

Negative Convexity

June 2017

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IN TAX-EXEMPT MUNICIPAL SECURITIES

Convexity is an important but little discussed aspect of bond mathematics and efficient fixed income management. In essence, convexity provides a measure of the rate of change of a bond's duration and price as interest rates change. Below is a detailed discussion of negative convexity.

Negative Convexity

Long maturity, low coupon bonds with short calls trading close to par have serious negative convexity risk. Price appreciation potential is limited when interest rates decline while price deterioration in rising rate environments can be dramatic.

As an example, Aa2 rated Broadview Heights, OH 3.25% bonds due 12/1/2037 with a 12/1/2020 par call were recently priced at a \$100.439 dollar price. Yield to call is 3.11%, yield to maturity 3.22%. Yield to call pricing was applicable. Modified duration is 3.25 years.

With an interest rate decline of 1% (100 basis points) over one year, the bond will continue to be priced to the call and its dollar price would rise to \$102.728, an increase of about 2.27%.

Conversely, if yields increase by 1% over one year, the bond's price will decline dramatically as the yield to worst shifts from the shorter call date to the 2037 maturity. Assuming a 4.11% yield to maturity, the dollar price will drop well below par. Ignoring taxes, the price would fall to \$88.551, a decline of 11.84%. However, because the bond has now breached its de minimis threshold, and the appreciation back to par is subject to ordinary income taxes, its price would fall further - likely to about \$86.098. Duration extends to approximately 13.81 years.

Upside potential of about 2%; downside risk of over 14% - plus duration extension. This could be seen as a terrible tradeoff.

It is not uncommon for C.W. Henderson to find bonds with negatively convex structures when accounts are funded with existing securities. These securities are expeditiously traded for bonds not subject to negative convexity. Durations of the replacement bonds are relatively stable and de minimis risk is avoided.

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