

# What's Bad About Yield-to-Worst

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Given the dollar price of a bullet bond, an investor can obtain the corresponding yield-to-maturity (YTM), and then calculate the spread between the YTM and that of a matching maturity Treasury bond. Because this spread is an indication of credit risk, he can assess the bond's relative value. For example, assume that the bond matures in five years, its quoted dollar price converts to a YTM of 6.50%, and the five-year Treasury happens to be 4.25%. The resulting 225 basis point spread is an indication of the bond's relative value.

In contrast to a bullet, the cash flows of a callable bond<sup>4</sup> depend on the course of interest rates. The sooner and steeper rates decline, the earlier will the bond be called. This feature complicates meaningful quotes for a callable bond. For example, a 6.50% YTM for a not-yet-callable bond may sound attractive only until one learns that the yield-to-first-call (YTC) is 2%. Similarly, a 7% YTC is meaningless if the YTM is only 4%.

Yield-to-worst (YTW) evolved as the intended solution. It is obtained by calculating the yield-to-call to each call date (using the appropriate call price), and then determining which yield is the lowest.

While YTW may be a modest improvement over either YTM or YTC, it is still less than satisfactory. One problem with any yield as a measure of relative value is that it has to be presented along with its term. If the yield curve is upward sloping, a lower yield of 4% over three years may be preferable to a higher 5% yield over seven years. Yet, even if the term is stated explicitly, there is no guarantee that the actual cash flows will conform to the assumed term.

Instead of quoting various yields, a superior approach is to calculate the option-adjusted spread (OAS) of the bond at the given price, along with its option-adjusted duration. The OAS approach explicitly recognizes the basic uncertainty of the cash flows of a callable bond. OAS is defined in reference to a *yield curve* (usually Treasuries), rather than in reference a *yield* (say the YTM of the five-year Treasury). When combined with option-adjusted ("effective") duration, which is the analog of time to maturity, OAS is a simple and meaningful indicator of relative credit risk.

## Bibliography

Kalotay, Andrew J., George O. Williams, and Frank J. Fabozzi. "A Model for Valuing Bonds and Embedded Options." *Financial Analysts Journal*, May/June 1993, pp. 35-46.

<sup>4</sup> Although the issuance of callable, investment grade, corporate bonds has been on a decline, the call feature continues to be prevalent among Agency, municipal, and high yield bonds.