# Lecture Notes – December 3, 2012

## First Class needs this material

In 1987 AIGFP – AIG Financial Products was formed to specialize in interest rate and currency swaps and more broadly the capital markets. It was set up to take advantage of AIG’s AAA rating. A AAA rating meant that one did not have to post collateral against derivative transactions.

It had a unique profit sharing arrangement with AIG – 38% of the initial profits on a trade would go to AIGFP and the rest to AIG. The initial profits could be paid out in compensation immediately. This meant that if there were significant issues in the future that AIG was on the hook.

In 1998 AIGFP transacted the first credit default swap.

## Second class starts here

March 2005 – Greenberg steps down (is forced out?) amid an investigation into questionable accounting practices at AIG. Subsequently AIG loses its AAA rating.

In 2005 AIGFP decides to stop writing credit default swaps due to increased risks in the US housing market – in particular sub-prime. They have approximately $80bn of CDS on the books though.

In August 2007 CEO states “It is hard for us, without being flippant, to even see a scenario within any kind of realm of reason that would see us losing $1 in any of those transactions.”

Throughout 2007 and 2008 AIGFP repeatedly posts additional collateral against these trades.

In September 2008 AIG executives learn that the rating agencies are going to downgrade them again. This will trigger significant collateral calls for which AIG does not have the cash.

The US government knew that both Lehman Brothers and AIG were on the verge of collapse. They decided that the collapse of Lehman Brothers would cause larger systemic issues and thus focused efforts on a rescue of that institution. When the Fed Reserve decided to change directions and allow Lehman Brothers to collapse it was very late to focus on AIG.

The government then put the rescue in the hands of two banks – JP Morgan Chase and Goldman Sachs – both of these companies would be the largest beneficiaries of a government rescue. They had significant conflicts of interest not to organize a private rescue.

The bailout of AIG was incredibly complex so I will try to layout a timeline. I have attached a slide from the treasury that details this.

http://www.treasury.gov/connect/blog/PublishingImages/20120911\_AIG\_v14.jpg

September 16, 2008 – Fed establishes an $85bn credit facility for AIG

October 8, 2008 – Fed commits an additional $37.5bn for securities lending

November 10th, 2008 – US treasury makes a $40bn TARP investment in AIG to reduce the Fed’s credit facility. Fed authorizes loans to Maiden II and Maiden III to purchase securities from AIG.

* Maiden Lane II was set up to buy residential mortgage backed securities from the securities lending part of AIG.
* Maiden Lane III was set up to buy multi-sector CDOs from AIGFP counterparties to allow AIGFP to terminate the associated CDS.

March 2, 2009 – Treasury commits an additional $30bn of TARP investment to AIG. Fed reduces its credit facility in exchange for preferred interests in two SPVs.

Jan 14, 2011 – Fed loans to AIG paid off, Loans to Maiden Lane II and III remain, Fed’s SPV interests transferred to the treasury and treasury receives 92% of common stock. Previously committed but unspent TARP funds are used to complete the transaction

May 2011 – Treasury sells 5.8bn of common stock and cancels unused TARP Commitments.

Feb 2012 – Sale of final securities in Maiden Lane II. Total gain from portfolio is 2.8bn on 22.5bn portfolio (return of 11%)

March 2012 – Treasury sells an additional 6bn of common stock

May 2012 – Treasury sells an additional 5.75bn of common stock

Aug 2012 – Treasury sells an additional5.75bn of common stock

Aug 2012- Sale of final remaining securities in Maiden Lane III. Total gain on portfolio is 6.6bn on a 30bn portfolio (a 22% return)

Sep 2012 – Sale of 20.7bn of common stock.

Remaining stake in AIG is worth around $7.6bn as of Sep 2012.

To start talking about AIG we should probably start with Subprime.

## Subprime Mortgages

Last week we talked a bit about mortgages. Recall standard mortgages have a 30 year term with fixed monthly payments. Each payment is composed of principal and interest. Then I mentioned two additional ideas – ARMs and conforming loans.

An ARM is an adjustable rate mortgages. Typically it will be denoted 5-1 or 7-1 which means that the payments are fixed for the first 5 or 7 years and then change once a year thereafter.

A conforming loan is one that matches various criteria. These include:

* Limits on the size of the mortgage – for a single family home the mortgage cannot be more than 417K
* Credit quality of the borrower
* Debt to income ratios for the borrower
* Loan to value ratio (depends on the mortgage could be up to 95%)

If a loan does not satisfy these criteria then historically one could not take out a mortgage and buy a house.

There are various classifications of mortgages but the one that got AIG into trouble was subprime. Subprime is a poorly defined term.

What is a sub-prime mortgage? These are typically mortgages for which the borrower has poor credit – for example missing payments on debt or a lack of credit history.

In order to protect the lender sub-prime mortgages were often structured differently than standard mortgages.

The most common structure was a 2-28 mortgage. This was a mortgage with a 2-year fixed rate usually below the rate at which the borrower would have had to pay for 30 years and then after 2 years it would switch to a variable rate changing every 6 months or 12 months. The rate that it would change to would look something like 6M Libor + 6.5% Now things would not be as bad as that. Most mortgages limit the increase in the rate between 2% & 3% per reset. In addition during the first two years there would be a large repayment penalty on the order of 6 months interest. Note these mortgages stopped being offered in mid-2007.

Now the good part of a 2-28 mortgage was that during the first two years you had time to

1. build up some equity in your home – home prices going up helped here
2. build up some credit history.
3. hopefully after the initial two-year period you would qualify for a conventional mortgage.

The bad part was:

After two years you might see an large increase in your loan rate. If you cannot refinance then you could be in trouble.

First an exercise to see what this meant in practice. Let’s look at a hypothetical mortgage of 200K at an interest rate of 4% that we took out in 2005. We will assume that it is a 2-28 mortgage that resets at 6 month LIBOR + 6.5%. It will reset annually after 2 years. It will have a rate reset cap of the current rate + 3%. First what is the initial payment? You want to plug into your calculator 360 payments, interest of 4%/12, PV of 200K) = $954 per month.

Now what happens in 2007 when 6-month LIBOR is 5%. The theoretical new interest rate will be 11 but the rate will only go up 3%. To compute the new payment we need to know the balance on the mortgage. We can compute this using the PV function on the calculator again. The rate is 4%, the number of payments is 360-24=336 and the payment is $954. This gives a PV of $192,812.

Let’s assume that the rate reset cap is the existing rate +3%. Thus the mortgage will reset up 3%. The new rate is 7%, the outstanding mortgage is 192,812, and the number of payments is 360-24=336. The new payment is 1310.37 - an increase of over 30%.

Note the rate will reset again in a years time. If LIBOR doesn’t reduce then it will increase again significantly.

Now there are several things that can happen at this point.

1. the borrower has better credit history now, the house is worth more or the same as before and they can refinance into a traditional mortgage at a much lower rate.
2. the borrower does not have better credit history and they can afford to pay the higher rates. This seems like an unlikely scenario.
3. the borrower does not have better credit history and cannot afford the higher payments but the house is worth more than before.
	1. They can refinance into another subprime mortgage, possibly take cash out of the home and use some of that cash to afford the next couple of years of payments
	2. If lending standards have tightened so that they cannot take out a new mortgage then they can sell the house and pay off the mortgage.
4. the borrower does not have better credit history, cannot afford the higher payments, and the house is worth less than before.
	1. Unscrupulous mortgage originator who will earn a 1% fee on originating a new loan gives a higher appraisal, adds the 1% fee to the balance of the mortgage and issues a new mortgage
	2. If they do not meet mortgage lending standards (esp LTV requirements) then they will be forced into default.

Before the wheels came off of this market there were very few defaults. There were lots of prepayments but one would have predicted that based on the structure of the loans. On the other hand this mask problems in the underlying market. These mortgages would have defaulted if the borrower could not have refinanced the mortgage.

## Securities Lending

One of the markets that AIG got into trouble over was the securities lending business. This was generally considered a very low risk part of an asset management business so let’s first review what the business is and then what went wrong.

The best place to start is to review a slide that I introduced when talking about the equity markets – the mechanics of a short sale.

Remember that in a short sale the trader who wants to sell something that they do not own goes to their broker and asks him to locate it for them. The broker then goes and finds it. He may find it from other customers of the brokerage firm but he may go to a specialist in securities lending.

Securities lending is the business of being the somewhere that the broker can find it. Let’s say I run a business in which I hold lots of securities for the long-term – for example a mutual fund for stocks or an insurance company. Given that there are people out there looking to short these securities I can earn an additional yield by making them available to be borrowed. In this situation the borrower has to place capital against the borrowed assets directly with the lender.

In a typical securities lending operation the borrower must post collateral worth 102-105% of the security value. The collateral can be in the form of other securities – generally government bonds or cash. If it is government bonds then the borrower pays a fee to the lender. If it is cash then the lender pays a sub-market interest rate on the cash. They can then invest the cash in short-term low-risk market instruments and earn the spread.

Uses of Securities Lending

* Pairs trading
	+ seeking to identify two companies, with similar characteristics, whose equity securities are currently trading at a price relationship that is out of line with the historical trading range. The apparently undervalued security is bought, while the apparently overvalued security is sold short.
* Convertible bond arbitrage
	+ buying a convertible bond and simultaneously selling the underlying equity short.
* Merger arbitrage
	+ for example, selling short the equities of a company making a takeover bid against a long position in those of the potential acquisition company
* Index arbitrage:
	+ selling short the constituent securities of an equity price index [e.g. SP500] against a long position in the corresponding index futures contract
* Short positions arise as a result of
	+ failed settlement (with some securities settlement systems arranging for automatic lending of securities to prevent chains of failed trades) and
	+ where dealers need to borrow securities in order to fill customer buy orders in securities where they quote 2-way prices.
* The lender is seeking to borrow cash against the lent securities
* Transfer ownership temporarily to the advantage of both lender and borrower
	+ For example, some investors might be subject to withholding tax on dividends whereas others are not.
	+ Some investors might have access to cheap reinvestment plans for the dividends while others may not.

## AIG’s Security Lending Business

The various insurance company subsidiaries of AIG had large numbers of securities. AIG set up another corporation AIG Securities Lending Corporation that entered into securities lending arrangements with the insurance company subsidiaries. These allowed the corporation to lend their securities with a small number of counterparties (generally large banks and brokerage firms).

AIG’s business was unique in two ways from standard securities lending businesses.

First involves the risk that AIG took with the collateral. In theory borrowed securities can be returned on very short notice – thus this business generally invests in very short-term securities to match the lending terms. Beginning in late 2005 AIG started to use the cash to invest in residential mortgage backed securities (RMBS) in order to maximize its returns. At its peak AIG had 76bn of invested liabilities of which 60% was in RMBS.

The problem here that arose was that although the RMBS securities were AAA rated when AIG bought them as problems in the housing market began to appear in 2006/7 these securities were subject to downgrades and became more illiquid.

The second problem that arose is that various unregulated businesses started to enter the securities lending business and were requiring less cash collateral than the 102-105% traditionally required. AIG solved this by allowing lower collateral requirements on the securities lending and making up the difference from the parent company. So if AIG securities lending corporation was lending an asset but only receiving 90% in cash collateral AIG itself would step in and provide the other 12-15% to the insurance company subsidiary.

As investors became concerned about AIG they started to shorten the terms of the lending and eventually started demanding their money back. This increased the problems for AIG as the only mechanism that AIG had to return the cash was to sell the more liquid assets in the pool. Thus the concentration of RMBS in the pool became greater and greater.

## Maiden Lane II

The solution to these problem (amongst the various other rescue packages) was first the securities lending program in which FRBNY allowed AIG to lend securities to it in exchange for cash collateral. Then a SPV called Maiden Lane II was set up in which the SPV bought 22.5bn dollars of RMBS securities.

This along with a $5bn capital injection by AIG to the securities lending progam allowed it to terminate all of its securities lending programs and return the assets to the insurance subsidiaries.

The last securities from Maiden Lane II were sold in Feb 2012. For a commitment of 22.5bn dollars the Fed made a profit of $2.8bn or a total return of just over 12% for a 4-year commitment.

## CDOs

What’s a CDO

## Credit Default Swap

What is a credit default swap

## Super Senior Tranche

What’s a super senior tranche of a security and why did AIG write CDS on them

## Derivative Agreements

How a transaction is structured and the role of collateral. Why getting downgraded causes one problems

## Greenberg Video

Let’s talk about what Greenberg sees differently. Was he correct or incorrect?