Investment Primer: Bonds

**Market Strategy**

**JON MACKAY**  
Managing Director  
Morgan Stanley Wealth Management  
Jonathan.Mackay@morganstanley.com  
+1 212 296-1600

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In this report, we will discuss various high level aspects concerning bonds. This issue will review the following:

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**Bonds**

**Why We Own Bonds**

The term “bonds” is a very broad category and encompasses a wide range of asset classes with varying degrees of risk ranging from sovereign bonds such as US treasuries to collateralized obligations such as mortgage-backed securities and credit issues like high yield bonds. In our opinion, most investors do not own bonds for appreciation, but as a vehicle for providing a regular stream of income and as a counterweight against volatility in the equity markets.

Investing in bonds requires some patience, especially in an environment when interest rates are rising. Bonds prices tend to fall as interest rates rise, thus investors may be exposed to market losses if they sell their bonds prior to maturity. Holding bonds to maturity is one way to mitigate potential market losses, and positioning portfolios with shorter maturity bonds is another way to lessen the risk of rising interest rates.

Although there may be investment opportunities with greater potential returns than bonds have to offer with the possibility of rising rates over the coming years, we believe a diversified portfolio that includes an allocation to bonds is still appropriate especially for income-oriented investors.

This research primer explores some basic ideas about bonds, how they work and the concept of bond investing.
Bond Basics
A bond is a form of debt issued by an entity (borrower), where the buyer (lender) of the debt generally receives interest payments until the bond matures, a period of time that is pre-determined when the bond is first created.

- Most bonds provide buyers with income through interest payments and in some cases the potential for capital gains through appreciation.
- Some bonds can be issued with zero coupons, which will accrete to par over time. These bonds are usually issued at a discount.
- Other bonds may have par amounts that change over time, such as mortgage-backed securities where the face value may decline as it is paid off over the life of the security rather than one lump sum at maturity.
- Bonds are issued with pre-set maturity dates that can range from less than a year to more than 30 years.
- Bonds are issued with face values, generally $1,000 increments, referred to as “par.” However, in some cases bonds may be issued in smaller or larger increments depending on the type of investors interested in the bonds.
- Bonds can be held until maturity where the bondholder will receive par, or bonds can be sold in the secondary market, at par or a discount or premium.
- The interest rate, or coupon, an issuer pays on a bond is set by the market. Investors will take into account prevailing interest rates, credit worthiness of the issuer, and the maturity date of the bond. These factors will help determine the coupon of the particular bond.
- Issuing bonds is a form of financing. Entities that issue bonds may include corporations, municipalities, and government entities such as the Treasury Department or government agencies.
- Bonds may be issued to raise capital for a variety of reasons. Corporations may issue bonds to refinance existing higher cost debt, to pay for acquisitions, or just simply to expand operations. Government and municipal entities generally issue bonds for both refinancing purposes and expenditure requirements.
- The ability of an issuer to make interest and principal payments on their bonds is known as the credit risk of the issuer. The higher the credit risk of the issuer the more interest an investor may demand for loaning the issuer money.
- Rating agencies such as Moody’s, S&P, and Fitch will rate (using a lettered rating scale) issuers on their ability to meet their debt obligations in a timely manner.
- The investor base for bonds is comprised of both individual and institutional investors, including pension funds, central banks, insurance companies, mutual funds, hedge funds, sovereign wealth funds, and commercial banks.

Bond Trading
Unlike equities, most bonds do not trade on formal exchanges, but instead trade in a negotiated market and are referred to as over-the-counter (OTC) securities. Most trading occurs through broker/dealers. There are two distinct levels of bond trading: primary and secondary.

**Primary**
The primary market represents new issue bonds. When an issuer decides to sell bonds to the public, they generally sell to institutional investors through an underwriter (investment banking firm) or in the case of the treasury department, directly to the public.

**Secondary**
The secondary market is where bond trading occurs after the initial public offering. This market is largely OTC with most of the trades done in fragmented markets or on proprietary systems. Smaller investors can participate in this market through a broker who, upon receiving an order, either acts as a dealer and fills the order from its inventory or acts as a broker and seeks a counterparty to complete the order.
Yield

Yield of a bond is a measure of the income return that you may receive; at a given point of time, yield takes into account the coupon and the discount/premium that the bond is currently priced at (which is why at par, yield is equal to the bond’s coupon). Yield can be expressed in a variety of ways, but the most common are yield to maturity, yield to call and yield to worst. Current and historical yields on various asset classes are shown in Figure 1.

Yield to Maturity (YTM)

The yield to maturity is the rate of return of a bond if it is purchased and held until maturity. YTM is expressed as an annual percentage rate and takes into account the current market price, par value, coupon, and time to maturity of the security.

Yield to Call (YTC)

Yield to call is calculated the same way as yield to maturity, but instead of using the maturity date, the calculation uses the call date (a date prior to maturity). YTC is based on a bond’s market price, call price, coupon rate, and time until the call date. Bonds are typically called at par, but sometimes the call feature may include a small premium to face value.

Yield to Worst (YTW)

This is the lowest yield an investor can expect barring an issuer default. YTW is the lower of the yield to maturity or yield to call of a bond.

Figure 1: Asset Class Yields

Source: Morgan Stanley Wealth Management Investment Resources; Bloomberg; Analytics Provided by The Yield Book® Software and Services. © 2014 Citigroup Index LLC. All rights reserved. Data as of Oct. 6, 2014 and is subject to change at any time. See Index Definitions section on page 8 for representative indices used for yield calculations.
Bond Quotes

The price of a bond is typically expressed either as a percentage of par, discount to face value, or yield to maturity. Bonds can be quoted at par or a premium or discount to par.

**Percentage of Par**

Corporate and Government notes and bonds are quoted as a percentage of par. Corporate bonds are generally quoted in 1/8th increments and government bonds in 1/32nds. For example, a bond quoted at 99 3/8 represents 99.375% of par or $993.75.

<table>
<thead>
<tr>
<th>Quote</th>
<th>Price</th>
<th>Face Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>99 3/8 or 99.375%</td>
<td>$993.75</td>
<td>$1000</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley Wealth Management Investment Resources

**Discounted Yield Basis**

Treasury bills, government debt with less than 1 year of maturity, are issued at a discount to their face value and will accrete to par as they near maturity. The discount is quoted at an annual rate and the actual discounted price must be adjusted according to the maturity. In the example below, the maturity is 26 weeks so the annual rate of 5% is divided in half to give a discount of 2.5%.

<table>
<thead>
<tr>
<th>Discounted Yield Basis</th>
<th>Quoted Discount</th>
<th>Price</th>
<th>Face Value</th>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5%</td>
<td>$975</td>
<td>$1000</td>
<td>26 Weeks</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley Wealth Management Investment Resources

**Yield to Maturity (YTM)**

This is the internal rate of return of an investor who buys a bond today at its market price, holds it to maturity, and receives all scheduled coupon and principal payments. Bonds, such as municipal bonds, may be quoted on a yield to maturity basis.

<table>
<thead>
<tr>
<th>Yield to Maturity</th>
<th>Quote (YTM)</th>
<th>Price</th>
<th>Face Value</th>
<th>Coupon</th>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8%</td>
<td>$798</td>
<td>$1000</td>
<td>5%</td>
<td>10 years</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley Wealth Management Investment Resources

**Par, Premium, or Discount Priced Bonds**

Bonds can be quoted at face value (par), a higher price (premium), or lower price (discount) to the face value depending on bond characteristics and benchmark interest rates.

<table>
<thead>
<tr>
<th>Percentage of Par Quote</th>
<th>Discount Priced Bond</th>
<th>Par Priced Bond</th>
<th>Premium Priced Bond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>92 1/4</td>
<td>100</td>
<td>107 3/4</td>
</tr>
<tr>
<td>Coupon</td>
<td>$922.50</td>
<td>$1000</td>
<td>$1077.50</td>
</tr>
<tr>
<td>Maturity</td>
<td>4%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Yield</td>
<td>10 Years</td>
<td>10 Years</td>
<td>10 Years</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley Wealth Management Investment Resources
Factors That Can Influence the Market Value of a Bond

Many factors can influence the market value of a bond. Two of the most important factors are the direction of interest rates, and the credit quality of the issuer. Other factors can include supply/demand dynamics, structure and seniority of the bond, and the size or liquidity of the issue. We discuss interest rates and credit quality below:

The Direction of Interest Rates – Up is Down and Down is Up

The bond market is driven primarily by interest rates. Monetary policy rates such as the Federal Funds rate, which is set by the Federal Open Market Committee (FOMC), directly influence the level of Treasury rates (Figure 2). Treasury rates are used as a benchmark for pricing nearly every other asset class in the bond market. Investors will price bonds at a spread (additional yield) over the yield on the Treasury market.

- For example: Corporate issuer XYZ issues a bond at par with a 6% coupon and 10 years to maturity. The yield to maturity of the bond is 6%. The 10-year Treasury yields 5%. The yield difference, or spread, between corporate issuer XYZ and the 10-year Treasury is 1%. This would be quoted in the market as 100 basis points over Treasuries. 1 basis point is 1/100th of a percent.

When Treasury rates move up or down, this can have a direct feed-through effect to bond prices. As benchmark interest rates change, the fixed coupon on a bond becomes more or less attractive to investors depending on the current market rate.

- As market interest rates rise, the price of existing bonds generally falls.
  - This happens because as interest rates rise, bonds that are trading in the market become relatively less attractive than they were before the rate rise.

- As market interest rates fall, the price of existing bonds generally rises.
  - This happens because as interest rates fall, bonds that are trading in the market become relatively more attractive than they were before rates fell.

The Yield Curve

The yield curve represents the relationship between interest rates and time to maturity. During normal times (periods of economic growth), the yield curve is upward sloping or positive with longer-term securities yielding more than shorter-term securities. The yield curve can also be flat where interest rates are the same or very similar across the different maturities. An inverted yield curve is downward sloping, or negative, meaning that shorter-term maturity securities are yielding more than longer-term maturities. An inverted yield curve is often associated with a recessionary environment.

![Figure 2: Treasury Yield Curve](source: Morgan Stanley Wealth Management Investment Resources)
Credit Quality Matters

Pricing on bonds, or the yield investors demand to hold a bond, is largely determined by the credit quality of the issuer. The higher the credit quality of the issuer the lower the default risk and thus the lower the yield an issuer will have to pay to borrow money. US Treasury securities are viewed as the lowest risk securities in the market because they are direct obligations of the US government and the US government has never defaulted on its debt. High yield corporate debt is viewed as the riskiest debt in the bond market, and as the name implies, companies that issue debt in the high yield market must pay more in yield to attract investors due to the higher risk of default.

Rating agencies such as Moody’s, S&P, and Fitch have their own lettered rating scales that reflect their opinion of the credit worthiness of issuers in the bond market. See the ratings table below for an example of how the Moody’s, S&P, and Fitch ratings scale works. Ratings that are considered investment grade are Baa3 and above for Moody’s and BBB- and above for both S&P and Fitch. The highest-quality bonds are listed Aaa and AAA at the top of the scale.

<table>
<thead>
<tr>
<th>Credit Rating Scale</th>
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<tbody>
<tr>
<td><strong>Moody’s</strong></td>
</tr>
<tr>
<td>Aaa</td>
</tr>
<tr>
<td>Aa1</td>
</tr>
<tr>
<td>Aa2</td>
</tr>
<tr>
<td>Aa3</td>
</tr>
<tr>
<td>A1</td>
</tr>
<tr>
<td>A2</td>
</tr>
<tr>
<td>A3</td>
</tr>
<tr>
<td>Baa1</td>
</tr>
<tr>
<td>Baa2</td>
</tr>
<tr>
<td>Baa3</td>
</tr>
<tr>
<td>Bal</td>
</tr>
<tr>
<td>Ba2</td>
</tr>
<tr>
<td>Ba3</td>
</tr>
<tr>
<td>B1</td>
</tr>
<tr>
<td>B2</td>
</tr>
<tr>
<td>B3</td>
</tr>
<tr>
<td>Caa1</td>
</tr>
<tr>
<td>Caa2</td>
</tr>
<tr>
<td>Caa3</td>
</tr>
<tr>
<td>Ca</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>WR</td>
</tr>
<tr>
<td>NR</td>
</tr>
</tbody>
</table>

WR: Withdrawn Ratings  
NR: Not Rated

Source: Bloomberg

The rating agencies above were selected given they are the most widely followed in the fixed income market.
Duration: A Way to Measure Interest Rate Risk

Duration is a measure of the sensitivity of the price of a bond to a change in interest rates. It can be thought of as a weighted average of the present value of the coupon and principal payments of a bond. There are many different types of duration such as Macaulay duration, modified duration, and effective duration. We will be concentrating on effective duration.

Effective Duration

Effective duration takes into account the present value of the cash flows of the bond, changes in market interest rates, and options embedded in the bonds, which could cause the expected cash flows to fluctuate. The duration is the approximate percentage change in the price of a security for a 100-basis-point (1%) change in market interest rates (Figure 3). This measure allows investors to compare the interest rate risk on different bonds.

Example 1:

A 10-year, 5% coupon bond is issued at par, $1,000. In one year, interest rates have fallen by 100bps. At the end of year 1, the duration of the bond is 7 years. What would be the approximate price change of the underlying security?

By looking at the duration, we can approximate that the bond would appreciate by about 7% due to the falling market interest rates. The bond would now trade close to $1,070.

Using the same example but this time reversing the movement in rates, if interest rates rise by 100bps, the bond would lose approximately 7% of face value and would now trade close to $930.

Example 2:

A 30-year, zero-coupon bond with a face value of $1,000 is issued at $231. Because it is a zero-coupon bond, its duration is equal to its time to maturity, 30 years. If interest rates rise by 100bps, the value of the security would fall by approximately 30%. The new market value after the rise in rates would be near $161.

Figure 3: Percent Change in Bond Prices for a Given Duration and Change in Interest Rates

<table>
<thead>
<tr>
<th>Change in Interest Rates (Basis Points)</th>
<th>-150</th>
<th>-100</th>
<th>-50</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Year Duration Bond</td>
<td>3%</td>
<td>2%</td>
<td>1%</td>
<td>0%</td>
<td>-1%</td>
<td>-2%</td>
<td>-3%</td>
</tr>
<tr>
<td>5-Year Duration Bond</td>
<td>7.5%</td>
<td>5%</td>
<td>2.5%</td>
<td>0%</td>
<td>-2.5%</td>
<td>-5%</td>
<td>-7.5%</td>
</tr>
<tr>
<td>10-Year Duration Bond</td>
<td>15%</td>
<td>10%</td>
<td>5%</td>
<td>0%</td>
<td>-5%</td>
<td>-10%</td>
<td>-15%</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley Wealth Management Investment Resources

Hypothetical performance should not be considered a guarantee of future performance of a guarantee of achieving overall financial objectives. Asset allocation and diversification do not assure a profit or protect against loss in declining financial markets. For more information about the risks to hypothetical performance as well as duration, please see the Risk Considerations section beginning on page 9 of this report.

Duration Quick Takes

- A zero-coupon bond—a bond that only makes one payment at maturity and no coupon payments—has a duration equal to its time to maturity. This is because there is only one cash flow, the principal repayment at maturity.
- A coupon-paying bond will always have a duration that is less than its time to maturity.
- All else equal, the larger the coupon payments a bond for a given maturity has, the shorter its duration. This is because a greater amount of dollars are toward the earlier years.
- Everything else held constant, the longer the time to maturity, the greater the duration of the security.
Index Definitions

The Citi US BIG Corporate Index is designed to track the performance of US dollar denominated US and non-US corporate bonds. It excludes US government guaranteed and non-US sovereign and provincial securities. Bonds must have a fixed coupon, a minimum of one year to maturity and be rated a minimum of BBB-/Baa3 by both S&P and Moody's.

The Citi High Yield Market Index is designed to capture the performance of below investment grade debt issued by corporates domiciled in the United States or Canada. Bonds must have a fixed coupon, a minimum of one year to maturity and be rated a maximum of BB+/Ba1 by both S&P and Moody's.

The Citi US BIG Agency Index is designed to track the performance of US dollar agency bonds. It excludes callable zero agencies and bonds callable less than one year from the issue date. Bonds must have a fixed coupon, a minimum of one year to maturity, a minimum issue size of $1 billion and be rated a minimum of BBB-/Baa3 by both S&P and Moody's.

The Citi US BIG Mortgage Index is designed to track the performance of US dollar mortgage bonds. It is comprised of 30 and 15 year GNMA, FNMA, and FHLMC securities and balloon mortgages. Bonds must have a fixed coupon, a minimum of one year to maturity, a minimum issue size of $250 million and be rated a minimum of BBB+/Baa3 by both S&P and Moody's.

The Citi Emerging Markets Sovereign Debt Index (ESBI) is designed to track the performance of US dollar denominated foreign debt from more than 25 countries in Latin America, Europe, Africa, the Middle East, and Asia. Bonds must have a fixed, step, or floating-rate (Brady bonds only) coupon, a minimum of one year to maturity, a minimum issue size of $500 million and be rated a minimum of BBB+/Baa3 by both S&P and Moody's.

Barclays Capital Municipal Bond Index is designed to track the performance of US municipal bonds. Bonds must be rated investment grade Baa3/BBB- or higher by at least two of the rating agencies Moody’s, S&P and Fitch. It must be rated investment grade if only rated by one rating agency. Bonds must have fixed rate coupons, a minimum of one year to maturity, and a dated-date after December 31, 1990.
Risk Considerations

Hypothetical Performance

General: Hypothetical performance should not be considered a guarantee of future performance or a guarantee of achieving overall financial objectives. Asset allocation and diversification do not assure a profit or protect against loss in declining financial markets.

Hypothetical performance results have inherent limitations. The performance shown here is simulated performance, not investment results from an actual portfolio or actual trading. There can be large differences between hypothetical and actual performance results achieved by a particular asset allocation.

Despite the limitations of hypothetical performance, these hypothetical performance results may allow clients and Financial Advisors to obtain a sense of the risk / return trade-off of different asset allocation constructs.

Investing in the market entails the risk of market volatility. The value of all types of securities may increase or decrease over varying time periods.

This analysis does not purport to recommend or implement an investment strategy. Financial forecasts, rates of return, risk, inflation, and other assumptions may be used as the basis for illustrations in this analysis. They should not be considered a guarantee of future performance or a guarantee of achieving overall financial objectives. No analysis has the ability to accurately predict the future, eliminate risk or guarantee investment results. As investment returns, inflation, taxes, and other economic conditions vary from the assumptions used in this analysis, your actual results will vary (perhaps significantly) from those presented in this analysis.

The assumed return rates in this analysis are not reflective of any specific investment and do not include any fees or expenses that may be incurred by investing in specific products. The actual returns of a specific investment may be more or less than the returns used in this analysis. The return assumptions are based on hypothetical rates of return of securities indices, which serve as proxies for the asset classes. Moreover, different forecasts may choose different indices as a proxy for the same asset class, thus influencing the return of the asset class.

Duration

Duration, the most commonly used measure of bond risk, quantifies the effect of changes in interest rates on the price of a bond or bond portfolio. The longer the duration, the more sensitive the bond or portfolio would be to changes in interest rates. Generally, if interest rates rise, bond prices fall and vice versa. Longer-term bonds carry a longer or higher duration than shorter-term bonds; as such, they would be affected by changing interest rates for a greater period of time if interest rates were to increase. Consequently, the price of a long-term bond would drop significantly as compared to the price of a short-term bond.

For additional risks, please see the Disclosures section beginning on page 10 of this report.
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Bonds are subject to interest rate risk. When interest rates rise, bond prices fall; generally the longer a bond’s maturity, the more sensitive it is to this risk. Bonds may also be subject to call risk, which is the risk that the issuer will redeem the debt at its option, fully or partially, before the scheduled maturity date. The market value of debt instruments may fluctuate, and proceeds from sales prior to maturity may be more or less than the amount originally invested or the maturity value due to changes in market conditions or changes in the credit quality of the issuer. Bonds are subject to the credit risk of the issuer. This is the risk that the issuer might be unable to make interest and/or principal payments on a timely basis. Bonds are also subject to reinvestment risk, which is the risk that principal and/or interest payments from a given investment may be reinvested at a lower interest rate.

Bonds rated below investment grade may have speculative characteristics and present significant risks beyond those of other securities, including greater credit risk and price volatility in the secondary market. Investors should be careful to consider these risks alongside their individual circumstances, objectives and risk tolerance before investing in high-yield bonds. High yield bonds should comprise only a limited portion of a balanced portfolio.

Interest on municipal bonds is generally exempt from federal income tax; however, some bonds may be subject to the alternative minimum tax (AMT). Typically, state tax-exemption applies if securities are issued within one’s state of residence and, if applicable, local tax-exemption applies if securities are issued within one’s city of residence.

Treasury Inflation Protection Securities’ (TIPS) coupon payments and underlying principal are automatically increased to compensate for inflation by tracking the consumer price index (CPI). While the real rate of return is guaranteed, TIPS tend to offer a low return. Because the return of TIPS is linked to inflation, TIPS may significantly underperform versus conventional U.S. Treasuries in times of low inflation.

Asset allocation and diversification do not assure a profit or protect against loss in declining financial markets.

Please refer to important information, disclosures and qualifications at the end of this material.
The indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment.

The indices selected by Morgan Stanley Wealth Management to measure performance are representative of broad asset classes. Morgan Stanley Wealth Management retains the right to change representative indices at any time.

Principal is returned on a monthly basis over the life of a mortgage-backed security. Principal prepayment can significantly affect the monthly income stream and the maturity of any type of MBS, including actual MBS, CMOs and Lottery Bonds. Yields and average lives are estimated based on prepayment assumptions and are subject to change based on actual prepayment of the mortgages in the underlying pools. The level of predictability of an MBS/CMO’s average life, and its market price, depends on the type of MBS/CMO class purchased and interest rate movements. In general, as interest rates fall, prepayment speeds are likely to increase, thus shortening the MBS/CMO’s average life and likely causing its market price to rise. Conversely, as interest rates rise, prepayment speeds are likely to decrease, thus lengthening average life and likely causing the MBS/CMO’s market price to fall. Some MBS/CMOs may have “original issue discount” (OID). OID occurs if the MBS/CMO’s original issue price is below its stated redemption price at maturity, and results in “imputed interest” that must be reported annually for tax purposes, resulting in a tax liability even though interest was not received. Investors are urged to consult their tax advisors for more information.

Interest income from taxable zero coupon bonds is subject to annual taxation as ordinary income even though no interest payments will be received by the investor if held in a taxable account. Zero coupon bonds may also experience greater price volatility than interest bearing fixed income securities because of their comparatively longer duration.

Investing in foreign emerging markets entails greater risks than those normally associated with domestic markets, such as political, currency, economic and market risks.

Yields are subject to change with economic conditions. Yield is only one factor that should be considered when making an investment decision.

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