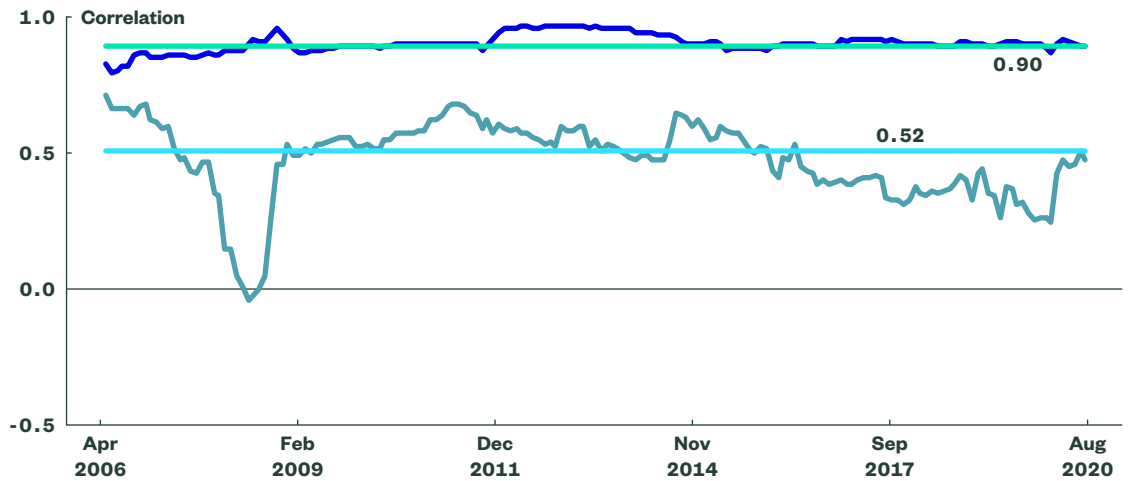
- US Aggregate Bond/Europe Aggregate Bond/Convertibles (Unconstrained USD — Theoretical)
- US Aggregate Bond/Europe Aggregate Bond (Unconstrained)/Convertibles USD 10% (Fixed) USD
- US Aggregate Bond/Europe Aggregate Bond (Unconstrained)/Convertibles USD 30% (Fixed) USD
- US Aggregate Bond/Europe Aggregate Bond (Unconstrained) USD



Source: Bloomberg, State Street Global Advisors, as of 30 August 2020. Monthly data between May 2003 to August 2020. "Equity" is represented by MSCI ACWI Net Total Return USD Index, "Fixed Income" is represented by Bloomberg Barclays Global-Aggregate Total Return Index Value Unhedged USD, "Convertibles" is represented by Refinitiv Global Qualified Convertible Index (USD), "US Aggregate Bond" is represented by Bloomberg Barclays US Agg Total Return Value Unhedged USD Index, and "Europe Aggregate Bond" is represented by Bloomberg Barclays Euro Aggregate Total Return Index Value Unhedged USD.

Figure 3
Correlation of Convertible Bonds with Equities and Fixed Income

- Equity v Convertibles Rolling
- Equity v Convertibles Full Period
- Fixed Income v Convertibles Rolling
- Fixed Income v Convertibles Full Period



Source: Bloomberg, State Street Global Advisors, as of 30 August 2020. Monthly data between May 2003 to August 2020. "Equity" is represented by MSCI ACWI Net Total Return USD Index, "Fixed Income" is represented by Bloomberg Barclays Global-Aggregate Total Return Index Value Unhedged USD, and "Convertibles" is represented by Refinitiv Global Qualified Convertible Index (USD).

Managing drawdowns and accessing cheap equity call options

Convertible bonds may help to manage drawdowns in investment portfolios given the hybrid equity-bond features embedded within them and the dynamic nature in which the characteristics change depending on market conditions. When the stock market rallies, these bonds trade more like their underlying equities but, **during periods of stock market turmoil, they behave like conventional bonds that offer a regular stream of coupons and the equity optionality loses value.**

Convertible bonds can help alleviate portfolio drawdowns

From a risk management perspective, investors are partially protected because the value of the convertible bonds will not fall below the value of the traditional bond component, known as the "bond floor." In terms of riskiness, there is often the belief that convertible bonds are riskier than high yield corporate bonds because a substantial number of them (around 60% in the Refinitiv Global Qualified Convertible Index) are not rated by international credit rating agencies. Based on our estimates using both domestic and international credit rating agencies, **54.5% of convertible bonds within the Refinitiv Global Qualified Convertible Index are investment-grade and 43.9% are high yield**, of which non-investment grade speculative (BB+ to BB-) is 19.01%, highly speculative (B+ to B-) is 18.19%, and extremely speculative (CCC to C) is 6.62%. Only 1.6% are unrated.⁶

However, this perception is mistaken because the average credit (option-adjusted) spread of convertible bonds between August 2006 and September 2020 is 296 bps and compares favourably to global corporate BBB bonds and global high yield bonds at 210 bps and 583 bps, respectively. The story is similar for the 12-month average default rate where 2.41% of global convertible bonds defaulted and 4.21%⁷ of US high yield suffered the same fate.

To understand whether the inclusion of convertible bonds helps reduce risk and mitigate drawdowns, we have created a number of simulated multi-asset portfolios that target an overall portfolio volatility of 10% and include differing levels of convertible bond allocation. During the study period, as shown in Figure 4, convertible bonds improved the risk-adjusted return, incurred lower drawdowns and generated higher excess returns in down markets, even though all three portfolios targeted an overall volatility of 10%. **Even over shorter time periods, convertible bonds appeared to have reduced portfolio drawdowns, in particular during the periods of the three worst drawdowns** (including the Global Financial Crisis and COVID-19 at the start of 2020) (see Figure 5).

Figure 4

**Selected Risk-Return
Characteristics of
Equity-Fixed Income
Efficient Portfolios**

(10% Portfolio

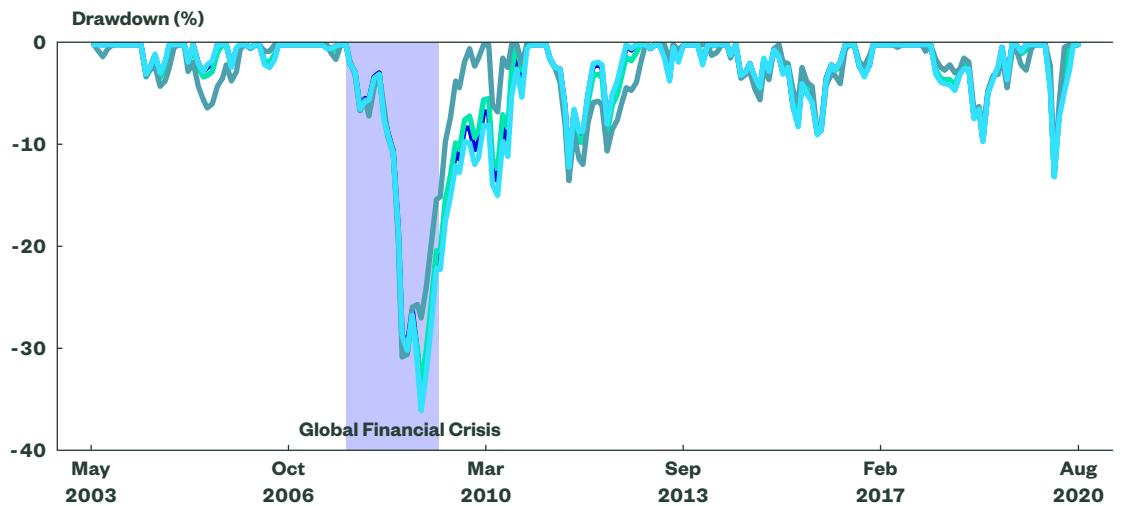
Volatility Target)

	Equity/Fixed Income/ Convertibles 10% (USD) Efficient Portfolio	Equity/Fixed Income/ Convertibles 30% (USD) Efficient Portfolio	Equity/Fixed Income/ Convertibles (Unconstrained USD — Theoretical) Efficient Portfolio	Equity 60%/Fixed Income 40% (USD) Efficient Portfolio
Return (%)				
Annual Return	7.19	7.38	7.69	7.18
Risk (%)				
Annual Volatility	9.86	9.94	9.93	10.06
Maximum Drawdown	-34.47	-33.49	-30.66	-35.94
Ratio				
Return per Unit Risk	0.73	0.74	0.77	0.71
Market Beta				
Market Beta	0.98	0.98	0.92	1.00
Up Beta	0.99	0.99	0.96	1.00
Down Beta	0.98	0.99	0.95	1.00
Excess Returns (%)				
Up Months	-0.04	-0.03	-0.15	—
Down Months	0.07	0.10	0.39	—
Drawdown Statistics Based on the 60 Equity — 40 Fixed Income Drawdown Dates (%)				
October 2007 to February 2009 (Global Financial Crisis)	-21.37	-20.26	-16.81	-35.94
April 2011 to September 2011 (Greek Debt Crisis)	-7.04	-7.68	-8.24	-12.09
December 2019 to March 2020 (COVID-19)	-7.72	-7.78	-7.36	-12.95

Source: Bloomberg, State Street Global Advisors, as of 30 August 2020. Monthly data between May 2003 to August 2020. The portfolios outlined above target 10% volatility with varying levels of convertible bonds. "Equity" is represented by MSCI ACWI Net Total Return USD Index, "Fixed Income" is represented by Bloomberg Barclays Global-Aggregate Total Return Index Value Unhedged USD, and "Convertibles" is represented by Refinitiv Global Qualified Convertible Index (USD). Cells highlighted dark green indicate the most favourable number and cells highlighted light green represent the most unfavourable number. The three worst drawdowns are determined on the basis of the peak-to-trough declines of the Equity 60%/Fixed Income 40% portfolio.

Figure 5
**Rolling 1-Year
 Average Drawdown
 of Select Multi-Asset
 Efficient Portfolios
 (at 10% Portfolio
 Volatility Target)**

- Equity/Fixed Income/
Convertibles 10% USD
- Equity/Fixed Income/
Convertibles 30% USD
- Equity/Fixed Income/
Convertibles
(Unconstrained USD —
Theoretical)
- Equity 60%/Fixed Income
40% (USD)



Source: Bloomberg, State Street Global Advisors, as of 30 August 2020. Monthly data between May 2003 to August 2020. The above chart is for portfolios targeting an overall portfolio volatility of 10%. "Equity" is represented by MSCI ACWI Net Total Return USD Index, "Fixed Income" is represented by Bloomberg Barclays Global-Aggregate Total Return Index Value Unhedged USD, and "Convertibles" is represented by Refinitiv Global Qualified Convertible Index (USD).

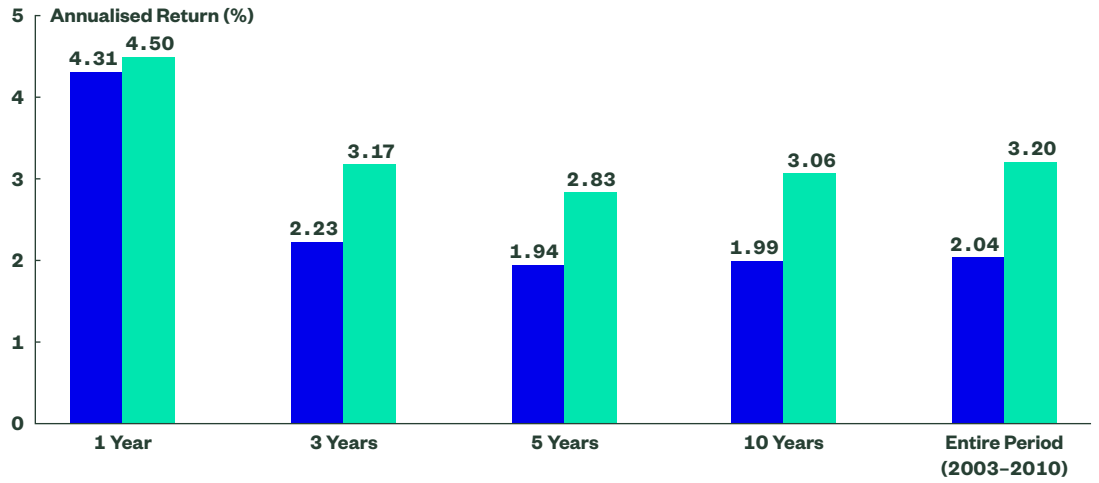
Convertible bonds historically captured over 65% of equity upside but suffered only 50% downside

Risk management benefits aside, convertible bonds offer investors the possibility of additional return by capturing equity market upside. In exchange for a lower coupon level compared to corporate bonds, investors have the option to convert fixed maturity convertible bonds into a predetermined number of shares. This optionality becomes all the more desirable when the underlying equities fare well. Therefore, convertible bonds represent a cost-efficient way to access equities. Comparing the performance of convertible bonds and global equities, Figure 6 shows that convertible bonds historically captured over 65% of equity upside but suffered only around 50% of the downside (across different time periods).

Figure 6
**Upside and
 Downside Capture of
 Convertible Bonds
 and Global Equities**

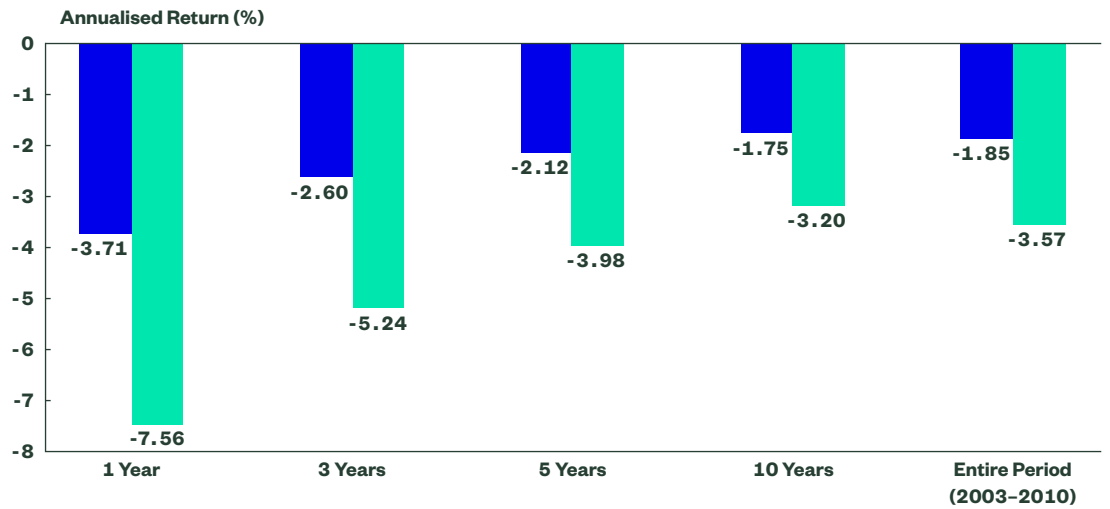
Equity Up Markets

■ Global Convertible Bonds
 ■ Global Equities



Equity Down Markets

■ Global Convertible Bonds
 ■ Global Equities



Source: State Street Global Advisors, as of September 2020. Monthly Data from May 2003 to September 2020. Convertible Bonds are represented by the Refinitiv Global Qualified Convertible Index and Global Equities are represented by the MSCI ACWI Index.

Convertible bonds may be a Solvency II capital-efficient option in the return-seeking portion of an insurer's portfolio

Capital efficiency for insurers

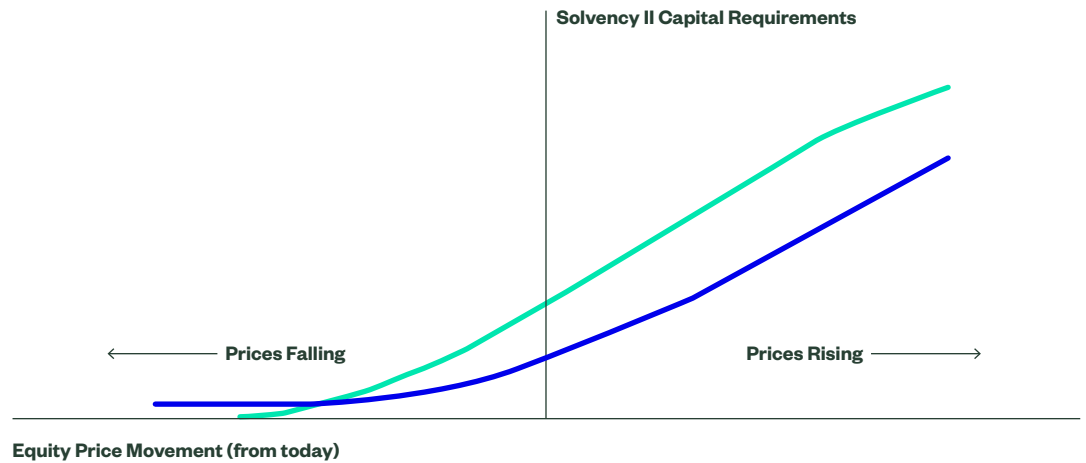
Convertible bonds may be an option for insurers, whereby they can potentially provide access to equity-like returns with lower risk and Solvency II capital requirements (SCR).⁸ Because of their embedded equity exposure, convertible bonds are more difficult to use as liability matching assets from a duration management perspective as their future cashflows cannot be wholly predicted in advance. For this reason, convertible bonds lend themselves more to the return-seeking portion of the portfolio as they can generate additional return in a broader investment portfolio.

Overall, convertible bonds are subject to capital charges relating to interest rate, credit spread and equity charges. Assuming that the duration and FX risks are well matched, the market SCR comes from two sources: equity risk and credit risk (see Figure 7).

The total capital charge incurred by convertible bonds is lower for all values of underlying equity. This is because the convertible bond's floor acts to protect its value when equity stress is applied. The only exception is when the stock price falls so much that the underlying equity exposure becomes immaterial. Depending on the moneyness of the embedded equity option in the bond, the credit capital charge can dominate in some instances while the equity capital charge can dominate in others.

Figure 7
**Stylised Solvency II
 Capital Requirements
 of Convertible Bonds
 and Equities**

■ Convertible Bond SCR
 ■ Equivalent Equity SCR



Source: State Street Global Advisors. The above diagram is for illustrative purposes only. The diagram shows stylised Solvency II capital requirements of convertible bonds and equities of a given company versus changes in equity prices. Conversion price = face value of the bond/conversion ratio. Conversion ratio = number of shares into which the convertible bond can be exchanged.

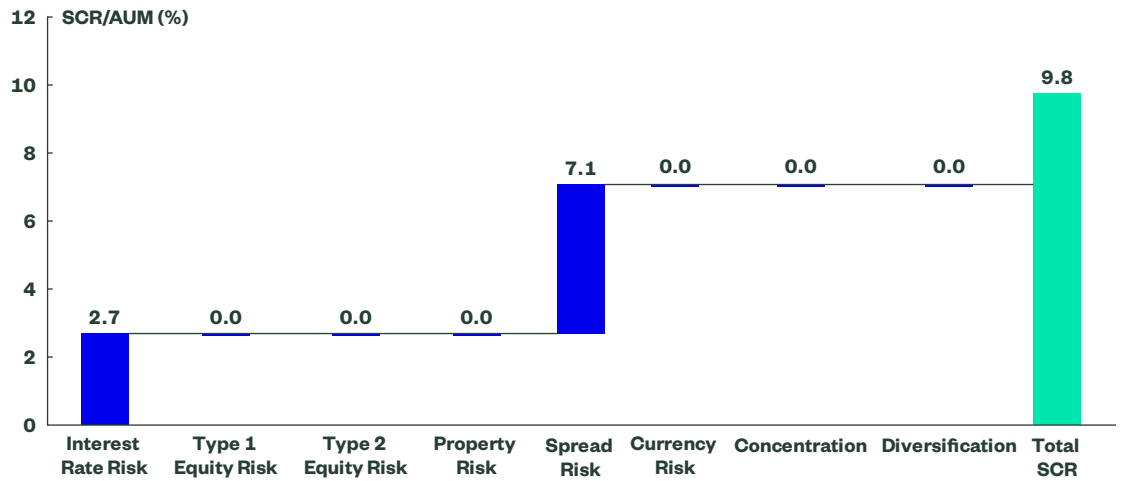
Calculated on the basis of mark-to-market, convertible bond SCR is often between equities and corporate bonds

As an illustration, we assessed the market SCR charges for three types of instruments linked to Bekaert S.A., a diversified manufacturing company in Belgium: (1) a convertible bond, (2) equity shares and (3) a bullet corporate bond. In this analysis, we assume there are no concentration, diversification or foreign exchange risks.* Results in Figure 8 show that the corporate bond incurred the lowest SCR charge, followed by the convertible bond and equity. As could be anticipated, the SCR of the convertible bond is somewhere between equities and corporate bonds.

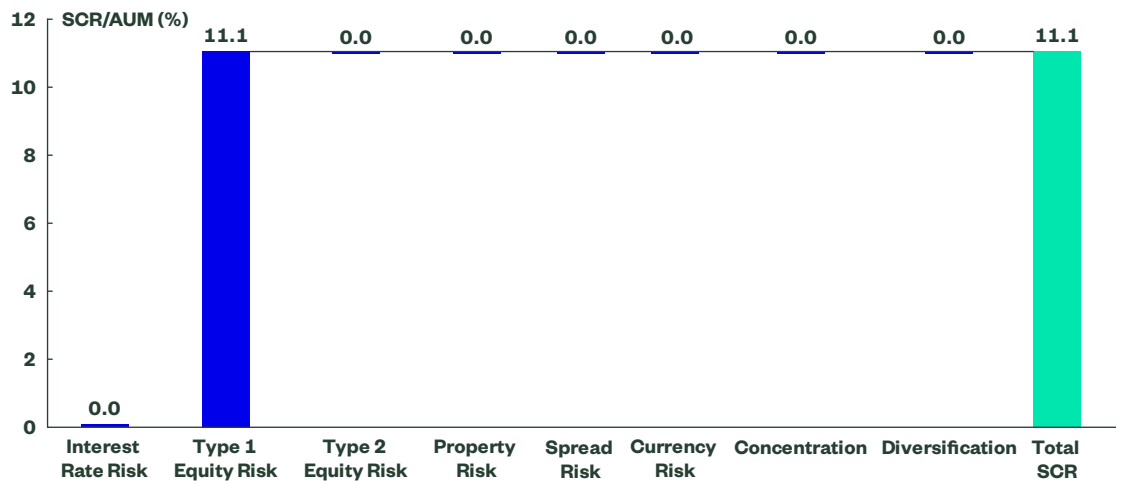
As this is a point-in-time analysis, the market SCR will change according to the market movements of these instruments. This is particularly true for convertible bonds where the future cashflows remain uncertain and depend on the moneyness of the embedded equity option as well as their spread and duration risks.

* This information should not be considered a recommendation to invest in a particular sector or security shown above.

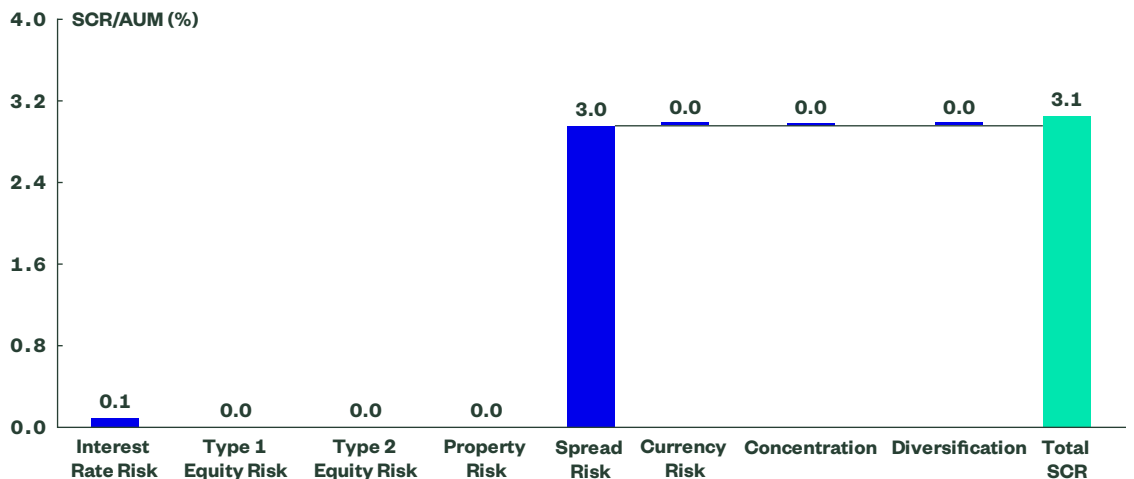
Figure 8
A Point-in-Time Comparison of the Market SCR between a Convertible Bond, Corporate Bond and Equity for the Same Company
 Bekaert S.A.
 Convertible Bond



Bekaert S.A. Equity



Bekaert S.A.
 Corporate Bond

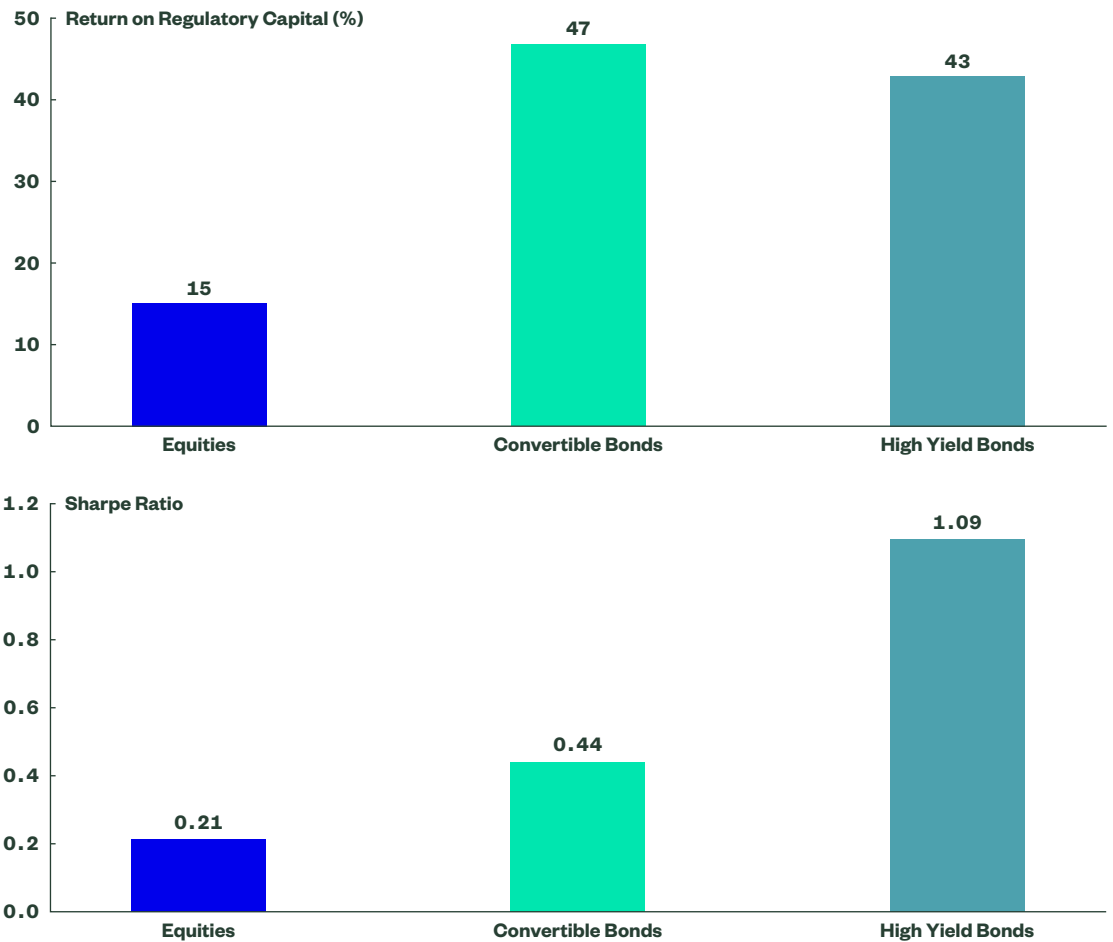


Source: State Street, as of October 2020. Figures above are calculated as of end of September 2020. Concentration, diversification and FX risks are assumed to be zero. This is a point-in-time analysis and the precise SCR ratio will change depending on market movements of the underlying instruments. The Convertible Bond is represented by the Convertible Bond that is scheduled to mature in June 2023, with a conversion date up to February 2021 and a conversion price of 50.71. The equity is based on Bekaert's stock traded on Euronext Brussels and the Corporate Bond is based on Bekaert's fixed 0% coupon bond, maturing in June 2023.

Some industry practitioners⁹ have also suggested that there may be regulatory advantages associated with allocating to convertible bonds in the wider portfolio. Particularly, convertible bonds offered a higher return on regulatory capital than high yield bonds and equities during the study period,¹⁰ although high yield might have looked better from a purely historical Sharpe ratio standpoint.

Ultimately, the choice of what asset to include in a portfolio is multifaceted and should account for a range of factors (such as whether the asset is expected to generate a strong risk-adjusted return *in the future*, from both a regulatory as well as “standard” investment perspective). In that context, there are limitations with long-term historical analysis, such as those presented in Figure 9, **but the analysis does show that convertible bonds may offer certain advantages compared to high yield bonds and equities.**

Figure 9
Regulatory and Accounting Balance Sheet Characteristics for Select Fixed Income Assets



Research suggests that convertible bonds were historically capital efficient

Source: Lombard Odier.

Risk Attribution for a Stylised Multi-Asset Portfolio with Convertibles

Integrating convertible bonds in a multi-asset portfolio will inevitably create biases. To assess these biases, we created two stylised multi-asset portfolios with varying levels of convertible bonds and compared them with a 60%/40% global equities/global bonds benchmark. The analysis was conducted on the basis of holdings data using MSCI Barra Multi-Asset Class Risk Model as at the end of August 2020.

The results are displayed in Figure 10. Unsurprisingly, with an increasing allocation to convertible bonds, the tracking error to the 60%/40% benchmark doubles from 1.18% to 2.35%. Of the total tracking error in either portfolio, around 50% comes from equities and 30% from fixed income with the remainder from selection.

The highest amount of risk came from credit and equity style

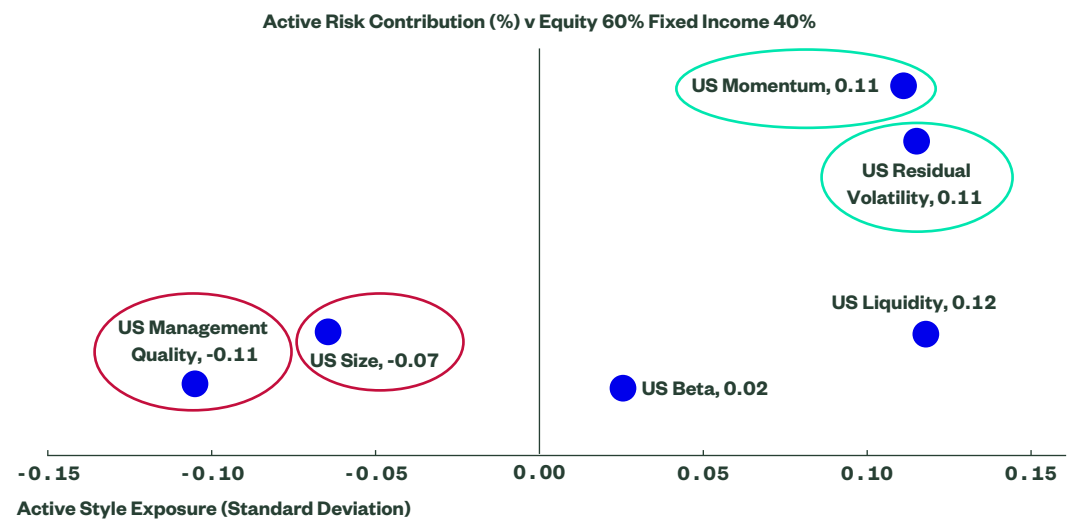
The largest contributor of active equity risk is style, in particular US momentum and residual volatility, and the largest contributor of active fixed income risk is credit, in particular US IT high yield, followed by US consumer discretionary high yield (see Figure 11). The high selection risk in the portfolio can be ascribed to the inclusion of convertible bonds, which are not part of the 60%/40% benchmark.

Figure 10
Risk Contribution to ex-ante Tracking Error (vs. Equity 60%/Fixed Income 40%)

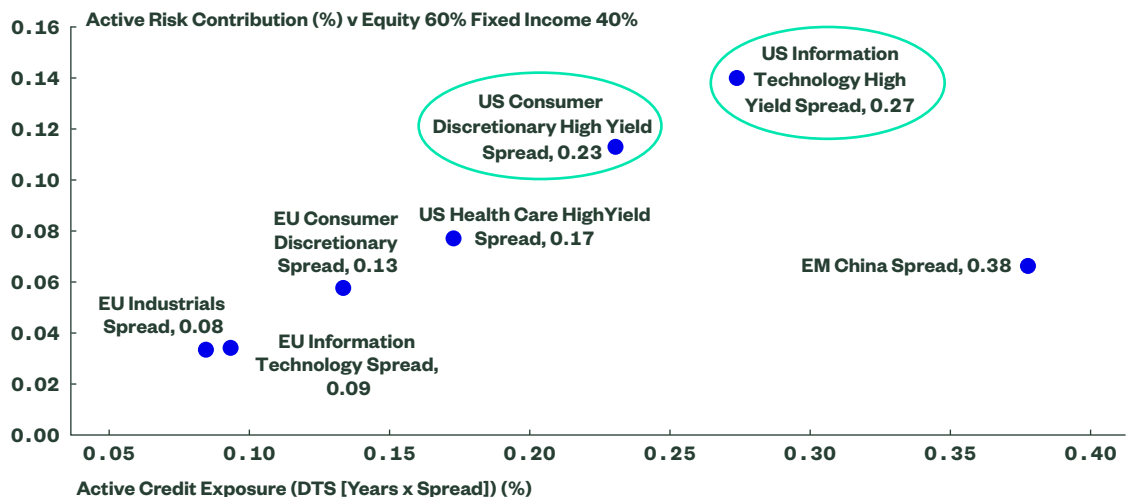
Factors	Equity 51%/Fixed Income 34%/Convertibles 15%	Equity 42%/Fixed Income 28%/Convertibles 30%
Equity	0.59	1.18
Market	-0.05	-0.11
Style	0.56	1.12
Industry	0.08	0.16
Fixed Income	0.35	0.71
Rates	0.01	0.02
Credit	0.34	0.68
Selection Risk	0.25	0.51
Currency Risk	-0.02	-0.04
Total (Tracking Error)	1.18	2.35

Source: MSCI Barra, State Street Global Advisors, as of 30 August 2020. "Equity" is represented by MSCI ACWI USD Index, "Fixed Income" is represented by Bloomberg Barclays Global-Aggregate Index Unhedged USD, "Convertibles" is represented by Refinitiv Global Qualified Convertible Index (USD). Larger numbers in the table are highlighted in dark green and smaller numbers are in light green.

Figure 11
Risk Exposure (Multi-Asset with 30% Convertibles) v/s Active Risk Contribution — Style & Credit Risk Factors
 Style Risk
 Decomposition



Credit Risk
 Decomposition



Source: MSCI Barra, State Street Global Advisors, as of 30 August 2020. The data has been computed on the basis of MSCI ACWI Index, Bloomberg Barclays Global Aggregate Unhedged Index USD as well as 30% Refinitiv Global Qualified Convertible Index.

Endnotes

- 1 Camissar J. and Lesné A. (2019), *Four years on: Convertible bonds still gathering steam*, SPDR.
- 2 For this analysis, we used the Refinitiv Global Qualified Convertible Index.
- 3 This finding holds well for both USD-denominated as well as EUR-hedged exposures.
- 4 Sauve M. et al. (2016), *Convertible bonds shine brighter under Solvency II*, Insurance Asset Risk.
- 5 For the Global Focus Convertible Index, we used the Refinitiv Global Focus Convertible Index.
- 6 Source: SSGA, FinAPU, as of September 2020.
- 7 Source: BofA Merrill Lynch Global Research. Data between August 2006 and September 2020.
- 8 For the purpose of the analysis, our focus is on the market Solvency II capital requirements (SCR). Solvency II capital requirements are computed based on a mark-to-market approach for balance sheet items and determines the level of capital requirement required to ensure that the insurer will be able to meet its obligations over the next 12 months with a confidence level of at least 99.5%. The Solvency II capital requirement is estimated on the basis of the standard formula.
- 9 Source: Strategy Insight: Long only convertible bonds for insurance companies, Lombard Odier, November 2015.
- 10 Between 2005 and 2015.

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* This figure is presented as of September 30, 2020 and includes approximately \$80.51 billion USD of assets with respect to SPDR products for which State Street Global Advisors Funds Distributors, LLC (SSGA FD) acts solely as the marketing agent. SSGA FD and State Street Global Advisors are affiliated.

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