

Bonus lecture: Some details regarding bonds

266: Financial Markets and Institutions

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► Intro: Standards

- If you have not read the notes on Annualized Rates, you should probably read at least the introduction on standards before proceeding.

► Bond market reality

- We have talked about simple bonds that pay coupons once a year until maturity when they pay a coupon plus par value.
- It is important to emphasize that, in practice, most bonds involve have additional features and components that complicate analysis.
- For example, as I mentioned earlier, U.S. government bonds (and many other bonds) pay coupons twice a year.

► Reality: special features

- Taxes. The interest (coupon payments) on some bonds in the U.S. are free from federal income tax. This is true, for example, of municipal bonds

► Reality: callable bonds

- Some corporate bonds are callable meaning, that under certain contractually specified terms, the bond can be 'repaid' by the borrower in full before maturity
- This complicates duration calculations, and thereby, complicates risk management

Since the bond holder does not know for sure when the money is coming back

► Callable bonds, some economics

- Thus, callable bonds should sell for a higher or lower price than an otherwise equivalent bond that is not callable?
- The ‘callability’ imposes risk on the lender (the bond buyer). Will they pay a higher or lower price for a bond with additional risk?
 - Lower price. Equivalently, the borrower has to compensate the lender and so sells the bond a bit more cheaply.

► **Reality: convertible bonds**

- What is a convertible bond?
 - The bondholder can convert the bond to shares of common equity at a contractually agreed upon price.
- Who owns the valuable option in this case?
 - the lender (bondholder)
- These bonds sell for more or less than bonds that are not convertible?
 - More. The bondholder pays a positive price for the right to convert.

► **Lesson about ‘options’** Generally, whomever gets a useful right or choice or *option* in a security pays a premium

► **Reality: Covenants**

- What are bond covenants?
 - Bond covenants are contractual agreements either forbidding or mandating certain actions on the part of the borrower. (These are recorded in the bond indenture).
- Why would a lender want covenants?
 - To help guarantee that the borrower doesn’t do something crazy with the money

► **What you should know**

- The basic promised stream of payments from a bond is just the starting point in analyzing the bond
- To fully understand the price, you often need to know many other contractual features

► **Uglier reality: some weird conventions**

- Suppose you look up some bond prices, yields, and durations as calculated in reality
- And you use our formulae but can’t quite get the answer exactly

- This is most likely because of some conventions used in the market and in reporting the numbers in practice

► **For example**

- When the price of the bond is reported, say, in the newspaper, the reported price is not what you would actually pay for the bond
- For example, if you buy the bond on a day half way between two coupon payments, you would pay the stated price plus (about) half the value of the next coupon
roughly, the former owner held the bond for half of the period between the coupon payments and gets half the coupon. The coupon being an interest payment, this is called accrued interest.

► **Conventions, conventions, conventions**

- Computing the exact amount of accrued interest depends on many further conventions regarding how we measure what share of a year (or half-year) has passed since last coupon
- For example, since months are of different lengths we can't say a month is $1/12^{th}$ of a year. But to make things easy, some bond markets base computations on a fictional 360 day year with 12, 30 day months.
- To exactly understand bond prices you need to know the exact calendar conventions used
- And the conventions vary across markets

See, e.g., SWX Swiss Exchange, 'Accrued interest and yield calculations. . . ' go

<http://www.six-swiss-exchange.com/download/trading/products/bonds/accrued%5Finterest%5Fen.pdf>

day count method <i>(ISO 15022 keyword in field 22F:MICO/aaaa)</i>	basic rule for determining number of interest bearing days (see §3.3)	basic rule for determining the length of a "year" (see §3.4)	remarks
Flat (No Accrued Interest) [A000]	-	-	no accrued interest
German (30/360) [A011]	30 days/month	360 days/year	This is the method currently used in the Swiss marketplace
Special German (30S/360) [A007]	30 days/month, except for February which is 28 or, in leap years, 29 days	360 days/year	This is the method formerly used in the Eurobond markets (the ISMA rule for bonds issued until the end of 1998)
English (Actual/365) [A005]	days/month as per calendar	365 days/year	This is the method used in the UK Gilt Edged Market (which moved to actual/actual from 1.11.98)
French (Actual/360) [A004]	days/month as per calendar	360 days/year	This method is used in the French money markets
US (30U/360) [A001]	30 days/month, US variant	360 days/year	This is the 30/360 day count method typically used in the US
ISMA-Year (Actual/365L) [A009]	days/month as per calendar	365 or 366 days/year	The number of days/year used depends on the coupon frequency and whether a leap year is involved
ISMA-99 Normal (Actual/Actual) [A006]	days/month as per calendar	days/year as per calendar (based on interest period length)	These methods apply to new issues in the Eurobond markets from the beginning of 1999 (hence the SWX names). They also apply to new Euro denominated bonds from the same date. "Converted" Euro denominated bonds need not change convention: the recommendation is to change convention on a coupon date, if at all. See Appendix A for a more detailed discussion of the two ISMA-99 methods.
ISMA-99 Ultimo (Actual/Actual) [A010]			

Note that the ISMA-99 rules given in this document are the SWX interpretation of the ISMA rules, and cover exceptional cases not fully addressed by these rules – this can mean that the accrued interest calculated by SWX may differ from that calculated in other markets under exceptional circumstances.

► **Excel**

- Go look at the `yield` function in Excel
- It calculates the yield on bonds and has a `basis` option for how you count days in a year
go

<http://office.microsoft.com/en-us/excel-help/yield-HP005209345.aspx>

► **What you need to know**

- You don't need to know calendar conventions for this class
- You DO need to learn that there are many subtle conventions you would need to know to be an expert in the field
- And you need to know WHY these conventions exist
- As noted in Annualized Rate notes, markets try to settle on a set of standardized conventions so that we can get lots of buyers and sellers trading in very similar items on a well-understood (at least to regular participants) basis.

► **In our examples/tests/etc.**

- In class, most of our bond calculations will all involve annual coupons and will be taken at a point in time one full year from the next payment

Thus, we will ignore the accrued interest issues in our problem sets and examples.