11-04 Class 11: Intermediaries and assets

- Intermediaries Definition
- There are still spreads
- creating new assets: Transformation; Bundling;
- Unbundling;
- Taking positions
- Leverage

Intermediaries

- Agents so far
  - Investor in securities (buyer)
  - Issuer of securities (seller)
- How to connect the two?
- Intermediaries
  - Brokers
  - Banks and other intermediaries
- What is the difference?

Taking positions

- Many intermediaries take positions
  - Buy a set of assets
  - Sell a different set of securities
- This makes sense only if there are spreads
  - The return on the assets you buy is higher than
  - The return on the assets you sell
- Simple case
  - (Exchange Traded Fund). Buy a bunch of shares and then sell share in the fund to the public (and take a 'management fee)
  - This is equity to equity and the spread exists by construction ($r_{ETF}=r_p-f$)

Banks

- Multifunction organizations
    1. Offer payment services
    2. Provide short term credit
    3. Provide long term credit
    4. And they may hold a portfolio of securities
- If only 1&2 they are commercial or merchant banks
    - If 1 to 4 then they are universal banks

Bank's sources of funds

1. Equity
2. Bond issues
3. Time deposits (CDs)
4. Demand deposits

- Until the 1980s demand deposits bear no interest so they are really cheap.

- Even now interest on checking accounts is tiny0.

- What about saving's account.

But

- DD are payable on <u>demand</u> so you face balance sheet risk
(someone might want their money back)

Bank balance sheet

Asset
(stuff it can sell)

Liabilities
(things it must pay on)

1. Short term loans
2. Long term loans
3. Asset portfolio
   – Bonds
   – Equities

1. Equity
2. Bond issues
3. Time deposits (CDs)
4. Demand deposits

Note in the banks portfolio of assets some things are easier to sell than other

Banks are leveraged

Their sources of capital are not purely equity
So they have a debt/equity ratio

Bank solvent as long as asset are larger than
bond issues, time deposits and demand deposits

Or Asset>debts

Or Equity has a positive price

Balance sheet risk

- Two different problems
- Exogenous shock to depositors' supply of funds (Liabilities)
- Exogenous shock to market value of investments (assets)
- Either way if changes are large you can run into insolvency so you need to be able to manage risk
  - Same applies to situation where you go short
- Something that is not necessary if all that you are doing is running a mutual fund

Dealing with liquidity risk

- A bank may fail because it faces unexpected withdrawals even though it is not insolvent.

- This could simply be because its depositors have had adverse shocks (or positive ones)

- It could also be because individuals all the sudden have concern about the solvency of the banks

- If you have a demand deposit and the risk of insolvency starts to rise
 - Dominant strategy to get your money out.

Three steps to tradeoffs of leverage

- Return to a firm in CAPM world
  - The firm has a return profile such that if it is a pure equity firm $r_i - r_F = \beta(r_M - r_F)$
  - What happens as we start changing the debt equity ratio?
- Mortgages and the homeowner/speculator
  - The speculator contemplate how much credit to get
- Banks
  - What should banks

The CAPM firm

- Starte such that $\beta = 1$
  - its return are those of the S&P 500 plus noise
  - Neglect the noise
  - If CAPM holds then the return to the firm is just r_m
- Now consider adding some debt to the firm.
  - The lowest possible cost of debt to the firm is r_F
  - We can calculate the return to equity if we add debt (assume for now that the cost of debt is indeed r_F). Let the firm debt equity ratio be DE
    - Loan to Value Ratio is α ($\alpha = 1/(1+1/A)$)
- The return to the firm is $(X_1 - (X_0(1+\alpha r_F)/((1-\alpha)X_0)$
- Clearly the cost of debt is r_F only if the firm never defaults
- So lets do that with some data

S&P 500 return cost of debt is 3 year T bill, loan period 1 year
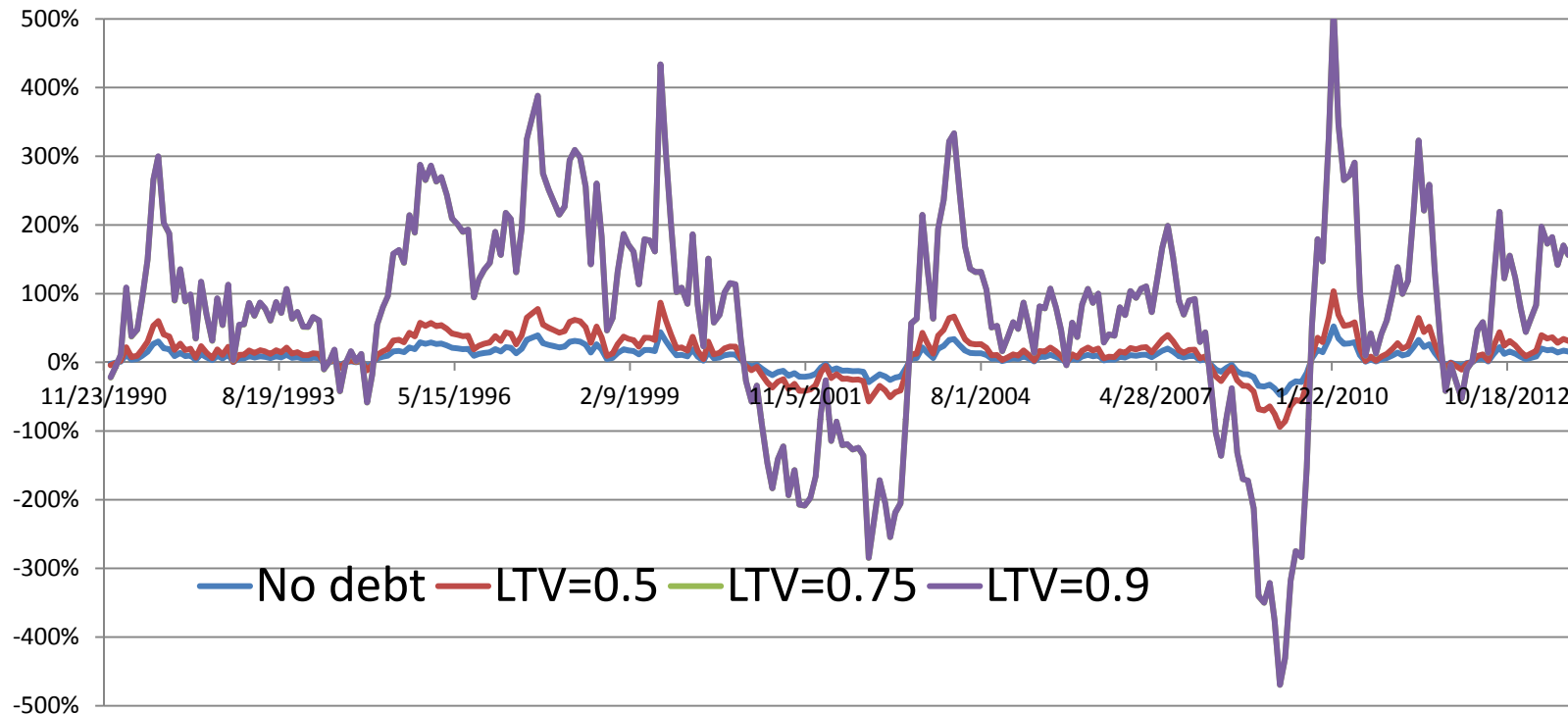
First Pass: ignore the problem of default
No debt β=1 and average return is 7% or twice the debt return
LTV=0.3 β≈1.4 and average return is 9.98% (default probability is 0)
LTV=0.5 β≈2 and average return is 14% (default probability is 0)
LTV=0.75 β ≈ 8 and average return is 28% (default probability is 7.6 %)
LTV=0.9 β ≈ 39 and average return is 69% (default probability is 21 %)
Conclusion if you like risk no debt is not going to be your solution?

The CAPM still

LTV	β	Return	R-R	Relative to no debt
0	1	7%	3.11	1
0.3	1.4	9.98	6.03	2
0.5	2	13.9	10.1	3.28
0.75	7.8	27.9	23.9	7.7
0.9	9.9	69.7	65.7	21.16

Here it is clear that at low levels of debt, return is increasing faster than β so it pays to borrow.
But recall that we assumed no default So we need to price the debt properly (for higher levels of leverage)

Leverage with risk

LTV	Default probability	Return bonds R_b	β	Return equity	Return equity net of R_F	Relative to no debt
0	0	R_F	1	7%	3.11	1
0.3	0	R_F	1.4	9.98	6.03	2
0.5	0	R_F	2	13.9	10.1	3.28
0.75	7.6%	R_F+1.4%	3.96	27.8	23.9	7.7
0.80	12%	R_F+2.5%	4.98	34.8	30.8	9.9
0.85	16%	R_F+3.5%	6.6	46.4	42.5	13.6
0.9	21%	R_F+6%	9.9	69.5	65.5	21.6

Incentives to use debt are pretty large because the risk premium you get charged does not rise very quickly. What rises is the likelihood you get nothing.

Notice also that you are changing the security profile of the equity

You will be leveraged.

- Consider the case of homeownership
- Most people cannot afford to pay cash for a home so they borrow.
- How much they afford depends con how much they can borrow.
- How much of a return they make (loose) on their investment depends on how much they borrow.
- So lets look at this in a specific context and assume that the only source of uncertainty is home prices.
  - So there are no other relevant shocks (unemployment, health….)

Home leverage

- Start with the Case Shiller home price index
- Use 30 year fixe rate for conforming mortgages (from Fredie Mac).
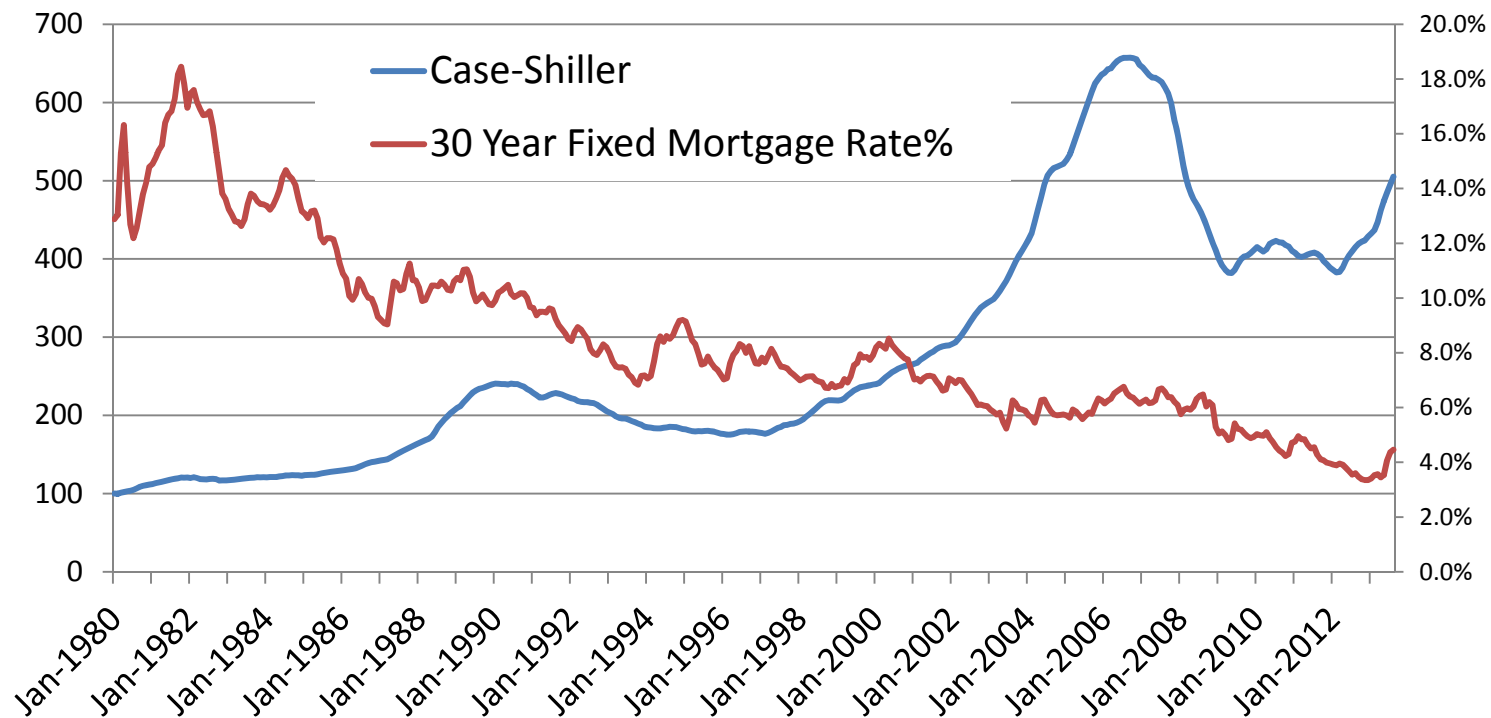
The return calculation

- Compute 1 year return
- Assume the rental income is 3% of price
- Taxes
  - Mortgage interest rate deduction is based on 20% rate so leads to real cost of credit =0.8*r.
 - Capital gains apply without respect to leverage
- If you do not borrow

$$R=P_1-(0.97P_0)/P_0$$

- If you do not borrow

$$R=P_1-[(0.97+\alpha r)P_0]/(1-\alpha)P_0$$

	LtV=0	LtV=0.5	LtV=0.7	LtV=0.8	LtV=0.9
Return	8.2%	9.6%	11.3%	13.5%	20.1%
St dev	142.7%	248.3%	351.9%	443.8%	599.3%
-250	0	0	0	0	3
-200	0	0	0	0	4
-100	0	0	0	4	14
-75	0	0	3	5	20
-50	0	2	5	11	29
-25	0	5	15	26	42
-15	4	11	25	36	44
-10	5	18	31	42	46
-5	10	28	40	44	48
0	23	38	45	47	49
5	39	47	49	49	50
10	55	52	51	51	50
25	93	76	60	56	53
50	100	95	83	74	58
100	100	100	99	92	76
150	100	100	100	99	84
200	100	100	100	100	92
300	100	100	100	100	99

In a graph
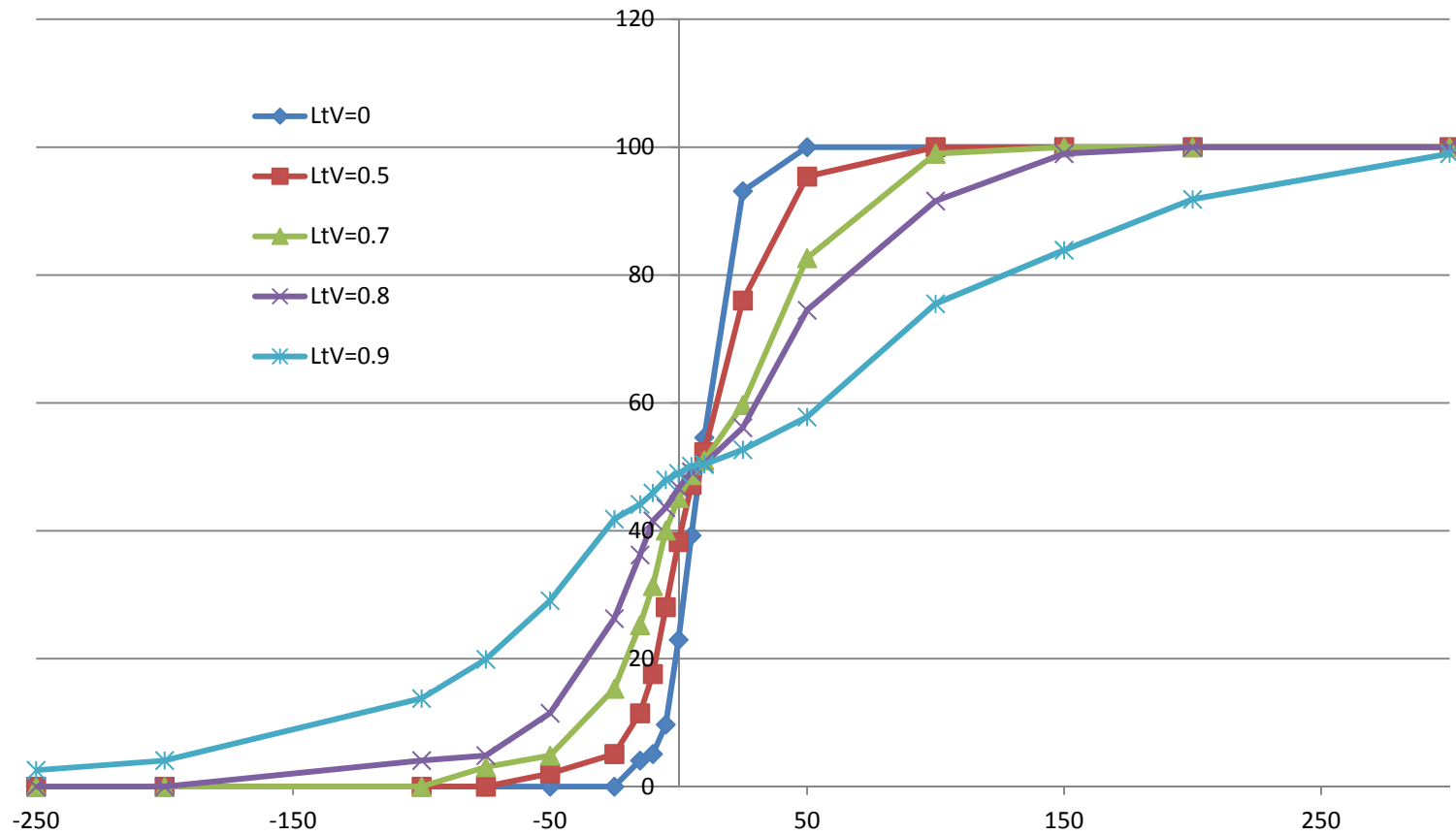
Returns and foreclosure

- Returns are correlated with foreclosures but negative returns do not imply foreclosure

- Negative returns imply you are "under water"

- You can still decide to pay.
  - Because you love your house
  - Because you expect the market to recover

- The questions is what will your lender do?

Back to the leveraged fund

- Return to S&P 500 fund with 75% leverage
  - And look at one that formed June 2008. By January 2009 it has lost 29% of its value (at dissolution time May 31 2009 it will be down about the same)
- Suppose a lender has the option of asking for the loan on January 1.
  - If she does then she can get paid of for sure as long as her loan is less than the current value of the fund.
  - If she does not then she is more likely than not to face a capital loss even if the market recovers somewhat.
  - So she asks for her money back
  - Fund has to liquidate part of its assets
- Important to avoid maturity miss-matches.
- If you are using funds that have short horizon that limits leverage
  - The problem would not have arisen if the fund had been 50% leveraged.
  - Notice the difference between closed end funds, standard mutual funds and hedge funds

Banks

- One fundamental role is to use short term liabilities to create long term assets
  - The time mismatch is fundamental
- Have a set of risky assets
  - Their value (and expected value) will vary over time
  - They are also of diverse liquidity and maturity
- Have a set of liabilities that have a variety of time horizons
  - So when bad news occurs the depositors and lenders who have the option to do so will want their money back
  - Bank runs

It even happens in Pasadena !

- July 1, 2008 (Housing wire), **IndyMac Bancorp, Inc.** (IMB) felt the pain of a mini bank run this past week, thanks to a leaked letter from New York Senator Charles Schumer that questioned the bank's solvency and led to widespread press coverage last week, the Pasadena-based thrift said in a filing with the Securities and Exchange Commission late Monday.

- "As a result of Sen. Schumer making his letters public and the resulting press coverage, we did experience elevated customer inquiries and withdrawals in our branch network last Friday and on Saturday of roughly $100 million, about ½ of 1% of total deposits,"

- The bank said that while traffic in its banks remains elevated, and further withdrawals likely, it was "hopeful that this issue appropriately abates soon." IndyMac acknowledged that its financial position "has deteriorated since last quarter," and said it was working with regulators to develop a plan to "improve the safety and soundness" of the thrift

  On **July 11, 2008**, IndyMac Bank, F.S.B., Pasadena, CA IndyMac Bank, F.S.B, with approximately $32.01 billion in assets was closed was closed by the Office of Thrift Supervision (OTS) and the FDIC was named Conservator.
  Estimated losses 13.214 Billion. FDIC (bank and thrift failure data base)

Bank runs

- Common through the Great Depression, then rare but as example above shows—they still happen.

- They also happen in outside the U.S.

- Motivation is that as long as the bank pays you get 100% of your capital but once it stops paying you may only get a fraction.

- Historically bankruptcy is exactly that. A bank facing a run cannot pay. Officials show up and break the 'bench' where the banker used to sit

- Bank failures are costly. So have to develop mechanisms to minimize them

Four ways to limit bank runs

1. Bank prudence
   1. Failure is very costly to bank
   2. So it can take steps to keep its assets and liabilities balanced (enough short term marketable securities and cash on hand to face a run)
   3. Expensive (in particular when demand for loans high)
   4. Undermined by bank competition
2. Bank reserve systems
   1. Designed to solve 3&4
   2. Works well when shocks are specific to banks and banks a local or regional
3. Government assistance
   1. These involve the government assuming the losses
   2. TARP, FDIC and other forms of insurance
4. Government regulation
   1. Designed to deal with the fact that if you give assistance you are encouraging risk

Regulation to limit balance sheet risk

- Restrictions on banking activity
  - National banking act (1863). No mortgages (no 3)
  - National banking act (1933 also known as Glass-Steagall). No investment banking no holding of equities.
  - Financial liberalization since 1980 banks can do it all.
- Create a lender of last resort
  - Federal reserve (and some prior actions)
- Insure depositors
  - Federal deposit insurance

1-06
Class 12 Forwards and Futures

- **Financial markets as insurance markets**
- **Instruments and exchanges;**
- **The counterparty risk problem**