

duration: not the whole story

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How often have you heard an investor remark, “I think interest rates are going to rise, so I’d prefer a portfolio with a shorter duration.” This seemingly innocuous remark highlights some important concepts in the analysis and management of fixed income portfolios, especially multisector portfolios. It sheds light on the misconceptions and limitations of one of the most popular portfolio analytics—duration. Implicit in this remark is the assumption that duration alone is a sufficient metric for determining the performance of a fixed income portfolio in an environment of rising interest rates. Simply put, duration does not tell the whole story.

The price-to-yield relationship is the kernel of fixed income security valuation. Basically, it states that when the yield of a security moves up, its price moves down (and vice versa), and its duration provides an approximation of the size of the price move. Thus, a shorter duration portfolio will outperform a longer duration portfolio if both portfolios experience the same increase in yield. This is a mathematical identity; however, how do we know both portfolios will experience the same increase in yield? There is the rub!

The remark “I think interest rates are going to rise” is ambiguous, as it does not specify which interest rates—fed funds, US Treasuries, LIBOR? For simplicity, let’s assume that it refers to US Treasury yields. Now, in order to understand the performance of a portfolio in a period of rising interest rates, we need to know not only its duration, but also how it will react to higher US Treasury yields.

This paper takes a closer look at this topic and expands the discussion by introducing a proprietary metric called Loomis Sayles Treasury Interest Rate (iRate) Beta. The Loomis Sayles Quantitative Research Risk Analysis (QRRR) team developed iRate Beta to help deliver a broader perspective on a portfolio’s interest rate sensitivity. We believe that arming our experienced investment teams with analytics such as iRate Beta can help them form a more comprehensive assessment of portfolio risk.

A HISTORICAL CONTEXT

Financial markets are dynamic, and many factors influence their movements. Not all fixed income securities will react the same to changes in US Treasury yields; this is intuitive given that a variety of factors (including economic risk, default risk, prepayment risk and liquidity risk) influence changes in yield, and different sectors have different exposures to each factor. For example, during periods of low economic activity, demand for US Treasuries may pull

	BARCLAYS INDICES				
	US Treasury Index	US Corporate IG Index	US Corporate HY Index	EM International Sovereign Index	Global Treasury ex-US Index
12/31/96	0.70	0.64	(0.37)	(0.97)	(0.91)
12/31/97	(0.42)	(0.43)	(0.59)	1.28	1.16
12/31/98	(0.91)	(0.40)	1.65	3.34	(0.85)
12/31/99	1.60	1.54	1.01	(1.25)	(1.62)
12/31/00	(1.15)	(0.33)	2.91	(0.43)	(0.30)
12/31/01	(0.97)	(0.99)	(1.99)	(1.63)	(0.40)
12/31/02	(1.38)	(1.31)	(0.38)	(0.91)	(0.60)
12/31/03	0.24	(0.61)	(4.69)	(2.47)	0.12
12/31/04	0.49	0.22	(0.64)	(0.24)	(0.11)
12/31/05	0.72	0.68	1.49	(0.65)	0.08
12/31/06	0.35	0.31	(0.54)	(0.17)	0.61
12/31/07	(1.20)	0.13	1.94	0.04	0.11
12/31/08	(2.04)	1.71	9.79	2.68	(1.00)
12/31/09	0.91	(2.77)	(10.36)	(2.83)	0.02
12/31/10	(0.58)	(0.72)	(1.55)	(0.64)	(0.14)
12/31/11	(0.86)	(0.28)	0.85	0.02	(0.28)
12/31/12	(0.17)	(1.03)	(2.22)	(1.52)	(0.40)

Source: Barclays. Annual change in yield-to-worst shown for all indices. All indices are unmanaged and do not incur fees. You cannot invest directly in an index.

their yields down, while increased default risk could simultaneously push corporate bond yields higher. The table at left shows the annual yield change of the *Barclays US Treasury Index* and various sectors since 1996.

As the table illustrates, not all sectors react in the same manner as US Treasuries. Portfolios with distinct sector and quality characteristics can, and often do, respond differently to movements in US Treasury yields. A multisector portfolio that cuts across sectors, ratings and regions is not likely to behave the same as a portfolio that invests in a homogenous set of securities, say only US investment grade securities. Therefore, to evaluate the potential performance of a fixed income portfolio in a period of rising US Treasury yields, it is not only necessary to measure its duration, but also to understand the composition of the portfolio—or the sources of duration.

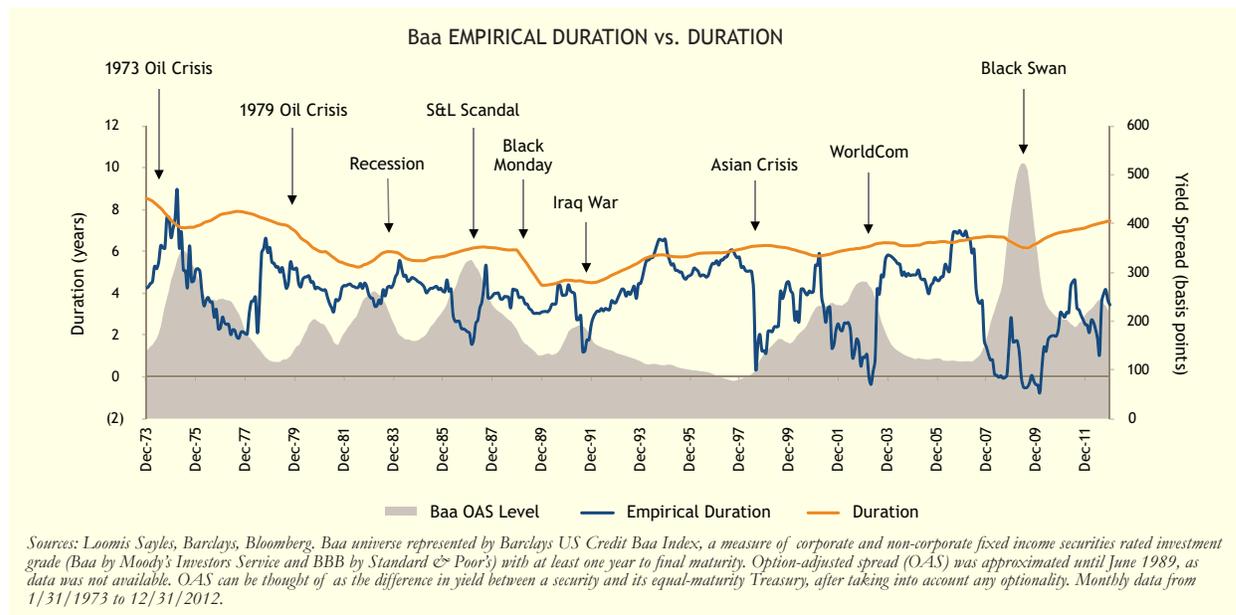


DURATION VS. EMPIRICAL DURATION

The historical sensitivity of a security to changes in US Treasury yields is often referred to as its “empirical duration.” Empirical duration can be broadly interpreted as the historical price return of a security given a 100-basis-point change in the yield of the equal-maturity US Treasury. It is important to note that this is not a stable relationship, and any calculation of empirical duration depends upon both a specific historical period and the data intervals (e.g., daily, monthly, etc.).

Credit quality can be a primary influence on a bond’s Treasury sensitivity. In general, as credit quality declines, the sensitivity to changes in US Treasury yields also declines. A 2010 research publication by *Barclays* confirmed this principle, stating, “...the sensitivity to rates [Treasury yields] decreases as spreads widen.”¹ Hence, a portfolio that invests in lower-quality securities has historically tended to exhibit less sensitivity to changes in US Treasury yields than a higher-quality portfolio. This stands to reason, since the prices of lower-quality investments are often more attuned to the market perception of an issuer’s credit standing.

It is important to note the dynamic nature of empirical duration. The graph below provides the rolling 12-month empirical duration of Baa credits compared to their duration. The graph demonstrates how the relationship between duration and empirical duration can change over time, at times consistent, and in other environments divergent. The ebb and flow has often related to the bonds’ spread levels. Generally, when spreads have been stable and low, the difference between duration and empirical duration has been smaller, whereas high spread levels and high volatility have produced a more pronounced difference. This graph underscores the fact that empirical duration represents a fluid relationship and depends on historical context. Future periods may produce varying results, and portfolio managers must continuously monitor this relationship. The broader point, however, bears repeating: dissimilar fixed income securities and overall portfolios are likely to react quite differently to changing US Treasury yields.



TREASURY IRATE BETA: AN ADDITIONAL PERSPECTIVE

Understanding a portfolio’s sensitivity to changes in US Treasury yields can offer valuable information in the management of fixed income portfolios. At Loomis Sayles, the QRRA team has developed a proprietary measure referred to as Treasury iRate Beta, which estimates a portfolio’s Treasury sensitivity. iRate Beta is based upon our proprietary risk model and recognizes that each bond in a portfolio contributes “sources of duration” due to its individual characteristics. The model simulates a portfolio’s return in different historical environments and analyzes how its underlying securities have responded to past shifts in Treasury yields. Because the model is historically based, it has limitations, but we believe iRate Beta is one of many informative inputs for managers to evaluate during the investment process.

¹ Ambastha, M., Ben Dor, A., Dynkin, L., Hyman, J., and V. Konstantinovskiy. 2010. “Empirical Duration of Corporate Bonds and Credit Market Segmentation,” *The Journal of Fixed Income*, Vol. 20, No. 1, 5-27.



A broader understanding of a portfolio's sensitivity to Treasury yields has applications when considering different hedging alternatives, chiefly the use of Treasury futures. If a portfolio manager is wary of long-term interest rates rising, he or she might seek to limit, dampen, or in some instances neutralize the portfolio's Treasury sensitivity by selling Treasury futures. Our analysis of the actual historically observed movements in bond prices relative to movements in interest rates can add to portfolio managers' perspectives, helping them avoid over- or under-hedging a portfolio. It is important to note that hedging based upon iRate Beta can have significant implications for portfolio construction, view formulation and attribution.

CONCLUSION

Our analysis has shown that drawing on a broad set of quantitative tools to assess a portfolio's perceived interest rate sensitivity can enhance the decision making process. At Loomis Sayles, iRate Beta is one of many resources—including other analytics, fundamental research and trading insights—for portfolio managers to consider when making investment decisions. By arming portfolio managers with a comprehensive perspective on their portfolios' Treasury sensitivity and risk, we believe managers will be better positioned to consider various investment and hedging strategies.

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