FUNDING INVESTMENTS
FINANCE 238/738, Spring 2008, Prof. Musto
Class 1 – Introduction and Overview

Today:

I. Description of course material
II. Course mechanics, schedule
III. Big picture of funding sources
IV. "Free Cash Flow" Problem
V. Quotation of Bond Prices

I. Description of Course Material

Funding Investments is a survey of the important sources of financing from capital markets, and the economic issues that arise

- Design
- Placement with investors
- Trading in the secondary market
- Taxes
- Financial Distress
- Agency Problems

Funding sources we analyze

- Repo Market
- Straight and convertible debt; other debt varieties; hybrids
- Commercial Paper and related short-term instruments
- Securitizations, mortgage-backed and asset-backed
- Equity - initial and seasoned offerings

Topics Covered on the way:

- Options
- Corporate Bankruptcy and Restructuring
- Market-Making
- IPOs and rights offerings
- Bank Runs

This course is ***not*** about

- Valuation of companies
- Pricing securities
- Venture Capital

And covers only briefly

- Optimal Capital Structure
- Commercial Banking

II. Course Mechanics and Schedule

- Lectures
  - Readings
  - Handouts (like this) every day
- Cases (4, in 2 days)
  - In groups of three to five
- Homeworks (7)
  - By yourself
  - Can drop one homework
- Two Midterms
  - Both Mandatory

Grades: Median grade for undergrads historically either B or B+
Distribution will probably be very similar for MBAs

III. Overview of Funding Sources

When firms raise money, they usually issue debt, not equity

We can see the global debt and equity markets in the surveys by *Thomson Financial*

Debt markets in 2007

Equity markets in 2007

- IPOs
  - US: $46BB, c/w $45BB in 2006
  - Global: $309BB, c/w $269BB
- Secondary (i.e. post-IPO sales)
  - US: $83BB, c/w $92BB
  - Global: $389BB, c/w $328BB
- Convertibles:
  - US: $94BB, c/w $69BB
  - Global: $178BB, c/w $123BB

Investment banking fees from equity issuance: $22BB, up from $19BB

Global debt issuance:

- Investment grade
  - US: $978BB, c/w $935BB
  - Global: $2562BB, c/w $2641BB
- Junk
  - US: $136BB, c/w $146BB
  - Global: $166BB, c/w $185BB
- Mortgage-backed
  - US: $922BB, c/w $1052BB
  - Global: $1300BB, c/w $1452BB
- Asset-backed
  - US: $864BB, c/w $1250BB
  - Global: $1145BB, c/w $1545BB

Investment banking fees from debt issuance: $20BB, down from $23BB
Note that

- Corporations raise far more money by issuing debt than by issuing equity
- But from IB's point of view, revenues are similar, because fees are much higher for equity issuance

On the other hand, equity is the major part of firms' capital structure

- Equity accretes as earnings are reinvested, rather than paid to shareholders
- This reinvestment is the major source of funding for new investment

A couple facts we will explore:

Investment banks deliberately price IPOs well below their anticipated market values:

On average, investors earn big returns buying IPOs at their offering prices, and selling them immediately at the market price the same day

- In 2006, the average return (across 162 U.S. offerings) was 12%
- The average since 1960 is 18%
- In 1999, the average return was *71%*
    - This data is all from Jay Ritter's web page

The US experience is around the middle of global stock markets

A substantial portion of debt finance is from Commercial Paper (but this has recently shrunk):

Unregistered, unsecured, very short-term debt

- Outstanding as of 12/26/07: $1.8 Trillion
    - Down from peak of $2.2 Trillion in July 2007

- About $173B issuance per trading day, so about $43 Trillion/year
- From www.federalreserve.gov/releases/cp

IV. Funding with Retained Earnings

Most of the money spent on new investment comes from retained earnings

- Profits from existing operations and *not* distributed to shareholders
  - *Not* paid as dividends or spent on share buy-backs

From one angle, nothing to talk about here

- No interaction with capital markets; company just spends cash on hand

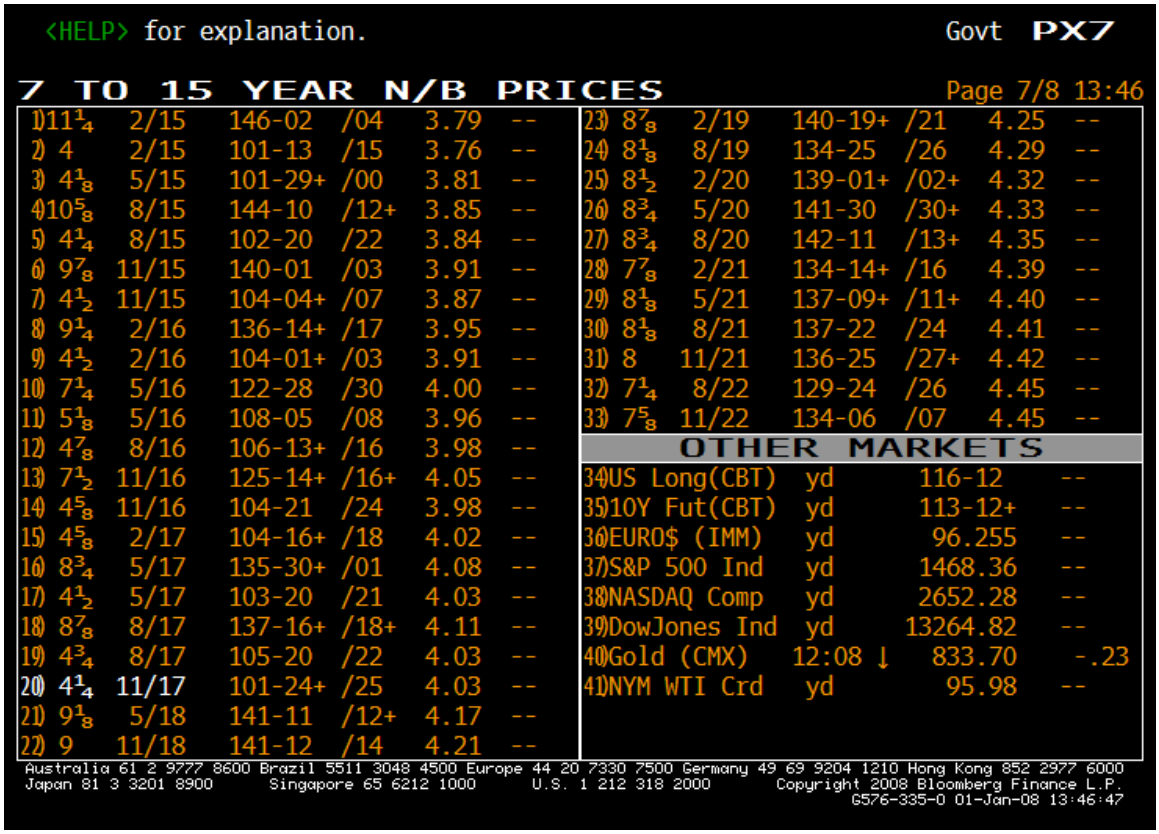
But the practice of investing retained earnings has attracted some criticism

- Manager of a profitable company with no growth opportunities should pay out the profits to shareholders
- But the manager may prefer to reinvest anyway, to increase the size of his company
- Oil Industry *circa* 1980 is often cited as an example
  - Could this describe the oil industry right now?
- Often called the ***free cash flow*** problem

Solution to this potential problem is for the firm to be highly levered

- Need to make big debt payments, nothing left to squander
- Consistent with the LBOs in shrinking industries (*e.g.* Tobacco)
  - LBO firm takes out a big loan; uses the cash to buy the company
  - Company is now highly levered
  - So even a small underperformance triggers financial distress
  - Argument at the time: this won't lead to costly bankruptcy because there will be so much value to preserve by avoiding it
  - But it *did* lead to costly bankruptcy. More about that later in the course

Some other courses (*Advanced Corporate Finance*, primarily) analyze this problem, but that's all we'll say about it for now.



V. Quotation of Bond Prices

Here's a Bloomberg screen from January 1st showing where Treasury bonds with 7 to 15 years maturity closed on 12/31/07.

- The actual screen that traders see shows much more than this

Let's consider the one highlighted in white, the 4 ¼ 11/17 note:

20) 4 1/4 11/17 101-24+ /25 4.03

The 4 ¼ means this bond pays $4.25 in coupons, annually, per $100 principal amount

- So if you buy $100 principal amount, you'll get $4.25 every year in coupons until the $100 principal is repaid on the maturity date, 11/15/17
- Treasuries pay coupons semiannually, so really you're going to get $4.25/2 = $2.125 *twice* a year
- Coupon payment dates correspond to maturity dates. This one matures on 11/15/17 so the coupons are paid on each 5/15 and 11/15 until then

What the Bloomberg is telling us is the price per $100 principal amount

You can't tell from the table that the maturity date is the 15th

- Look at *Monthly Statement of the Public Debt* for a complete listing of Treasury securities
- Can look up a coupon rate and maturity month, and find the maturity date
- Also, as we'll see, this is the *on-the-run* ten-year note, which will always mature on the 15th of a month

The Bloomberg tells us **101-24+ /25**. What does this have to do with the price? Three points are key:

- First, we are being told the bid and the ask

> Bid: The price at which a market maker will buy from you
>
> Ask: The price at which a market maker will sell to you

  - We'll talk more about market makers in a few classes. All you need to know right now is that if you want to sell a security right now, you'll get the bid price, and if you want to buy, you'll pay the ask price
  - For this bond, at this moment,
    - Bid = 101-24+
    - Ask = 101-25
- Second, these prices are in 32nds, and in this context, "+" means "+ ½ of a 32nd".
  - So,
    - Bid =101 +24.5/32 = 101.765625
    - Ask =101 + 25/32 = 101.781250
- Third, bonds trade *with accrued interest*, unlike how stocks trade
  - If you buy a stock, you pay the quoted price, you don't *also* pay the seller some amount of the future dividend
  - But this is essentially what happens if you buy a bond instead

Accrued Interest:

Basic idea – Bondholders get interest for the days they hold the bond, even though the issuer pays interest only twice a year.

How does this work?

- First, count the number of days from the last coupon date (or the issuance date, if this a new issue) to the next coupon date. Call this number *n*
- Next, count the number of days since the last coupon (or the issuance date, if this bond is in its first coupon period) to the settlement date. Call this number *x*
    - Settlement date is the day that securities and cash actually change hands
    - Usual assumption with bonds (the default assumption on the Bloomberg) is that it's the *next* business day
- Finally, call the coupon rate *C*
    - That is, if you buy $100 face value of the bond, you get $*C* in coupons during the year
    - So at each of the semiannual coupon dates, you get *C*/2

The Definition: Accrued Interest = $(C/2)(x/n)$

Let's apply this to the 4 ¼ % note above

- *n* = number of days from 11/15/07 (issuance) to 5/15/08 (next coupon)
    - This is 182 days
- Transaction date is 12/31/07, so the settlement date is 1/2/08
    - So *x* = number of days from 11/15/07 to 1/2/08 = 48
- *C* = 4.25

So accrued interest is (4.25/2)(48/182) = 0.5604

=> the actual transaction prices would be

101.765625 + 0.5604 = 102.3261 bid
101.781250 + 0.5604 = 102.3417 asked

These are sometimes called the *dirty* or *invoice* prices of the bond.

These are prices per $100 principal amount, so if you buy $*F* principal amount, then you pay *F*/100 times this price

- Suppose you want $2.5MM principal amount of this 4 ¼ % note
  - What do you get?
    - $2.5 principal repayment at maturity
    - Semi-annual coupon is ($2.5MM/100)(4.25/2) = $53125
    - So you will receive payments of
      - $53,125 on 5/15/08 (coupon)
      - $53,125 on 11/15/08 (coupon)
      - *etc.*
      - $53,125 on 5/15/17 (coupon)
      - $53,125 on 11/15/17 (coupon)
      - $2,500,000 on 11/15/17 (principal repayment)
  - What do you pay for it? (*you **pay** the **ask** price*)
    - (2.5MM/100)($102.3417) = $2,558,542
  - What would you get for it? (*you **sell** for the **bid** price*)
    - (2.5MM/100)($102.3261) =$2,558,152

One important use of invoice prices is to calculate the *yield to maturity*. If you haven't seen the actual formula, you probably would not guess it. The basic idea with the ytm is that you count time in coupon payment periods, i.e. *half*-years, discounting at *half* the ytm. Specifically:

1. Calculate the fraction of a coupon payment period until the next coupon. In this case, 48 of the 182 days until the first coupon have elapsed, so there are (182-48)/182 = 0.7363 coupon payment periods until 5/15/08. In the notation above, this is 1-*x*/*n*
2. The number of coupon periods to the *next* coupon is that number plus one, i.e. 1.7363, and the number to the coupon after that is one more, i.e. 2.7363, and so on.
3. The yield to maturity is the number *y* such that the present value of the bond, discounted at *y*/2 and counting time in coupon periods, equals the invoice ask price.

In this case,

$$\text{Invoice Ask} = 102.3417 = \frac{2.125}{(1+y/2)^{0.7363}} + \frac{2.125}{(1+y/2)^{1.7363}} + \frac{2.125}{(1+y/2)^{2.7363}} + \text{etc.} + \frac{2.125}{(1+y/2)^{17.7363}} + \frac{2.125}{(1+y/2)^{18.7363}} + \frac{102.125}{(1+y/2)^{19.7363}}$$

(coupon @ 5/15/08)
(coupon @ 11/15/08)
(coupon @ 5/15/09)
(coupon @ 11/15/16)
(coupon @ 5/15/17)
(coupon+principal @11/15/17)

The y that solves this equation is 0.0403, which is why the Bloomberg lists 4.03% as the yield to maturity of the bond.

Notice that:

- *If* the bond's coupon rate equals its yield to maturity, *then* it will trade at par, i.e. its quoted ask price will be (*almost* exactly) 100.
    - The invoice price will be $100(1+C/2)^{x/n}$
    - This is very close to $100 + (C/2)(x/n)$
        - (Using the Taylor approximation from calculus)
    - So the quoted price (net of accrued interest) is close to 100
    - Look at listed prices, you'll notice this
        - If the coupon rate is near the yield, the price is near 100

In general, notice that

- If a bond's coupon rate is above its yield, then its price is above par
- If its coupon rate is below its yield, then its price is below par
- If its coupon rate equals its yield, it trades at par

We could prove this mathematically, but the intuition is straightforward

- If a bond pays below-market interest on its face value, buyers have to buy it for less than its face value to get market interest
- If a bond pays above-market interest on its face value, buyers get market interest at a price above face value

Treasury Bonds are issued at almost exactly par, i.e. the coupon is set as close as possible to the yield that clears the market, so if you look at the Treasury Bonds currently outstanding you'll see high and low coupons depending on where the market was in those days

- In the screen above you see two notes maturing 2/15/15: an 11 ¼ % that was issued as a 30-year in 1985, and a 4% issued as a 10-year in 2005

Current Yield vs. Yield-to-maturity

Current yield is defined as *C*/(quoted ask price)

- For example, the current yield of the 4 ¼ % note is 4.25/101.78125 = 4.18%
- It is the interest income from the bond divided by its cost

Simple fact about current yield

- If a bond trades *above* par, then its current yield is *higher* than its ytm
- If a bond trades *below* par, then its current yield is *lower* than its ytm

Why does this matter?

- Bond-fund investors care (reportedly) about current yield
- Bond funds can manipulate current yield by investing in bonds trading above par

For example, consider the two notes maturing February 15, 2015

Coupon	Ask	YTM	Current yield
11.25	146:04	3.79	**7.70**
4.00	101:15	3.76	**3.94**

The yields-to-maturity are close, but the current yields are far apart

If bond fund *A* invests only in the 3.5% note, and bond fund *B* invests only in the 11.25% note, then *B* will show a much higher current yield than *A*

- Mutual-fund investors would see *B*'s shareholders getting much more interest income, per dollar invested, than *A*'s shareholders
- So for this reason they may choose *B* over *A*
- But of course there's no free lunch

The SEC is so concerned about this that they forbid funds from even *mentioning* their current yields in their ads (funds must use an alternate calculation which is very similar to yield to maturity)

- Doesn't stop mutual fund *brokers* from mentioning it, if they want