SEC BOND TRAINING WORKSHOP

September 2011

Table of Contents

1. Nigerian Debt Markets

Bonds

- A bond is a debt security.
- The bond investor lends money to a government, corporation, municipal authority, company or any other entity known as an issuer.
- In return for this investment, the issuer promises to pay a periodic interest to the investor (a coupon) over the life of the bond and then re-pay the face value of the bond (the principal) at maturity.
- Bonds are also called fixed income securities because the cash flow from them is fixed.
- Bonds are debt instruments as opposed to stocks which are equity instruments.

Types of Bonds and their characteristics

Zero Coupon Bond: Bears no coupon, issued at a discount to face value

Plain Vanilla Bond: Makes periodic coupon payments, pays principal at maturity

Accrual Bond: a fixed-interest bond that is issued at its face value and repaid at the end of the maturity period together with the accrued interest.

Step-up Bond: Coupon rate increases over time

Deferred Coupon Bond: Interest payments are deferred for a specified number of years.

Floating Rate Bond: Coupon rate resets periodically based on some formula with reference to a particular rate.

Inflation linked Bond: The principal is indexed to inflation. Inflation-indexed bonds pay a periodic coupon that is equal to the product of the inflation index and the nominal coupon rate.

Others: Eurobonds, Corporate bonds, Municipal bonds

Players

Debt Management Office: Issues government securities with ability to buy back, Regulates the Bond market, Manages Federal Government domestic and foreign debts

Central Bank: Buys and sells government securities, changes discount/re-discount rate, issues specific regulations to guide the market , banker to the government

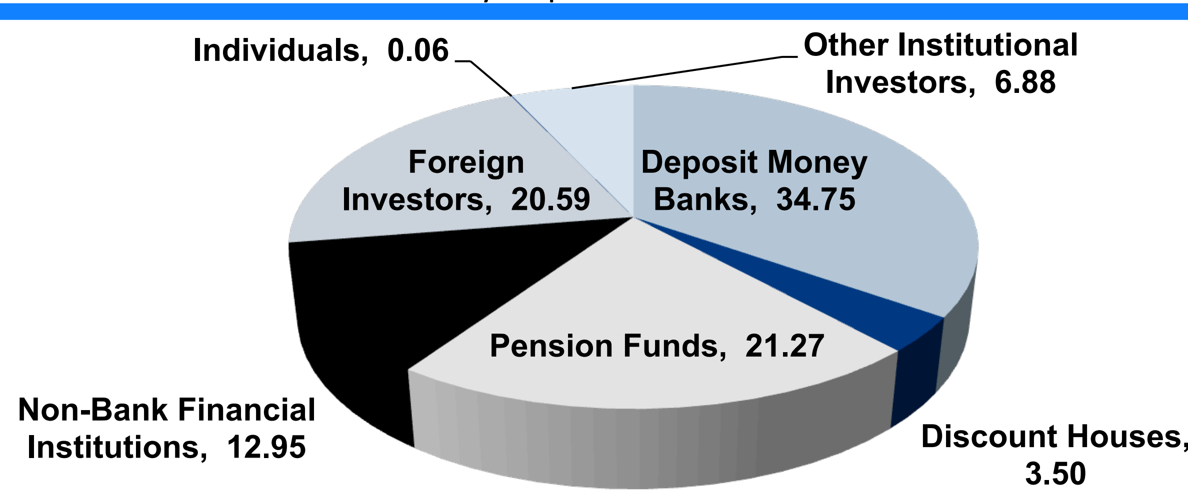
Foreign Investors: Maximize investment opportunities, Purchase govt. securities to meet portfolio requirements, Buy and sell to manage liquidity/cash flow needs

Government Agencies: Buy for returns and security

Institutional Investors/ Non Bank Financial Institutions: Maximize investment opportunities, purchase govt. securities to meet portfolio requirements, buy and sell to manage liquidity/cash flow needs

Individuals: Buy for returns and security

Banks/ Discount Houses: primary dealers, make market by buying and selling securities, maximize profit from trading in govt. securities, purchase securities to meet statutory requirements



2. Primary and Secondary Markets Trading in Nigeria

Primary Market/Underwriting/Regulation

Primary Market:

- This is where securities are first issued usually through an auction process (new issue market).
- Securities are issued every month except December , three maturities are usually on offer every month, DMO offers 3, 5, 7, 10 and 20 year bonds
- DMO publishes the offer details at least one week in advance of the auction, on the DMO's website and in major national dailies. Primary Dealers submit bids for their proprietary account and on behalf of their customers
- The auction for bonds is a Single Price Dutch Auction, all winning bids are awarded securities at the highest yield accepted by DMO, multiple bids are permitted
- Bids must be for a minimum of NGN10,000.00 and in multiples of NGN1,000.00 thereafter, settlement is usually SPOT i.e. T + 2, Certificates are issued to successful bidders. Securities may be in dematerialized form (book entry)

Underwriting: The function of buying the securities from the issuer is called underwriting. When an investment banking firm buys the securities from the issuer and accepts the risk of selling the securities to investors at a lower price, it is referred to as an underwriter.

Regulation: The Nigerian Primary Dealer Market Maker (PDMM) system is regulated by the Debt Management Office (DMO). It ensures that all primary dealers abide by all primary issuance auction rules and requirements established by it

Secondary Market

Secondary Market:

- This is where dealers make markets by continuous bid and offer quotes for bills already issued in the primary market. Large quantities of bonds are traded daily
- Usually very competitive market with small margins, the secondary market is a more liquid financial market
- Dealers' profits in this market are generated from: bid-offer spread, appreciation/depreciation in the value of securities held, the difference between the interest earned on securities vs. cost of financing
- All PDMMs and non-PDMMs who have signed up to the two-way quote guidelines participate in the secondary market
- Deals are done on phone and Reuters dealing system, The secondary market is also guided by the Guidelines for Two Way Quote Trading in FGN Bonds
- The DMO is also responsible for monitoring the activities of PDMMs in the secondary market

Broker: A Broker is an agent who executes orders to buy or sell securities on behalf of a client in exchange for a commission.

Dealer: A dealer is an entity who stands ready and willing to buy a security for its own account (at its bid price) or sell from its own account (at its ask price). The difference between a broker and a dealer is that while a dealer makes trades for its own account a broker makes trades on behalf of others.

Market-maker: This is an entity that quotes both a buy and a sell price in a financial instrument or commodity held in inventory.

3. Pricing and Valuation of Fixed Income Instruments

General Principles of Bond Valuation

There are three steps in the bond valuation process

Estimate the expected cash flows

- Cash flow is the cash that is expected to be received in the future from an investment. Cash flows include coupon interest payments and the principal payment at maturity.

Determining the appropriate rate(s)

- The next step is to determine appropriate discount rates to be used to discount the cash flows based on the risk of receipt of the estimated cash flows. The minimum rate an investor should require is the prevailing market rate on a default free cash flow. For non government securities, investors will require a premium over the yield available on government issues. This represents additional risk the investor accepts.

Discounting the expected cash flows

- This involves multiplying the bond's expected cash flows by the appropriate discount factors. The resulting value is called the **present value** of the cash flow or the **discounted value**.

$$\text{Present value} = \text{Expected cash flow in period} * \frac{1}{(1+r)^n}$$

Valuation Approaches

Traditional Approach to Valuation

The traditional approach to valuation discounts every cash flow of fixed income security by the same interest rate. For example, the traditional approach would use the same discount rate to calculate the present value of a 12% coupon bond, an 8 % coupon bond and a zero coupon bond.

The Arbitrage –Free Valuation Approach

In this approach, we discount each cash flow using a discount rate that is specific to the maturity of each cash flow. These discount rates are called spot rates and can be thought of as the required rate of return on zero-coupon bonds maturing at various times in the future.

Valuation Models

A valuation model provides the fair value of a security. The previous approaches are used at valuing relatively simple securities i.e securities that do not have an embedded option.

In the fixed income, two common models used are the **Binomial Model** and the **Monte Carlo Simulation Model.**

The binomial model is used to value callable bonds, putable bonds, floating rate notes and structured notes in which the coupon formula is based on an interest rate.

The Monte Carlo model is used to value mortgage backed securities and certain types of asset backed securities.

Yield Curve

Yield Curve Analysis: Yield curve analysis involves the measurement of differences in interest rate between bonds that have a different term to maturity. The typical yield curve is upward sloping, meaning short term to maturity notes have low interest rates and longer term to maturity notes have higher interest rates. An inverted yield curve indicates that the longer the maturity the lower the yield. For a flat yield curve the yield is approximately the same regardless of maturity.

YTM (Yield to Maturity): This is an annualized internal rate of return, based on the bond's price and its promised cash flows. For a bond with semi annual coupon payments, the yield to maturity is stated as two times the semiannual internal rate of return implied by the bond's price.

Par Yield Curve: A par yield curve is a graphical representation of the yields on hypothetical Treasury securities with prices at par. On the par yield curve, the coupon rate will equal the yield-to-maturity of the security, which is why the Treasury bond will trade at par. Deriving a par yield curve is a step toward creating a theoretical spot rate yield curve, which is then used to more accurately price a coupon-paying bond. A method known as bootstrapping is used to derive the arbitrage-free forward interest rates.

Zero-Coupon (spot) yield curve: This is a graphical representation of a set of yields of zero-coupon bonds with varying maturities. The spot-rate curve is created by plotting the yields of zero-coupon Treasury bills and their corresponding maturities. The spot rate given by each zero-coupon security and the spot-rate curve are used together for determining the value of each zero-coupon component of a non callable fixed-income security

Yield Curve Theories

There are three main theories as to why spot rates vary by maturity.

Expectations Hypothesis

According to this hypothesis, the T-period spot rate is just the average of the expected one-period spot rate over the next T periods. The term structure can be upward or downward sloping depending on expectations of future short-term interest rates.

Liquidity Hypothesis

This hypothesis states that, even if the short-term interest rates are not expected to change, the term structure should be upward sloping. This is because there is more real interest rate risk for long-term bonds than for short-term bills.

Segmented Market Hypothesis

This says that investors who buy short-term bonds are different from those that buy long-term bonds. The shape of the term structure is then determined by supply and demand amongst each type of investor.

4. Risk Associated With Investing In Bonds

Risk Associated with Investing in Bonds

Interest Rate Risk : This is the exposure of a portfolio or a security to changes in the level of interest rates. Because the prices of most fixed income securities move opposite to interest rates, a rising interest rate will adversely affect the value of the portfolio. If assets need to be sold to service liabilities, the manager may find a shortfall. Interest rate risk is the largest risk that a portfolio manager will face.

Yield Curve Risk: Yield curve risk is the exposure of a portfolio or a security to a nonparallel change in the yield curve shape. This is a component of interest rate risk. Yield curve risk for a portfolio occurs when interest rates increase by different amounts at different maturities.

Call and Prepayment Risk: The cash flow risk resulting from the possibility that a callable bond will be redeemed before maturity. Callable bonds can be called by the company that issued them, meaning the bonds have to be redeemed by the bondholder, usually so that the issuer can issue new bonds at a lower interest rate.

Reinvestment Risk: The risk of reinvesting coupon income or principal at a rate less than the original coupon or purchase rate

Credit Risk: Credit risk is the risk of loss caused by a counterparty or debtor's failure to make a promised payment

Liquidity Risk *(Market Liquidity Risk): this* is the risk that a financial instrument cannot be purchased or sold without a significant concession in price because of the market's potential inability to efficiently accommodate the desired trading size. The size of the "*bid-ask spread*" is frequently used as an indicator of liquidity, another way to measure liquidity is by monitoring transaction volumes

Risk Associated with Investing in Bonds

Liquidity Risk *(Funding Liquidity Risk):* This is a far more common description of liquidity risk. This is the risk that liabilities funding long asset positions cannot be rolled over at a reasonable cost. This description is largely cash flow related.

Exchange Rate or Currency Risk: The risk associated with the uncertainty about the exchange rate at which proceeds in the foreign currency can be converted into the investor's home currency.

Inflation or Purchasing Power Risk: The possibility that the value of assets or income will decrease as inflation shrinks the purchasing power of a currency. Inflation causes money to decrease in value at some rate, and does so whether the money is invested or not.

E**vent Risk:** This covers any unexpected company-specific or situation-specific risks that may affect the prospects for an investment.

Sovereign Risk: This is a form of credit risk in which the borrower is the government of a sovereign nation. This is closed associated to *political risk* which is associated with changes in the political environment. The most popular example is the famous 1998 Russian default

5. Measurement Of Interest Rate Risk

Measurement Of Interest Rate Risk

- **Introduction**

We had mentioned earlier that a fixed income portfolio manager's single largest risk is interest rate risk. Interest rate risk is the volatility of a bond's price due to changes in interest rates. To control interest rate risk, a manager must be able to quantify what will result from an adverse change in interest rates.

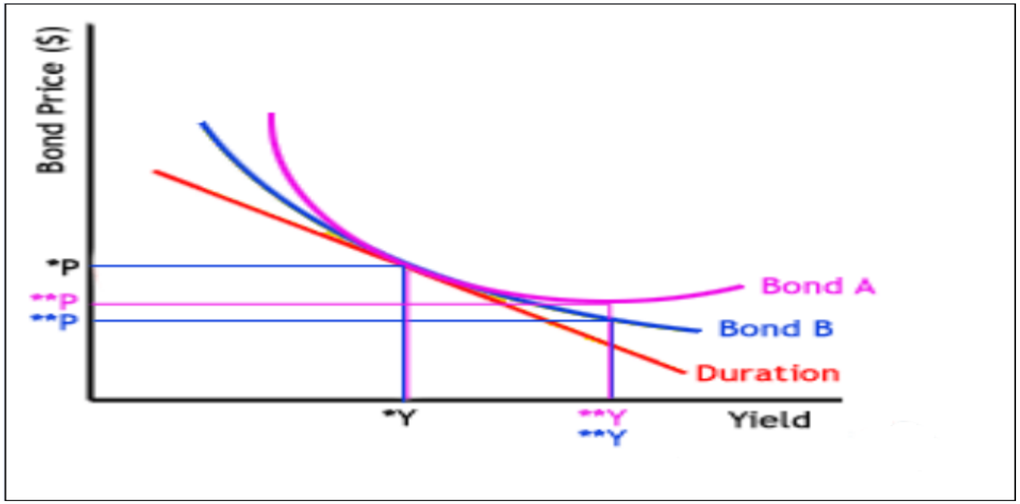
The Full Valuation Approach : The full valuation approach involves revaluing a bond position (every position in the case of a portfolio) for a scenario of interest changes. This approach has four steps:

1. Identify the current price and yield of a bond or bond portfolio.
2. Determine the possible yield change scenarios.
3. For each scenario, calculate the bond price using the new required yield.
4. For each scenario, calculate the percentage change in the price of the bond or bond portfolio.

Price Volatility Characteristics of Bonds: The sensitivity of a bond to a general change in interest rates is usually captured by assuming that the bond price changes in response to a change in its yield, which is driven by the general level of interest rates. The responsiveness of a bond price to a yield change is captured in two ways: duration and basis point value.

Measurement Of Interest Rate Risk

Duration: This is a measure of the approximate sensitivity of a security to a change in interest rates (i.e. it is a measure of interest rate risk). It is a measure of the size and timing of the cash flows paid by a bond. Duration seeks to measure the average maturity of this zero coupon bonds which is the average maturity of the bond. This average is a weighted average.



ΔP ≈ - DURB * P * ΔyB/ (1 + yB)- A simplified version, using Modified Duration (MDURB) as against Macaulay Duration (DURB)

ΔP ≈ - MDURB * P * ΔyB

If a bond with a modified duration of 6.50 is priced at 92.50 and the yield increases by 20 basis points. Then the price change should be approximately

ΔP ≈ - 6.50 * 92.50 * 0.002 = - 1.20: For a 20 basis point rise in yield, the bond price should decrease by NGN 1.20, the new bond price should be 91.30.

Measurement Of Interest Rate Risk

Price Value of a Basis Point (PVBP)

This is also referred to as *Dollar Value of a Basis point, DVO1, Basis point value BPV.* PVBP is the change in the bond price for a 1 basis point change in yield. This is can be mathematically expresses as

PVBP ≈ MDURB * P * 0.0001

*For the example above, PVBP = 6.50 * 92.50 * .0001 = 0.06.*

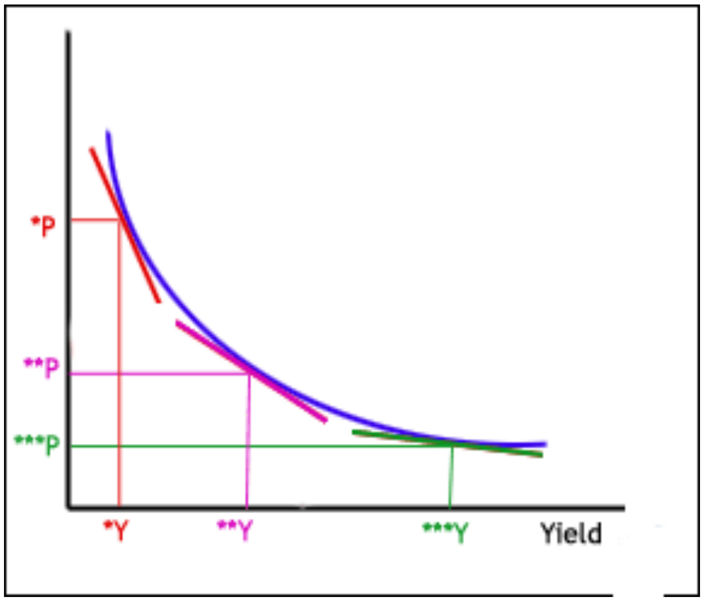
So for every 1 basis point change, the bond price will change by 0.06.

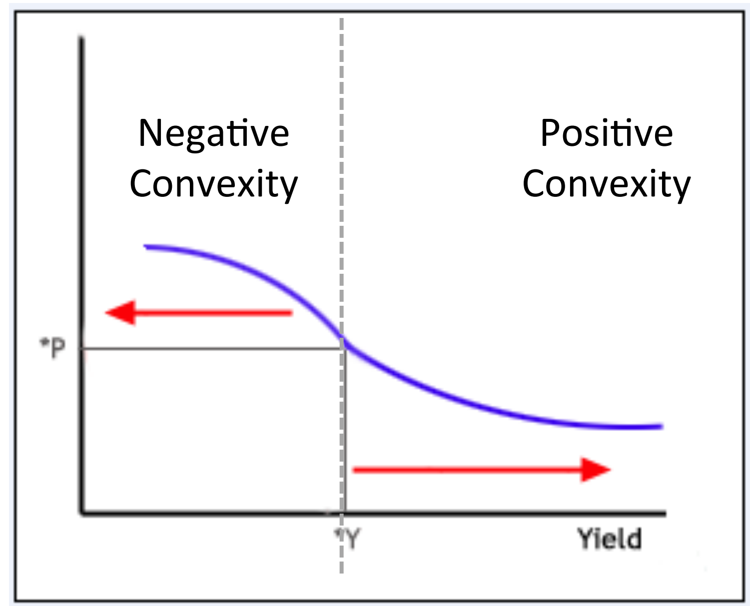
In practice, you will tend to use duration and PVBP at the portfolio level. A portfolio manager must be able to understand, using duration and PVBP, the impact of a 10 basis point change in market yields on his portfolio.

An understanding of these concepts will also assist the fund manager in deciding what bond to buy or sell since this will directly impact the portfolio's duration and PVBP. A manager looking to reduce his portfolio duration could either sell higher duration bonds or buy lower duration bonds.

Measurement Of Interest Rate Risk

Convexity is a measure of how interest rate sensitivity changes with a change in interest rates. A measure of the curvature in the relationship between bond prices and bond yields, which demonstrates how the duration of a bond changes as the interest rate changes. Convexity is used as a risk-management tool, and helps to measure and manage the amount of market risk to which a portfolio of bonds is exposed.





Concept of Value at Risk: Value at Risk is an estimate of the loss (in money terms) that the portfolio manager expects to be exceeded with a given level of probability over a specified time period. VAR measures a minimum loss.

7. Accounting Treatment of Fixed Income Portfolio

Trading vs. AFS Positions

Portfolio	IFRS/ FAS115		SAS -10	
	Balance Sheet	**Profit/Loss**	**Balance Sheet**	**Profit/Loss**
Held To Maturity/Long Term Investments	Asset - Historical Cost	Dividends/Interest Only	Asset - Historical Cost less credit risk adjustment	Dividends/Interest Only
Available For Sale/Short Term Investments	Asset - Market Value Equity - Market Value Adjustment	Dividends/Interest Only	Asset - Cost Method - Market Value - Lower of Cost and Market Value	Dividends/Interest Only Dividends/Interest Market Value Adjustment Dividends/Interest Only Loss
Trading	Asset - Market Value	Dividends/Interest Only Equity - Market Value Adjustment	N/A	N/A

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