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The Empirical Approach to Interest Rate and Credit Risk in a Fixed Income Portfolio

By Erik Lehr

In recent weeks, market news about fixed income has been growing increasingly bearish. Historically low interest rates and unconventional monetary actions by the Federal Reserve have fueled claims in the financial press of a “bond bubble” and an impending crash in asset prices. With interest rates nearly at a lower bound and credit spreads¹ compressing, many investors are becoming increasingly nervous about the risks associated with holding fixed income. For the majority of investors, bonds are seen as a “safe” asset, intended to stabilize a portfolio and preserve capital value in any market scenario, so the idea that fixed income securities might be riskier than they had originally realized can be quite disconcerting. This white paper will explain the two primary sources of risk to bond-holders; interest rate risk and credit risk, and then will discuss some of the methods that Empirical is using to mitigate these risks in client portfolios.

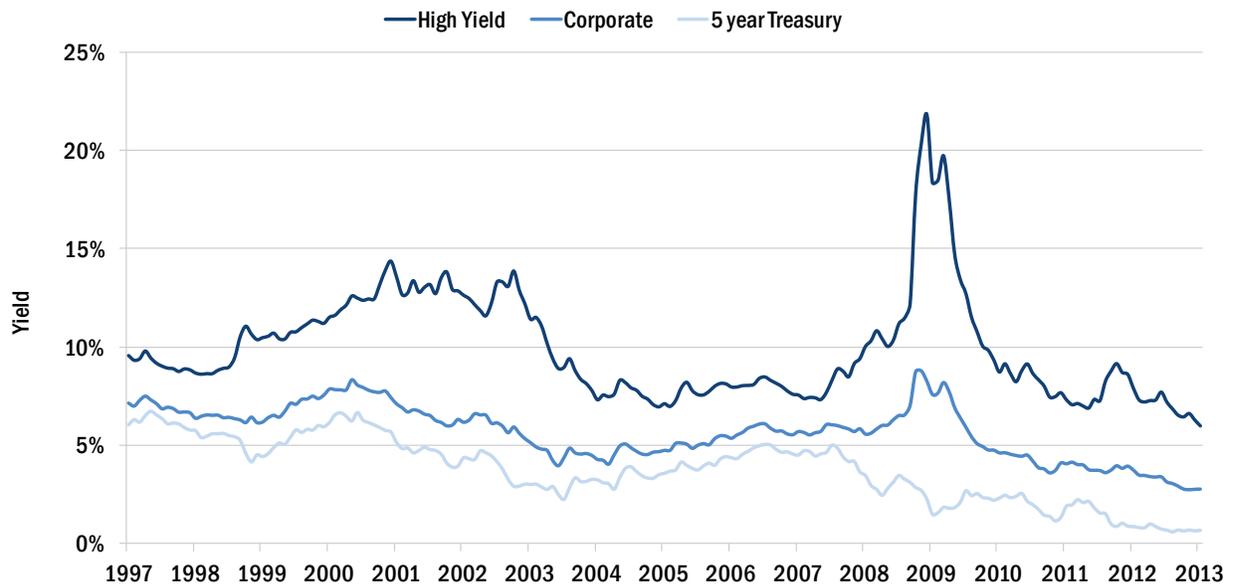
Credit risk is perhaps the most well known source of risk when holding fixed income securities. This is the risk that the issuer of the security could default on the commitment and become unable to completely repay their debt obligation. Bond ratings (as published by companies like Standard & Poor’s (S&P), Moody’s, and Fitch) attempt to quantify this type of risk. For example, issuers rated AAA by S&P are considered to have an “extremely strong capacity to meet their financial commitments.” Bonds with AAA ratings have had a historical default rate of well under 1% (there were only six defaults from 1981-2011). On the other hand, issuers rated CCC or below are considered highly vulnerable, and have an average default rate of nearly 25% per year. It is important to note that a “default” in this sense does not mean the bond has no value; it simply means that the bond issuer was unable to make 100% of its required payments on time. In some cases, the issuers are able to make all payments eventually, and even in the case of bankruptcy bond-holders are generally senior claimants on firm assets, usually receiving at least partial reimbursement. However, from an investor’s point of view, it is not necessary for a bond to default for there to be adverse effects on their portfolio. A negative “transition” (or a credit downgrade) such as the rating of a bond moving from AAA to AA will also decrease the value of that security.

Due to the increased risk associated with holding a bond with lower credit quality, investors demand a higher return, known as a credit premium. It is this premium that explains the yield difference between otherwise

¹ Credit spreads are the differences in yield between bonds with lower credit ratings and higher-rated bonds. For example, it is common to measure the yield spread between high yield bonds and investment grade bonds.

similar bonds with different credit ratings. Figure 1 shows monthly yields of US Treasury notes, investment grade² corporate debt, and high yield debt. The effect of low market rates can clearly be seen by the compression of current yields of all types of debt.

Figure 1 - Bond Yields: 1/1/1997 - 1/1/2013



Source: St. Louis Federal Reserve

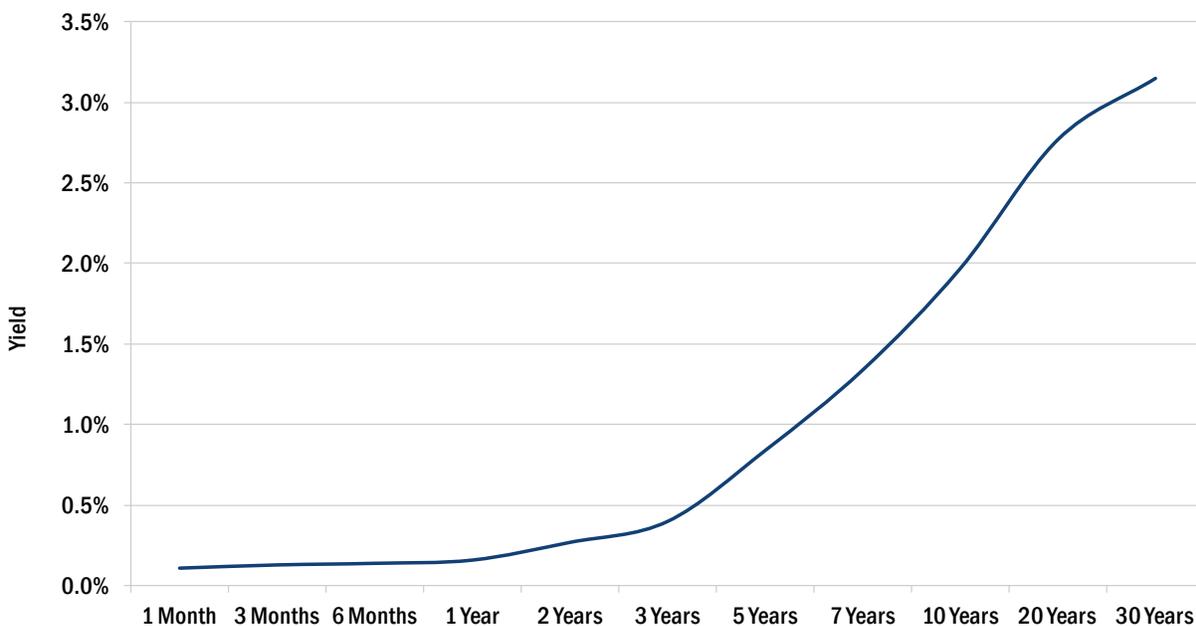
A brief note on credit ratings: Ratings agencies like S&P and Moody's received a large amount of negative attention and scrutiny after the Financial Crisis of 2008 for failing to properly assess the risk of mortgage securities and giving highly risky securities credit ratings that were not reflective of their inherent risk. Most notable of these securities were credit derivatives like mortgage-backed securities (MBS) and collateralized debt obligations (CDOs) that packaged large groups of individual loan securities together. While the ratings process has been the subject of extensive analysis since the crisis, and new regulations are being created to ensure that future credit ratings provide a more accurate reflection of the riskiness of the underlying security, it is important to keep in mind that all credit ratings are estimates, and as such are subject to error. While the credit rating of a bond is likely a good indicator of the credit quality of the issuing firm, it is by no means a guarantee, and should not be viewed as such.

The other major type of risk associated with fixed income is **interest rate risk**, also known as duration risk. This is the risk of market interest rates changing, causing a corresponding change in the value (price) of the fixed rate securities (which most bonds are). Prevailing market interest rates and the value of a fixed rate security have an inverse relationship, and this relationship is exacerbated by the length (or time until maturity) of the security. The idea of an inverse relationship may not be intuitive at first, but it is in fact quite straightforward. If an investor is holding a security that pays a fixed coupon rate (like a bond) and market interest rates increase, the value of that coupon payment will be worth relatively less because investors are now able to purchase higher paying instruments for lower prices, meaning the money locked up in the original bond would have been able to purchase a higher yielding security, thus lowering the value of that bond. The reverse is true if market rates decrease, value increases, which is one reason that bonds have performed so strongly over recent years as interest rates have been pushed down to near-zero levels.

² Bonds with an average rating of BBB or higher are considered to be "investment grade" debt. Bonds rated BB and below are known as high yield (or alternatively as speculative grade or "junk" debt). See the S&P rating scale: <http://www.standardandpoors.com/ratings/definitions-and-faqs/en/us>

The most common measure of interest rate risk is “duration” which estimates the change in bond value given a particular change in market interest rates. Duration is calculated using a variety of factors³, but the critical relationship is that duration increases as the maturity of a bond increases, meaning that longer-term bonds have higher duration, and thus more interest rate risk. Numerically, the duration of a bond gives the approximate percentage change in the price of a bond for a 1% change in interest rates. For example, imagine a bond with a price of \$100 and duration equal to 10. A 1% increase in market rates will cause a drop in the price of the bond of around 10% (which is equal to the percentage change of 1% multiplied by the duration factor⁴ of 10); and thus the bond would fall to approximately \$90. Figure 2 shows the Treasury yield curve (or the current yield of similar securities with different maturity dates) as of 2/22/2013. Because Treasury bonds have essentially no credit risk, this curve gives a relatively pure measure of interest rate risk.

Figure 2 - 30 Year Treasury Curve – As of 2/22/2013



Source: US Department of the Treasury

These two types of risk are more than just theoretical concepts; both are highly relevant in the current market environment. First, as market interest rates have fallen, investors have embarked on a “quest for yield,” leading them to purchase higher yielding securities. These securities tend to be riskier assets, either due to a lower credit quality or higher duration. This movement has caused the narrowing of credit spreads described earlier, as well as an increase in the average duration of the portfolios of many investors. The result is that many fixed income securities now contain far more risk than may be readily apparent to the casual investor. Prevailing market rates are nearly at a lower bound, and are unlikely to decrease much further. Most market observers believe that they will increase in the future, although exactly when this will occur is uncertain. As market rates increase, the value of existing bonds will decrease (due to the interest rate risk described above), and investors will also have opportunities to acquire more creditworthy investment options with higher yields. This will result in a widening of credit spreads and a decrease in the value of lower rated securities.

³ Some of the factors included are time until maturity, coupon rate and frequency, number of coupon payments remaining, current price, and prevailing market interest rates.

⁴ It is important to emphasize that this relationship is not exact, and that the measure becomes less accurate as the change in interest rate is increased. For example, duration is a better measure for a rate change of 1% than a change of 5%.

Now that the risks have been identified, the next step is to assess their severity and describe some of the techniques that Empirical is employing to mitigate those risks for our clients. First, in a portfolio of highly rated securities with relatively short duration, these risks do exist, but they are unlikely to be highly detrimental to portfolio value⁵. An increase in interest rates will cause a decrease in the return of bond funds⁶, but this will only be temporary. As the bonds held by the fund mature, fund managers will purchase new securities at the new prices resulting from the higher interest rates. For most investors, the prudent course would likely be to stay the course and wait out the dip, as opposed to trying to make tactical allocation⁷ changes to time bond markets. However, for investors with portfolios with particularly high duration, or with a relatively short time horizon, there are other strategies that we use:

- 1. Decrease portfolio duration:** By lowering the duration of the portfolio, any potential interest rate risk is reduced. This can be done by allocating a higher proportion of the portfolio in shorter-term funds, though there will be a tradeoff, as lower duration securities tend to have a lower yield than similar securities with higher duration (since investors require additional compensation for taking on increased interest rate risk). With this in mind, Empirical monitors credit spreads and yield curves to design portfolios that strive to take the optimal amount of duration risk and protect against significant losses in asset values. Currently, Empirical Targeted Credit bond models have an overall duration below five in order to protect clients in a rising rate environment.
- 2. Use defined maturity bond funds⁸:** Another option available to investors is to create a laddered portfolio of defined maturity funds. These funds are diversified portfolios of bonds that are structured such that all of the holdings mature at or around a particular date. This gives them characteristics similar to an individual bond, which is a positive trait in rising rate environments. These funds can simply be held until maturity, at which time they pay out the par value of their holdings, thus avoiding any decrease in value due to higher market rates (which have no effect on the par value of a bond). However, as with shorter duration funds, there is a yield tradeoff when using products that reduce interest rate risk. This is a solution that Empirical would use in the portfolio of a client that has significant cash needs in the near future and will be completely drawing down the value of their bond portfolio over the next five to ten years.
- 3. Reduce portfolio credit risk:** For investors who have taken on extra credit risk in order to increase portfolio yield, it is important to understand that lower rated securities face two types of risks in a rising rate environment. In addition to the duration risk associated with an increase in interest rates, credit spreads are likely to widen as investors are able to receive higher yields from securities with better credit ratings. As a result, low rated securities with high duration (such as a long dated high yield bond) could lose value for both reasons due to an increase in interest rates. To reduce this type of risk, Empirical advisors will strive to improve the credit quality of a client's portfolio by lessening exposure to risky assets such as long-dated high yield securities.

Of the methods described above, there is no universally correct solution for every investor. To determine which method is best for you, several factors need to be considered, including the structure of your current portfolio, your investment time horizon, and your willingness and ability to deal with decreased returns or temporary loss of value in your fixed income investments. These are among the criteria used by Empirical advisors to determine ideal bond models for each client. For more information about fixed income risk or about how Empirical portfolio managers are implementing these strategies, we encourage you to contact your financial advisor.

⁵ For simplicity, bond funds (as opposed to individual bonds) will be the focus of this analysis.

⁶ This discussion refers to open-ended bond funds without a specific maturity date.

⁷ See Chance and Hemler (2001) for an example of an empirical study documenting the difficulty of timing markets.

⁸ For more information on defined maturity bond funds, please see our blog post: <http://www.empirical.net/defined-maturity-funds-is-it-a-bond-a-fund-or-both/>

Disclosure

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