Lecture

IAQS | INSTITUTE OF ACTUARIAL & QUANTITATIVE STUDIES

Class: TY BSc

Subject : Risk Management & Investment Management -1

Subject Code: PUSASQF5.

Chapter: Unit 3 Chp 3 Part 1

Chapter Name: Getting Up to Speed on the Financial Crisis

Topics to be covered

1. Overview
2. Timeline
3. Historical Background

1 Overview

- The Financial Crisis of 2007-2009 began in early August with runs in several short-term markets formerly considered “safe”.
- As Ben Bernanke (2010) put it: “Should the safety of their investments come into question, it is easier and safer to withdraw funds—‘run on the bank’—than to invest time and resources to evaluate in detail whether their investment is, in fact, safe” (p. 3). The table later is an abbreviated timeline of the major events of the crisis.
- The crisis had been building for some time before August: During the first half of 2007 problems in the subprime market became increasingly visible and included the failure of several subprime originators.
- And even before that there was a credit boom, steeply rising home prices, and global imbalances in foreign trade.

2 Timeline

FINANCIAL CRISIS MAJOR EVENTS TIMELINE

2007	
Jan. –July	Subprime mortgage underwriters Ownit Mortgage Solutions and New Century Financial Corporation file for bankruptcy. Massive downgrades of mortgage-backed securities by rating agencies. Kreditanstalt für Wiederaufbau (KfW), a German government-owned development bank, supports German bank IKB.
August	Problems in mortgage and credit markets spill over into interbank markets; haircuts on repo collateral rise; asset-backed commercial paper issuers have trouble rolling over their outstanding paper; large investment funds in France freeze redemptions.
August 17	Run on U.S. subprime originator Countrywide.
September 9	Run on U.K. bank Northern Rock.
December 15	Citibank announces it will take its seven structured investment vehicles onto its balance sheet, $49 billion.
December	National Bureau of Economic Research subsequently declares December to be the business cycle peak.
2008	
March 11	Federal Reserve announces creation of the Term Securities Lending Facility to promote liquidity.
March 16	JPMorgan Chase agrees to buy Bear Stearns, with Federal Reserve assistance, and Federal Reserve announces creation of the Primary Dealer Credit Facility.
June 4	Monoline insurers MBIA and AMBAC are downgraded by Moody's and S&P.
July 15	U.S. Securities and Exchange Commission issues an order banning naked short-selling of financial stocks.
September 7	Federal government takes over Fannie Mae and Freddie Mac.
September 15	Lehman Brothers files for bankruptcy.

2 Timeline

September 16	The Reserve Primary Fund, a money market fund, "breaks the buck," causing a run on MMFs. Federal Reserve lends $85 billion to AIG to avoid bankruptcy.
September 19	U.S. Treasury announces temporary guarantee of MMFs, and Federal Reserve announces the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility.
September 25	Washington Mutual, the largest savings and loan in the U.S. with $300 billion in assets, is seized by the authorities.
October	Financial crisis spreads to Europe.
October 3	U.S. Congress approves the Troubled Asset Relief Program, authorizing expenditures of $700 billion.
October 8	Central banks in the United States, England, China, Canada, Sweden, Switzerland, and the European Central Bank cut interest rates in a coordinated effort to aid world economy.
October 13	Major central banks announced unlimited provision of liquidity to U.S. dollar funds; European governments announce system-wide bank recapitalization plans.
October 14	U.S. Treasury invests $250 billion in nine major banks.
2009	
May	Results of the Supervisory Capital Assessment Program ("stress tests") announced.
June	National Bureau of Economic Research subsequently declares June to be the business cycle trough.
October	Unemployment rate peaks at 10.0 percent.

1 Overview

- Bernanke makes several important points in developing the idea that the crisis was a like an old fashioned run. First, he distinguishes between triggers and vulnerabilities. Losses on subprime mortgages, or more accurately, the prospect of such losses, after house prices started to decline, were a trigger for the crisis. But, they cannot explain the crisis.
- As Bernanke puts it, ". . . judged in relation to the size of global financial markets, prospective subprime losses were clearly not large enough on their own to account for the magnitude of the crisis". Somehow the prospective losses had to be amplified to generate the crisis.
- A second point that Bernanke makes is that the systemic vulnerabilities in large part were due to changes that had occurred in the financial sector of the economy. The financial crisis was a bank run, but in sectors of the money markets where financial institutions provided bank-like debt products to institutional investors. These financial institutions were mostly shadow banks.

Shadow banks are financial entities other than regulated depository institutions (commercial banks, thrifts, and credit unions) that serve as intermediaries to channel savings into investment … Before the crisis, the shadow banking system had come to play a major role in global finance; with hindsight, we can see that shadow banking was also the source of key vulnerabilities.

1 Overview

- The main vulnerability was short-term debt, mostly repurchase agreements and commercial paper. These markets had grown enormously. Bernanke notes that "repo liabilities of U.S. broker dealers increased 2 ½ times in the four years before the crisis"
- The IMF also notes that "The repo market has represented the fastest growing component of the wholesale funding markets. . . "
- Not only were these markets large, but they were unregulated, as both Bernanke and the IMF point out.

A repo transaction is a collateralized deposit in a "bank," as follows. The depositor or lender puts money in the bank for a short-term, usually overnight. The bank promises to pay the overnight repo rate on the deposited money.

- To ensure the safety of the deposit, the bank provides collateral that the depositor takes possession of. Depositors are large institutional investors, money market funds, nonfinancial firms, states or municipalities, and other large investors. The size of their deposits is too big for an insured account at a bank, and hence the need for collateral to try to protect the deposit.
- If the bank fails, then the depositor can sell the collateral to recover the value of the deposit. If the deposit is $100 million and the collateral has a market value of $100 million, then there is said to be no "haircut" on the collateral. If the deposit is $90 million, and the collateral is $100 million, then there is said to be a 10 percent haircut.

1 Overview

- Though not a subject of academic research (prior to the crisis), the repo market is not a small, esoteric, market. IMF (2010) estimates total outstanding repo in U.S. markets at between 20 and 30 percent of U.S. GDP in each of the years from 2002 to 2007.
- Their estimates for the European Union are even higher, with a low of 30 percent and a peak just above 50 percent of E.U. GDP during the same time period. While these measurements are imprecise, it is clear that the repo market is sizeable in the advanced economies.
- It was not only in the United States that there were problems of this sort. Disruptions in the U.S. short term debt markets created a shortage of U.S. dollars in global markets. IMF : "U.S. dollar funding was required especially by banks in Europe (e.g., Dutch, German, Swiss, and U.K. banks), but also by banks in Korea, to roll over short-term funding of longer-term U.S. dollar assets. The shortage in U.S. dollars also affected the foreign exchange swap market, with the U.S. dollar being used as the main swap currency for cross-currency funding."
- The bankruptcy filing of Lehman Brothers in September 2008 (see the Timeline) enormously exacerbated the situation. The BIS summarizes what happened:

> The tipping point came on Monday 15 September, when Lehman Brothers Holdings Inc. filed for Chapter 11 bankruptcy protection: what many had hoped would be merely a year of manageable market turmoil then escalated into a full-fledged global crisis. Suddenly, with markets increasingly in disarray, a growing number of financial institutions were facing the risk of default. The resulting crisis of confidence quickly spread across markets and countries . . .

1 Overview

- Most importantly, the failure of Lehman led to a run on money market mutual funds after one large fund "broke the buck". The U.S. Treasury then announced a temporary guarantee of money market mutual funds. Confidence in the stability of the financial systems in the U.S. and Europe was lost.
- The resulting turmoil led to banks hoarding liquidity, and this will play an important role in transmitting the crisis to the real sector and internationally. In this way, the prospective losses in the subprime market were amplified. Bernanke: "Ultimately, the disruptions to a range of financial markets and institutions proved far more damaging than the subprime losses themselves".
- Central banks engaged in unprecedented interventions and the U.S. Congress eventually passed the Troubled Asset Relief Program (TARP). On October 8, 2008 there was a coordinated reduction in policy rates by six major central banks. But, this was not the end. As the BIS explained:

> Although the global crisis of confidence had come to an end, policy action continued on an international scale as governments sought to support market functioning and to cushion the blow of rapid economic contraction. Even so, with many details unspecified, questions about the design, impact and consistency of these measures remained. As a result, financial markets were roiled by increasingly dire macroeconomic data releases and earnings reports, punctuated by short-lived period of optimism–often in response to the announcement of further government interventions.

Eventually, there were signs of stabilization, from mid-March 2009. But, the real effects have persisted.

3 Historical Background

- The recent crisis is often described as being the worst global crisis since the Great Depression, and the evidence supports this label. But the gap between crises of this magnitude means we must look towards long historical time series to gain perspective on patterns of global crises.

- Reinhart and Rogoff (2011) drew a few conclusions.
  - First, external debt increases sharply in advance of banking crises.
  - Second, banking crises tend to lead sovereign-debt crises. In fact, not only does external debt rise sharply, but so does domestic government debt.

- The second finding – that banking crises lead sovereign debt crises – is also supported by a VAR analysis. Although the direction of causality cannot be conclusively determined from such analyses, the consistent findings across many different countries and time periods suggests that banking crises play an important accelerator role in broader debt crises.

3 Historical Background

- Schularick and Taylor (2012)'s paper goes on to explore the impact of this change on the incidence and severity of financial crises. Their analysis adopts an "early-warning signal" approach that is standard in this literature, where macro variables are used to predict the onset of a crisis. While this early-warning approach has been used extensively on emerging markets for the post-1970 period, only the data collection efforts of these authors allow for an extension to a longer time series while including credit aggregates as regressors.

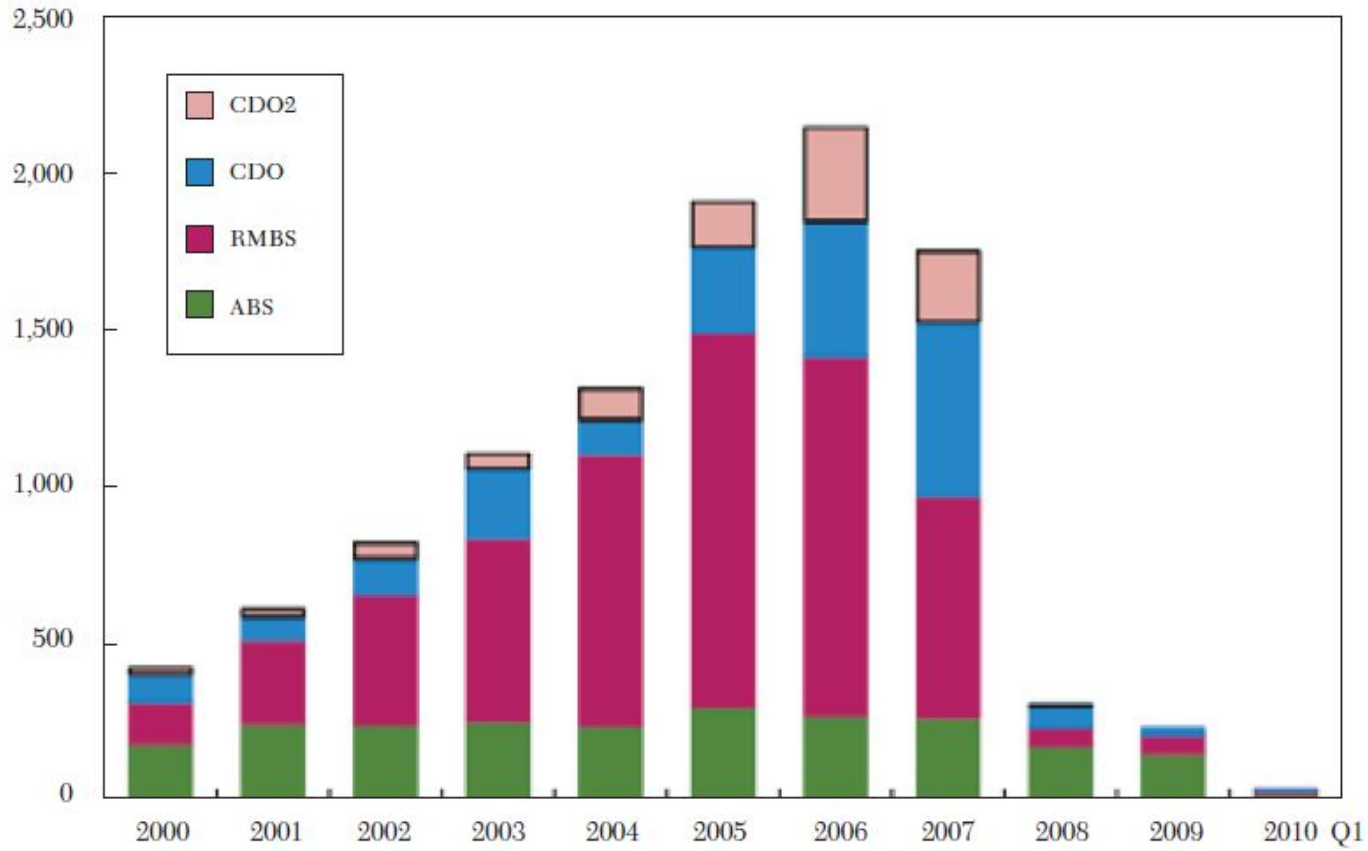
- The results show that changes in credit supply (bank loans) are a strong predictor of financial crises, particularly when these changes are accelerating.

- They are an echo of the findings in Reinhart and Rogoff for external debt. Furthermore, broad money aggregates do not have the same predictive power, particularly in the post-WW II period.
- Both provide a consistent picture of the run-up to a financial crisis: *an acceleration of debt from both governments and financial intermediaries are the most important antecedents.*

4 Build-up

- As discussed in the previous section, crises are often preceded by credit booms. In the case of the U.S. in the crisis, the credit boom took the form of an increase the issuance of asset-backed securities, particularly mortgage-backed securities.
- This is related to the development and functioning of the shadow banking system. The growth in the shadow banking system was the outcome of several forces.
- The traditional banking model became less profitable in the face of competition from money market mutual funds and junk bonds. Securitization, the sale of loan pools to special purpose vehicles that finance the purchase of the loan pools via issuance of asset-backed securities in the capital markets, was an important response.
- The next graph shows the growth of U.S. private-label securitization issuance during 2000-2010:Q1. Although securitization began in the 1990s, the figure makes clear the explosive growth in the six or seven years before the crisis, a growth consistent with the notion of a credit boom.
- Over the period portrayed in the figure, the private-label securitization market grew from under $500 billion in issuance to over $2 trillion in issuance in 2006, the year before the crisis.

4 Build-up



U.S. Private-Label Term Securitization Issuance by Type
(*In billions of U.S. dollars*)

Source: International Monetary Fund (2010).

4 Build-up

- Securitization is off-balance sheet financing for banks and other financial intermediaries. But, if these intermediaries are not going to finance these loan pools on balance sheet, who is going to buy the asset-backed securities?
- Pozsar, a researcher, describes institutional cash pools: ". . . they are large (typically at least $1 billion in size) and centrally managed. The central management of cash pools refers to the aggregation (or pooling) of cash balances from all subsidiaries worldwide in the case of global corporations, or all funds (including mutual and hedge funds and separate accounts) in the case of asset managers. Furthermore, the investment decisions that pertain to pooled balances are performed by a single decision maker (typically a treasurer) and through a fund that is a single legal person, but one that manages the cash balances of many legal persons".
- Pozsar documents a striking rise in the funds managed by these pools, from about $200 million in 1990 to nearly $4 trillion on the eve of the crisis.

4 Build-up

- The key point about the growth of institutional cash pools is that they have an associated demand for liquidity; in particular, they have a demand for insured deposit alternatives (Pozsar's terminology). The amounts of money that they wanted to allocated to "safe" asset classes far exceeded the amount that could be insured in a demand deposit account.
- The problem was that there were not enough safe assets, U.S. Treasuries, for the pools to hold. Pozsar estimates "that between 2003 and 2008, institutional cash pools' demand for insured deposit alternatives exceeded the outstanding amount of short-term government guaranteed instruments not held by foreign official investors by a cumulative of at least $1.5 trillion; the 'shadow' banking system rose to fill this gap".

4 Build-up

- Foreign official investors hold large amounts of U.S. Treasuries. And this is where the effects of the current account imbalance may have played a role.
- Bernanke (2005): “If a country’s saving exceeds its investment during a particular year, the difference represents excess saving that can be lent on international capital markets. By the same token, if a country’s saving is less than the amount required to finance domestic investment, the country can close the gap by borrowing from abroad. In the United States, national saving is currently quite low and falls considerably short of U.S. capital investment. Of necessity, this shortfall is made up by foreign net borrowing- - -“.
- There were large and persistent capital inflows from foreigners seeking U.S. assets as a store of value. It is not so clear why the foreigners want riskless assets, rather than, say, buy land and property in the U.S.

4 Build-up

- With large amounts of U.S. Treasuries held abroad, institutional cash pools had to find substitutes. The substitutes were of two forms.
- First, short-term bank debt-like products, such as repurchase agreements and asset-backed commercial paper provided collateral that substituted for government guarantees.
- Second, there were indirect holdings of unsecured private money market instruments through money market mutual funds, where the funds' asset portfolio was short-term and globally diversified.
- The joining together of the supply of asset-backed securities with the demand for private alternatives to insured deposits led to the shadow banking system, a genuine banking system providing products with a convenience yield, short-term debt of intermediaries, often based on privately-produced collateral.

4 Build-up

- Historically, for the private production of high quality asset-backed securities, mortgages have been the preferred collateral. The increase in the production of asset-backed securities appears to be a credit boom. In credit booms, households and firms are borrowing money. What are they doing with this money? One possibility is that they are buying houses. Credit booms seem to often coincide with house price increases.
- We've seen in the previous chapter as to how the housing boom and subprime crisis played out between 2007–10 in the US. It had an effect on the financial system at large and specifically on liquidity in these markets.
- The next chart displays how they have historically been timed around each other, ie a bank crisis and housing boom.

4 Build-up

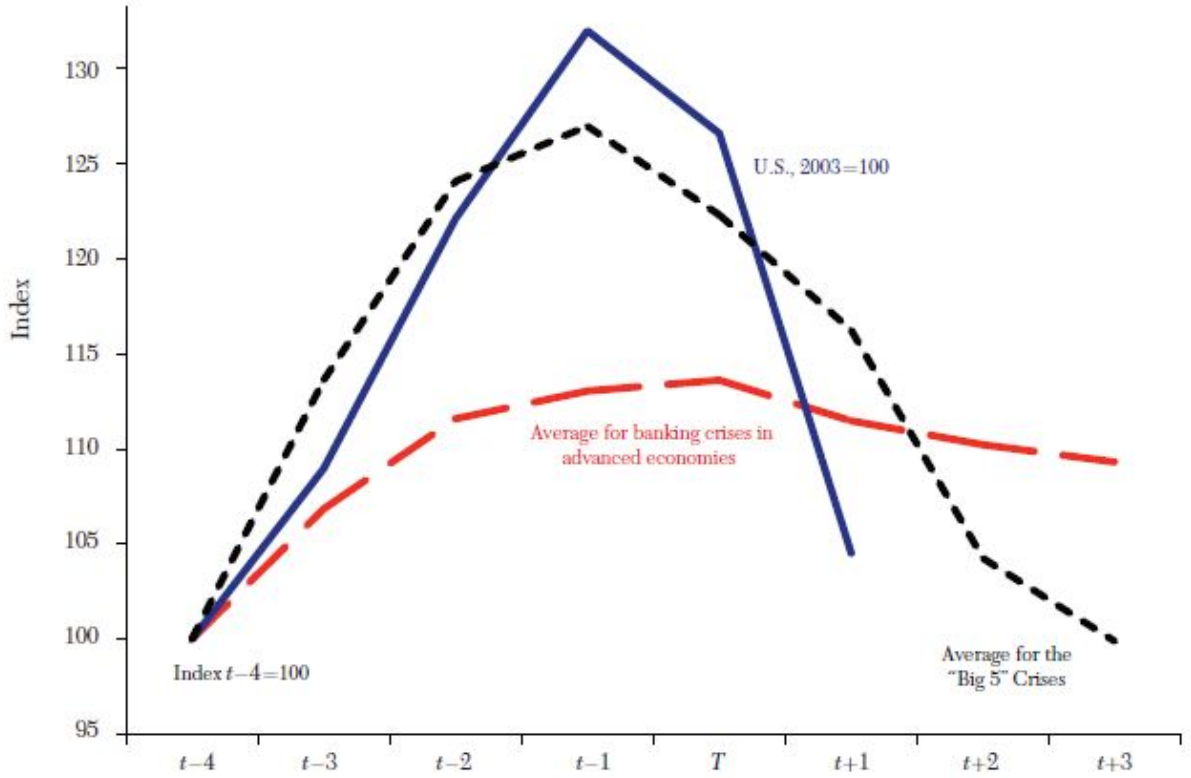


Figure 3. Real Housing Prices and Banking Crises

Source: Reinhart and Rogoff (2008).