

Ask Legg Mason

How do Bonds Work?

This is the second in a series of educational guides that seek to explain some of the concepts widely used in fixed income investing.

INSIDE:

[WHAT IS A BOND?](#)

[WHAT DETERMINES THE PRICE OF A BOND?](#)

[WHAT IS A BOND YIELD?](#)

[WHAT IS THE YIELD CURVE?](#)

[WHAT IS DURATION?](#)



How do Bonds work?

What is a bond?

A bond is essentially a loan from an investor to a bond issuer – such as a government, government-related agency or a corporation – for an agreed period of time. In return, the issuer generally promises to pay the investor a specified rate of interest (the coupon) for the life of the bond and to repay the principal (or the face value) of the bond at the end of the specified period (at maturity). Bonds do vary considerably and there are bonds that do not follow this structure, such as inflation-linked bonds (where the coupon and/or face value are not fixed, but are linked to a consumer price index or other measure of inflation).

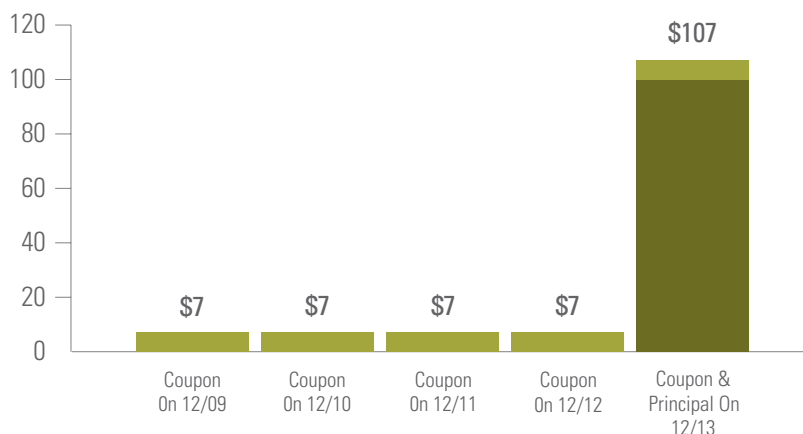
What determines the price of a bond?

Although most bonds pay out fixed cash flows (coupons and the face value) to investors, the price of a bond changes over time as it is traded in the open market. Indeed, the price of a bond reflects the value an investor is willing to pay now for the cash flows that are to be paid over the life of the bond. A number of fundamental factors can cause changes in bond prices. These include:

- **The outlook for inflation**
Increasing inflation erodes the value of the fixed interest offered by bonds over time.
- **Actual and expected changes in interest rates**
In a rising interest rate environment, the fixed interest payments offered by existing bonds become less attractive relative to other investments, such as savings accounts or newer bonds that offer a higher coupon.
- **The outlook for economic growth**
Strong global growth tends to lead to robust corporate earnings, rising interest rates and/or higher inflation, which in turn affect the bond market.
- **Supply and demand of bonds**
Increased new issuance or supply and reduced demand puts pressure on the bond market. These factors are often referred to as market technicals.
- **Change in the bond issuer's creditworthiness**
If a bond issuer becomes less likely to be able to pay the fixed cash flows to its bond investors (i.e. when the risk of default increases) or if the bond issuer is downgraded by a rating agency, the price of its bonds will come under pressure.
- **Alternative investment opportunities (such as cash deposits, equities and property)**
The relative attractiveness of other asset classes can affect the bond market.

A bond is a series of future coupon payments and capital repayment

For illustration purpose only.



The impact of these factors can vary by bond market sector and some factors can indeed be positive for government bonds and negative for corporate bonds or vice versa. Strong economic growth, for example, may be negative for government bonds, if it fuels investors' concerns over inflation. At the same time, corporate bonds may be positively impacted by the resulting improvement in corporate earnings.

What is a bond yield?

The value of any investment depends on the return it generates for an investor. In the case of a bond investment, the return is measured by a bond's yield, which can take into account the following factors.

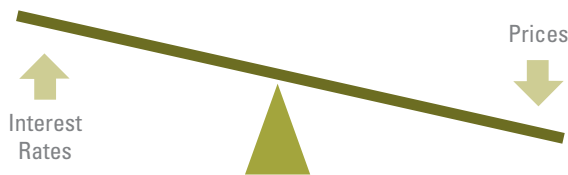
- **Coupon payments made by the issuer**
- **Capital gain (or loss) realised when the bond matures, is called or sold**
- **Income from reinvestment of coupon payments paid out over the life of the bond**

The relationship between a bond's price and its yield is inverse, in other words the yield moves in the opposite direction to the price of a bond:

- **As yields go up, prices go down.** If interest rates increase (or are expected to increase), the lower coupon on an existing bond seems relatively unattractive compared to new bonds. As demand for the existing bond falls, its price will generally decline, resulting in a rise in its yield.
- **As prices go up, yields go down.** If interest rates fall (or are expected to fall), the higher coupon on an existing bond seems more attractive compared to new bonds. As demand for the existing bond increases, its price will generally rise, resulting in a fall in its yield.

“ A bond is essentially a loan from an investor to a bond issuer – for an agreed period of time.”

As yields go up, bond prices go down



A number of yield measures are used in fixed income investing:

Nominal yield: reflects the income earned (coupon) on an investment as a percentage of its nominal or face value.

Current/running/income yield: reflects the income earned on an investment as a percentage of the current price of the bond.

Yield to Maturity (YTM) or redemption yield: The rate of return anticipated on a bond if it is held to maturity and includes coupon payments, capital gains and income generated from reinvestment of income (coupon).

Yield to call (YTC): This is a yield specific to callable bonds, which can be redeemed (or 'called') by the issuer prior to the maturity date under terms specified before the bond's issuance. This yield is calculated in the same way as the YTM, but assumes that the bond will be called at some date in the future. This would shorten the life of the bond and lead to less coupons being paid.

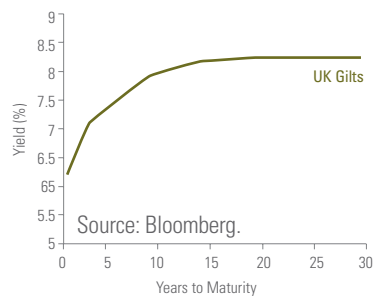
Cash Flow Yield (CFY): For a non-callable bond, the CFY equals the YTM. For callable securities, the CFY will take into account the probability of an early call, based on underlying interest rates and volatility, and will generally fall between the YTM and YTC.

What is the yield curve?

The yield curve depicts the difference in yields across bonds of different maturities. Bonds with longer maturities generally offer more yield than shorter dated bonds and a normal yield curve is therefore upward sloping across the maturity spectrum. There are different explanations for this shape of yield curve. One reason is that longer dated bonds offer higher yields to compensate investors for the higher uncertainty over the economic and inflationary outlook and the greater risk that the issuer may default over the longer time period. Another theory is based on the assumption that yields over different maturities reflect investors' expectations over interest rates over that period. An upward sloping yield curve therefore reflects a gradual rise in interest rates.

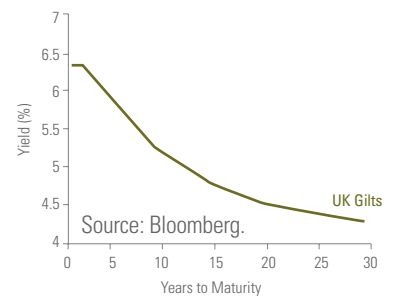
While this is a typical shape for a yield curve, there are periods when the yield curve takes on other shapes. The yield curve may become downward sloping or inverted for some time, i.e. when shorter dated bonds yield more than longer dated bonds. This can happen when investors expect interest rates to fall in the future, but expect stable or rising interest rates in the short term. Supply and demand factors can also cause changes in the shape of the yield curve. In the UK, for instance, demand from pension funds for long-dated assets has pushed up the price and lowered the yield of these bonds compared to shorter-dated bonds.

The yield curve: normal and inverted



A positive or 'normal' yield curve (30/8/96)

Interest rates expected to **rise** in future



A negative or 'inverted' yield curve (30/11/99)

Interest rates expected to **fall** in future

Fund managers can position a bond portfolio to take advantage of changes in the shape of the yield curve. We will look into this in more detail in a later guide.

What is duration?

Some bonds are more sensitive to changes in (expected) interest rates than others. The degree to which a bond's price moves in response to this change is measured by a bond's duration. The calculation of duration is based on a bond's price, coupon, maturity and yield and measures the percentage change in price due to a 1% change in interest rates or yield. The longer the duration of a bond (or a bond portfolio) the more its price will move in response to a change in interest rates. For example, when an expected rise in interest rates causes a general upward move in yields across bonds of various maturities, the price of longer-duration bonds is likely to fall by more than that of shorter duration bonds. The size of a bond's coupon payments also affects a bond's duration, with low coupon bonds being more volatile than high coupon bonds. This is because a lower coupon bond has more of its cash flows tied up in the payment at

maturity, which is furthest out in time and exposed to more interest rate risk.

Fund managers can adjust the duration of a bond portfolio to make it more or less sensitive to changes in interest rates, depending on its economic and interest rate outlook. We will look into this in more detail in a later guide.

Summary

In this issue we have looked at some bond basics that are fundamental to all fixed income sectors, such as bond pricing, yields, yield curves and duration. In the next issue, we will look in more detail at one of the major asset classes in fixed income, namely government and government-related bonds (including supnationals, local authorities, etc).



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