

International bond markets (overview)

INTRODUCTION: ORGANISATION OF THE BOND MARKETS

The international bond markets refers both to the sets of broker-dealer over-the-counter debt capital markets, trading bonds issued by government, municipalities or corporate organisations and the various fast growing electronic bond trading platforms resulting from either single initiatives or more frequently from a consortium of banks and dealers like TradeWeb, BrokerTec, Euro MTS, WebET, eSpeed, BondBook, BondDesk and many more. In the bond market, one usually also separates the primary market, corresponding to the issue of new bonds from the secondary market, trading existing bonds.

In contrast to equity stock market, there is no such a things as exchanges, although the emergence of trading platform may finally lead to similar environment as electronic stock exchanges. The international bond markets are in fact a set of fragmented broker dealer markets, often split by the country where the bond has been issued, and regulated by the national regulatory entities (like for instance the SEC¹ in the US or the FSA in the UK). Traditionally, one also makes a distinction between the reference entities of the bond, leading to three different markets:

- Government bonds.
- Municipal bonds.
- Corporate bonds.

Rational behind the bond market is to use the efficiency of financial markets to finance governments, local authorities, municipalities and corporations for various projects, activities and businesses. In return for the loan, the bond issuer has a fixed liability or an obligation to pay to the debtors some cash flow. Bonds usually pay coupon, however, there are some bonds paying only once at maturity called zero coupon bond in contrast to normal coupon bearer bonds. Usually, bonds are sold in a book entry form, meaning that the name and identity of the bondholder is registered in a computer book entry form.

GOVERNMENT BOND MARKETS

Used primarily to finance the public debt of countries, government bonds represent a substantial amount of the bond markets, with the very large part for US government bonds. Usually, one also makes a distinction between developing countries government bond referred to as emerging markets bonds and developed countries like the US, Europe or Japan. Government bond are mainly issued by the State Treasury agency of the country although the Central bank may in certain countries be also able to issue government bonds (referred to as govies by traders).

According to the maturity, US Bonds are called **bills** (maturity less than 1 year and usually zero coupon bond), **notes** (maturity of 2 to 10 years, 6 month coupon bearing) and **bonds** (more than 10 years maturities). UK government bonds are called **gilts**, while Japanese are called **JGBs** (for Japanese

¹ Security Exchange Commission

Government Bonds), French **OAT**, Spain **Bonos**, Germany **Bobl** (maturity of less than 2 years), **Schatzt** (5 years) and **Bunds**

Because government act as a **guarantor** to the bond debt, government bonds are considered to be relatively safe investment, and very much for developed countries. Emerging market government bonds are less safe as the backing entity bears a higher credit risk. Government bonds are sold via treasury auctions.

Governmental agencies for mortgage

There are various governmental associations that specialise in securitizing pools of mortgage into structured bonds. The most popular are:

- **Fannie Mae**, (Federal National Mortgage Association)
- **Freddy Mac**, (Federal Home Loan Mortgage Corporation).
- **Ginnie Mae** also referred to as GNMA (Government National Mortgage Association)

Their role is to securitise pool of mortgages or loans, and sell them in bonds after tranching the pool into different categories according to their credit exposure.

MUNICIPAL BOND MARKET (MUNIS)

Issued by a state or local government, municipal bonds are debt instruments securities for general financing needs or special projects. Municipal bonds have the advantage to be free from federal tax on the accrued interest and

also free from state and local taxes if issued in the state of residence of the bondholder. However, like any other bonds, profit realised from the purchase or sale of municipal bonds is subject to tax. Municipal bond issues and markets are traded by specialised brokerage and banking firms.

The different types of municipal bonds are

- **General Obligation Bonds (GO's):** Backed by the full faith and credit of the issuer for prompt payment of principal and interest, these bonds are very safe since the guarantee is of an unlimited nature. This means that the municipality that issues the bond has the right to raise taxes (and in particular property taxes) up to be able to pay the bond liability. Moreover, in the case of raising property taxes, if the property's landlord does not pay the tax, the bond issuer has the right to seize the property and to sell it at auction. City, county, or school district mainly issue general Obligation bonds. Before the issue, one does a thorough analysis in terms of the taxable resources to have realistic liabilities.
- **Limited and special Tax Bonds:** These bonds are backed by the proceeds of a specific tax. This tax can be a gasoline tax, a special assessment, or ad valorem tax levied at a fixed price. In contrast to General Obligation bonds, the issuer's guarantee is only limited to the source of revenue backing the bonds. These bonds are however relatively safe.
- **Revenue Bonds:** Backed by the earnings of a revenue producing states 's agency or enterprise, like water companies, airport and schools. The historical or potential earnings of the company can help to assess part of

the risk. Because of the higher risk, the yield of a revenue bond is higher than that of a general obligation bond.

- **Industrial Revenue Bonds:** these bonds are used to finance the activities and projects of the Industrial Development Agency, whose purpose is to develop industrial or commercial property for the benefit of private users. Backed by the corporate attached to the Industrial Development Agency, these bonds can be risky for corporate guarantor with high credit risk.
- **Housing Bonds:** Mainly secured by mortgage repayments on single family homes, these bonds are also backed by federal subsidies for low income families, FHA insurance, VA guarantees, and private mortgage insurance. Both state and local governments can issue housing bonds to finance housing projects for low-income families. Old bonds secured by the US government and referred to as PHA', (Public Housing Authority issues) are only traded in the secondary market.
- **Moral Obligation Bonds:** with very little trading volume, these bonds are issued for specific purpose (like public housing) and are more an old history of the municipality bond business when the New York State issues them in 1960's.
- **Double Barrelled Bonds:** these are very safety bonds as they are doubly backed by a pledge of two or more sources.
- **Municipal Notes:** short term debt instruments issued by state and local authorities. Their maturities run from about 60 days to one year.
- **Tax Anticipation Noted (TAN's):** issued by cities in anticipation of future tax revenue, these notes are backed by the expected taxes.

- **Bond Anticipation Noted (BAN's):** in the case of poor market conditions, an issuer may delay the bond issue. However, to still get some revenue, the issuer may issue a Bond Anticipation Noted backed by the bond issue to come.
- **Revenue Anticipation Notes (RAN's):** in anticipation of revenue coming in from the federal government, a local municipality may issue Revenue Anticipation Notes backed by the revenues to come.

CORPORATE BONDS (CORPORATES)

Corporate secured bonds can take the following forms:

- **Mortgage Bonds:** bonds backed by real estate and/or the physical assets of the corporation with a greater value than the one of the bond. In case of defaults, the assets are sold off to pay off the mortgage bondholders. Closed end assets means that the asset used to secure the bonds are restricted to this issue, while open end assets can be used for other issues, with equal right on the collateral.
- **Equipment Trust Certificates:** bond secured by assets whose depreciation rate is lower than the capital repayment on the loan, hence making the bond secure. Usually the bond is used to buy only a given percentage of the assets. In case of default, the equipment is sold off to pay bondholders.
- **Income Bonds:** bonds paying interest if earned by the company. Usually, issued by a company in bankruptcy or close to bankruptcy, these bonds do not trigger a credit event in the case of a failure to pay the interest. In contrast, creditors agree that interest will only be paid to

the extent earned to allow the company to survive a close to bankruptcy situation

Banks have specialised resource, referred to as the syndicate desk (or more generally debt capital market desk) that deals mainly with new issues. The market of new issue is referred to as the primary market as opposed to the secondary market where one can trade existing bonds.

MORTGAGE BACK SECURITIES

A growing business has consisted in pooling mortgage and splitting their cash flows into a number of tranches corresponding to different credit risk. The so-called tranches are often categorised by their seniority (order of priority of the debtor when there is default) but also their average life, coupon, stability and so on. These synthesised securities are part of the repackaging business, which consists in restructuring existing asset in a more efficient way.

COLLATERISED DEBT AND LOAN OBLIGATIONS (CDO, CLO)

Collateralised Debt Obligation is very similar to collateralised mortgage obligations with the only difference that low-rated bonds instead of mortgages are used as collateral. Similarly, Collateralised Loan obligations are structured bond backed by the loan repayments from a portfolio of pooled personal or commercial loans, excluding mortgages. These structures are very attractive for investors that otherwise would not have exposure to these markets, while allowing a bank, and more generally a financial institution normally exposed to

the credit risk of these assets to remove them from its balance sheet and reduce its capital requirement. (See credit derivatives).

RATIONAL OF THE BOND MARKET

DIFFERENCE BETWEEN BOND AND EQUITY STOCK

Although bonds and equities can be both used to raise capital, bonds and equities are fundamentally different. Debt capital instruments represents a loan while equity stock provides a stake in the company to the holder. Bond have a determined maturity at which all the payment must have been done², while an equity last as long as the company is alive. Other important difference between bonds and equity are the trading size and volume as well as the volatility on these markets³

Because of the trading size in the bond markets, investors are mainly financial institutions like banks, insurance companies and funds (mutual, provident, pension and government pension as well as hedge funds).

TAX AND ACCOUNTING ISSUES

Taxation distinguishes the following type of income on bond trading:

- ❑ Interest and coupon payment.
- ❑ Discount (a spread between par and offering price)
- ❑ Capital gain.

Tax rates also vary across types of investors (resident or not) and types of income (tax exempted and tax non-exempted bonds). As already mentioned

² Except for the very rare case of perpetual bonds

³ Although emerging markets may also suffer from very volatile environment.

in the section about municipality bonds, municipality bonds are exempt of federal tax on the accrued interest and also free from state and local taxes if issued in the state of residence of the bond holder. Like any other bonds, profit realised from the purchase or sale of municipal bonds is still subject to tax.

CREDIT RATING

INTRODUCTION TO CREDIT RATING

Credit rating is an important element for bond valuation. Rating agency are external companies charged to assess the overall credit of a given company and or bond issue. The two main companies are:

- Standard & Poor's
- Moody's.

Other less influential companies includes:

- Fitch/IBCA
- Thompson BankWatch.

Consulting the rating from these services ratings helps to determine the issue's safety and security. Although it is not compulsory to rate an issue, most issues are rated as they provide valuable market information to potential investors. Rating agency may not be able to rate a given issue if a company is too new and consequently does not have sufficient credit history

Table 1 provides the rating convention of Standard & Poor's and Moody's.

<i>Credit Quality</i>	<i>S&P</i>	<i>Moody's</i>
High quality bonds	AAA+/AAA/AA-	Aaa1/Aaa2/Aaa3
	AA+/AA/AA-	Aa1/Aa2/Aa3
	A+/A/A-	A1/A2/A3
medium grade	BBB+/BBB/BB-	Baa1/Baa2/Baa3
	BB+/BB/BB-	Ba1/Ba2/Ba3
	B+/B/B-	B1/B2/B3
Poor grade	CCC+/CCC/CC-	Caa1/Caa2/Caa3
	CC+/CC/CC-	Ca1/Ca2/Ca3
	C+/C/C-	C1/C2/C3
Default	D	C

Table 1: Rating convention of Standard & Poor's and Moody's

PRIORITY OF CLAIMS: SENIORITY AND SUBORNIDATED DEBTS

The priority claims is the following:

- ❑ Senior debt: often mortgage bonds or equipment trust certificates as these bonds have the higher seniority level
- ❑ Subordinated debt: there exists various level of subordination for the debt debenture.
- ❑ Preferred stock
- ❑ Common stock

PRICING AND RISK MANAGEMENT OF BOND PORTFOLIO

BASIC PRICING AND MARKET INDICATORS

Bonds prices are often related to the bond' s yield as it gives a quantitative measure of the return of a given bond. From an economic point of view, the return of a bond is mainly influenced by two factors:

- Risk of the bond: mostly related to the credit of the issuer and its probability of default or more generally credit event.
- General cost of borrowing or demand to borrow money. Mainly influenced by the money market, futures and swap market as a whole. Central banks play an active role in controlling the overall funding cost but easing or tightening their monetary policy.

EXOTIC BONDS

Convertible bonds: description and factor affecting pricing

Usually, a company can finance itself either via debt or equity. Convertible bond allows taking advantage of both. Compared to a standard bond, a convertible bond allows its bondholder to convert the bond into the company's common stock. This additional flexibility sold to the bondholder makes the financing cost lower for the issuer. However, convertible bonds influence the capital structure of a company as its debt equity balance may become substantially modified after conversion, diluting equity capital. The terms of conversion are set forth in the indenture (debt contract's terms). In particular, it specifies

- The exact number of shares per bond, (conversion ratio, number of shares per bond or conversion price, which is the price at which the bond holder can buy a share when converting the bond redeemed at its face value). This number may vary during the life of the bond.

- The different exercise dates at which the bondholder can convert the bond (various times Bermudan option or all the time American option).
- The rights of the bond issuer (usually right to call back the bond and force the conversion), etc.

Convertible bonds are not easy to price as these are bonds with a Bermudan or American option that depends not only on the overall volatility of the interest rates curve but also the correlation between the various rates.

Bonds with embedded options

Various bonds have embedded options like the right by the issuer to call the bond, or the right by the holder to put it. These options requires a good modelling of the yield curve as the bond's option can be very sensitive to the assumption of the correlation between the different forward rates. (See modelling of the interest rate curves).

BOND YIELD AND TERM STRUCTURE OF INTEREST RATES

Yield computation

The return for a bond is measured via its yields. There are various types of yields and it is important to make the difference:

- Nominal yield: defined as the yield stated on the face of the bond, also referred to as the coupon rate
- Current yield: defined as the nominal yield over the price of the bond, on a unit 1.

- Yield to maturity: defined as the reinvestment rate that makes the present value of the cash flows (interest and principal) equal to the market price.

Mathematically, denoting by P the principal paid at maturity T_n , C the (annual) coupon paid at the various payment dates $(T_i)_{i=1..n}$, the yield to

maturity is such that:

$$\text{Price} = \sum_{i=1}^n \frac{C}{(1+y)^{T_i}} + \frac{P}{(1+y)^{T_n}} \quad (1.1)$$

How to bootstrap a yield curve

Although widely used by the market, the concept of yield does not handle bond with different maturities very well, as well as bond with random cash flows like bond paying floating or more complicated bonds with embedded options. In fact, quantitative tools to measure bonds should have the following

- Handle cash flow uncertainty and embedded options quantifying both magnitude and timing.
- Take into account the general funding cost materialised by spot interest rates curve bootstrapped from the money market, the futures, treasury and swap markets.
- Address the issue of credit risk and counterparty risk.
- Allows the analysis and combination of various market scenarios.

The investment in a bond provide some return via the coupons paid, the interest in the coupon and the capital gains. One of the most common number used to compare bond is nowadays the total rate of return that takes into account the various elements cited above.

CAPITAL ASSET PRICING MODEL (CAPM)

The capital asset pricing model and all its successors have been successively used to provide a better understanding of efficient portfolios and modelling systemic risk in a portfolio. In the bond market, it is quite important to have a diversified and efficient selection of bond instruments. The capital asset pricing model focuses at the risk reward ratio represented by the variance, respectively the expected return of the portfolio. It aims at computing given constraints either on the expected return the portfolio with the smallest variance or given a level of risk, the portfolio with the best return (dual problem). The result of this portfolio optimisation lies in the existence of a continuum of optimal portfolio providing the best return for a given level of risk and referred to as the efficient frontier, related to the market portfolio by the beta of the stock.

FEDERAL RESERVE AND CENTRAL BANKS POLICY

The Federal Reserve and the other central banks play an important role in the determination of the short end of the interest rate curve by controlling the level of the FED's funds interest rate. The Treasury department is also involved in the control of the interest rate but rather on the long end of the curve by issuing government bonds, to finance public debt. The monetary policy rational is often to control the inflation by regulating the different money stock aggregate (M1 and M2 mainly).

BONDS AND CREDIT DERIVATIVES

With the arrival of credit derivatives, the international bond market has seen some important evolution. It is now possible to strip out the credit risk component of a bond issue using the credit derivatives markets. The most common credit derivatives used in this goal are the credit default swap, the total return swap (See credit derivatives).

Entry category: Market and Instruments.

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