



# Financial Crisis 101

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## Goal of Part One of Analysis

*Identify Fundamental Tools of Macroeconomics and International Economics (it needs a Textbook to cover all concepts and therefore only selection of relevant concepts is made).*

*Explain key Linkages and Relationships and elaborate important Economic Concepts.*

*Elaborate key Economic Theories to understand how the real world economy works.*

*Equip readers with these tools to understand the Key Question elaborated in Part Two: Why Financial Crisis Happen?*

## Part One: Economics 101 to Understand Financial Crisis

### What are Interest Rates?

Interest Rates impact a number of economic variables. They are the nerves of the economy.

Put simply: Interest Rates = Price of Money.

Did you know? Interest Rates are measured using Yield to Maturity (YTM).

YTM is the interest rate that equates the Present Value of payments received from a debt instrument (bond) to its Value today.

What is Present Value? Dollar today is worth more than it will be tomorrow. That's why you earned interest on the Dollar.

### Bond Returns and Interest Rates

Interest Rates are not necessarily equal to the rate of return on Bonds.

Return on Bonds comprises of two components: current yield plus the capital gains.

Price of Bonds fluctuate due to changes in the interest rates. Sensitivity of Bond Returns to changes in Interest Rates is called as “Duration” and is an important concept used by Bond Investors.

When price fluctuations cause substantial Capital gains or losses, Bond Returns will differ from Interest Rates.

Did you know? Bond prices are negatively related to interest rates. When Interest Rates go up, the price of the Bond falls and vice versa.

## Interest Rates & Behaviour of Bonds

Bond prices are sensitive to changes in the Interest Rates. This concept is called as “Duration.”

Higher Interest Rates dampen Bond Prices (for example during rising economy).  
Lower Interest Rates increase Bond Prices (for example during contracting economy).

Bonds with longer time to mature (Maturity) are more sensitive to interest rates and vice versa. Bonds with lower coupon (regular payments to investors) are more sensitive to interest rates and vice versa. Note Coupon Rate is NOT Interest Rate.

When Interest Rates greater than Coupon Rate we have Discount Bonds; and when Interest Rates lower than Coupon Rate, we have Premium Bonds.

## Nominal and Real Interest Rates

Nominal Interest Rates take into consideration Inflation (increase in price level of economy).

- Inflation = increase in price level in economy.
- Real Interest Rates adjust for Inflation.

- $\text{Real Rate} = \text{Nominal Rate} - \text{Expected Inflation}$ .
- $\text{Nominal Rate} = \text{Real Rate} + \text{Expected Inflation}$ .
- Lower Inflation; greater Real Interest Rate.
- Higher Inflation; lower Real Interest Rate.

## Inflation for Lenders-Borrowers

Expected Inflation and Current Inflation affects behaviour of Lenders as well as Borrowers. Expected Inflation implies higher Interest Rates and tendency to lend money. Expected lower inflation and lower Interest Rates imply tendency to borrow money.

Inflation benefits borrowers because they have to return money with cheaper dollars now. Inflation hurts lenders because they lose money.

## Inflation and Interest Rates

Inflation can effect lending and borrowing.

Financial Markets are driven by expectations.

Expected Inflation would imply higher expected Interest Rates. For example, people would like to lock their mortgage rates at the prevailing lower rates before the economy picks up.

Expected Deflation (decline in price level) would imply weaker economy and declining Interest Rates. People would like to have variable rates for their mortgages in anticipation of future lower rates.

## TIPS (Inflation Protected Bonds)

TIPS are Treasury Inflation Protection Securities.

The Interest and Principal payments of TIPS are adjusted to changes in the price level; the idea is to neutralize the impact of Inflation.

Remember that  $\text{Real Interest Rate} = \text{Nominal Interest Rate} + \text{Expected Inflation}$ .

In this sense, TIPS is a direct measure of Real Interest Rate.

Real Interest Rates are barometer of true conditions prevailing in the credit markets.

## What determines equilibrium Interest Rates?

It is interaction point of demand for and supply of Bonds. This important phenomenon comes under the umbrella of Loanable Funds Theory.

Factors determining the demand of loanable funds are: expected returns, expected inflation, liquidity, relative riskiness of bonds and quantity of wealth in the economy.

Expected Interest Rates (Inflation) would dampen the demand of loanable funds.

## Expected Inflation, Interests & Demand for Bonds

Degree of relationship between higher expected Inflation and higher expected Interest Rates.

Remember that Bond prices and Interest Rates move in inverse direction. Higher expected Interest would imply lower demand for Bonds.

Supply of Bonds is increased when there is greater expected profitability of investments. Increase in Government deficits would increase supply of Bonds as well.



## Fisher Effect

Put simply: when expected Inflation rises (people think that price level of economy will increase), the interest rates will tend to rise. Economists call this “Fisher Effect”.

The Business Cycle (Path which an economy typically covers in short to medium time frame) explanation of Fisher Effect is as follows:

Expansion of Economy — Demand for more goods — Increased Incomes  
Higher Prices (Inflation) — Profits and more expansion — Demand for more  
Loan — Higher Interest Rates.

## What is Deflation?

Deflation is negative inflation (declining price level).

Expected returns on assets would fall.

Expected returns on Bonds would rise.

Nominal rates kept at lower rate. Therefore the Bond prices tend to increase.

Real Rate = Nominal Rate - Expected Inflation.

If Expected Inflation is negative (Deflation) cutting down Nominal Rates will not decrease Real Rates because Deflation will increase the Real Rate in the economy (negative sign in the above equation becomes positive).

Real Rates (which matter) will be positive whereas nominal rates will stay lower and depressed. Lower nominal rates will not jump-start the economy because the Real Rates are higher. Japan has faced this economic enigma for two decades.

## What is a Yield Curve?

Bonds are of different maturities. Same Maturity Bonds can have different interest rates. Why? Because of four varying factors across Bonds: Liquidity, Rating, Risks (default) and Tax considerations.

Conversely, Bonds can have the same Risk, Liquidity and Tax considerations but different terms to maturity.

Yield Curve is plot of yields for Bonds with the same characteristics (Risk, Liquidity and Taxes) but different terms to maturity. Typically it slopes upwards.

## Yield Curve and Predictions about Health of Economy

The shape of Yield Curve speaks of the health of economy. Economists interpret future behaviour of Interest Rates to make this prediction.

An upward sloping Yield Curve implies expectations of higher interest rates in future. Therefore it signals of more inflation and economic activity in future.

Conversely, an inverted Yield Curve implies lower expectations about health of economy and depressed interest rates in future.

## The Foreign Exchange Market

Foreign Exchange rates between different currencies of the world are determined in the Foreign Exchange Market.

There are two types of Foreign Exchange Rates:

- Spot Rate is the exchange rate for spot transactions.
- Forward Rate involves transactions at specific future dates.

## Currency Appreciation-Depreciation

Domestic currency is always analyzed in comparison to some foreign currency. For example, what is the value of Canadian dollar in terms of US dollar?

When the domestic currency CAD appreciates in comparison to USD, American goods become relatively cheaper and Canadian goods become more expensive in the US Markets.

When the domestic currency CAD depreciates, Canadian goods (and exports) become cheaper and American goods (and imports) become relatively expensive in the Canadian Markets.

Equilibrium in the Foreign Exchange Market occurs at the interaction of the respective expected returns between two specific currencies.

## Behaviour of Exchange Rates

Behaviour of Exchange Rates is typically judged under Short term and Long term.

It is no surprise that behaviour of Exchange Rates differ quite a bit under different market assumptions and time frame.

Most theories assume low transactions costs and low barrier to trades, which does not hold true in the real world.

Above gives ample opportunity for Arbitrage – an act of buying low and selling high across Foreign Exchange Markets. Arbitraders grab spreads and finally wipe out such differences.

## Exchange Rates in the Long-Run

Microeconomics (deals with individual issues or commodities) of long-run exchange rates entail Law of One Price; assuming low transaction costs and barriers, identical goods must cost same regardless of where they are produced.

**Macroeconomics** (deals with economy as a whole) of long-run exchange rates entail Purchasing Power Parity; exchange rates between two countries (at least in the long run) adjust to reflect changes in the price levels between two countries. The key assumption is that there are minimum transaction costs.

For example, if US increases has price level increase compared to Japan, then in the long-run the US Dollar should depreciate and the Japanese Yen should appreciate.

## Long-Run Factors of Exchange Rates

Here is Summary of factors which affect long-run Exchange Factors:

- Productive Efficiency of Economy; more efficient economy = rates appreciation.
- Preferences for Exports versus Imports. It depends what is happening at point of time.
- Existence of Tariffs = rates appreciation.
- Relative price levels between commodities as well as countries.

## Behaviour of Exchange Rates – Short Run

Exchange Rates are more volatile in short-run.

Key drivers of Volatility: Market speculation and unexpected capital mobility.

Interest Parity Conditions: It holds in short run. For example, a domestic rate of 10% versus foreign interest rate of 5% would mean that the domestic currency must depreciate by 5% and foreign currency appreciate by 5%.

Foreign Exchange markets are also expectational in nature. These are driven by expected Inflation and expected Interest Rate Movements as explained in next slide.

## Interest Rates impact Foreign Exchange Rates

Interest Rates prevailing in the economy have degree of impact on Exchange Rates.

It is important to distinguish between Real Interest Rates and Nominal Interest Rates using Fisher Equation:

- $\text{Nominal Interest Rate} = \text{Real Interest Rate} + \text{Expected Inflation}.$

When domestic Interest Rates rise, domestic currency would typically appreciate.

When domestic rates rise due to an increase in the expected Inflation (or increase in money supply), the domestic currency would rather depreciate.

Conversely, when domestic rates rise due to increase in the Real Rates, it should appreciate.

## Part Two: How Financial Crisis Happen?

### What are Bubbles?

Bubbles are created when there is a persistent artificial activity going on which does not match the true value of that activity.

For example, Carry-Forward Trade is one activity which can create bubbles. People would typically get loans in low interest environment of North America and invest in properties in Asia; resulting in stoking prices of those assets in Asia. When Carrying-Forward Trade is halted, prices come down to original valuations.

### Speculators and Bubbles

Speculators who have lots of money create temporary bubbles in the stocks and commodity markets; ride the trend; and then get off when the trend is coming to an end.

This speculation led to many international crisis in the 1990s including the Asian Flu until the time the government imposed Capital Controls to dissuade international speculators entering their borders for short speculative purposes.

The Speculators' market runs in trillions of dollars of daily trade using Derivatives.

## Speculators and Shorting

Speculators can deploy number of strategies to profit from Bubbles.

It is hard to predict an upward trend unless speculators pump in lots of money.

Other way speculators can make money is by shorting securities.

Shorting is the process of selling security at higher prices; when the prices collapse; speculators pick it back at cheaper rates. The spread is the arbitrage opportunities.

Speculators like John Paulson and George Soros made billions of dollars through this speculation.

Wall Street II (Money never Sleeps) exhibits Gordon Gekko both as an insider and a speculator.

## Speculators and Derivatives

Derivatives act like steroids for the speculators.

Gordon Gekko in Wall Street II calls it Steriod Banking; when speculators pick up a security; leverage it 500-1000 times; and gambles it in international capital markets.

In the USA alone, Derivatives is a 50 trillion dollars unregulated industry. Different governments tried to regulate this huge industry but lobbyists never let it happen.

Changes in technology have let to mushroom growth of thousands of esoteric products woven around Derivatives. The Financial Crisis of 2008 was direct result of these esoteric products; not falling under regulatory regime of Government.

## Financial Intermediaries

Financial Intermediaries (like Banks) have emerged as the back-bone of the Financial Sector because of the following factors:

- Transaction costs, which are major barrier for smaller investors, are circumvented with huge volume and bulk purchases.
- Technology, innovation and deployment of skilled force leads to large economies of scales.
- Due to their huge size, Financial Intermediaries can control key Proprietary information and thus exercise some key arbitrage opportunities.
- When Financial Intermediaries become speculators under Moral Hazard problem (explained in next slides) we have Financial Crisis.

## Asymmetric Information

Two parties are involved in a transaction but one party has more knowledge than the other party at a certain point of time. Example, management of a corporation has better information than stockholders about the affairs of the Public Corporation. The problem of asymmetric information leads to two key problems in the Investment Industry: Moral Hazard and Adverse Selection.

## Adverse Selection (Market for Lemons)

John is owner of a used car which under-went an accident last year. John is not going to disclose this piece of information. His car is a “Lemon” and if John succeeds in selling his car at the prevailing rate he would get an ideal deal.

Peter is owner of a used car with perfect condition. Market does not trust Peter and offers a highly under-valued offer to him. Peter decides not to sell his car (Peach).

Over time, we will have many lemons and few peaches in the Market. This problem is due to Adverse Selection creating Market for lemons.

## Market for Lemons in Securities Market

Keeping example of Lemons Market in the Auto Market, we can anticipate similar situation in the Securities Market.

People may not have the right information to pick up under-valued securities (Warren Buffett has devised a system to pick such securities over a long period of time). Peaches will start to vanish from the Capital Markets.

People will randomly start picking Lemons or over-valued securities (because of biased analysis offered by Sales-side Analysts).

Over period of time, Lemon Stocks will start to dominate the Securities Industry while peaches will either vanish or bought by Warren Buffets.

## Role of Insiders in Lemons Market

Insiders operate in the Lemons Market by picking up Peaches and selling Lemons at over-valued rates.

These insiders are powerful groups comprising of Speculators, Sales side Analysts and sometimes management of companies.



Theoretically insiders are regulated on the Stocks of Public Companies.

Practically insiders operate through number of other channels like Alternative Investments and Derivatives to make huge profits.

Leveraging further compounds this problem and the 2008 Financial Crisis was Lemons problem put under Steriod Banking (or immense leveraging).

## Financial Intermediation and Lemons

Expert auto-dealers mitigate lemons problem by detecting trouble points and providing right advice to Clients. Financial Intermediaries play same role in the Investment Industry.

Banks because of their massive bandwidth reap economies of scale in their operations. Banks also have access to key information which could help to mitigate lemons problem.

It is their sheer scale and access to key information that banks make profit by making more money on lending operations than borrowing from clients.

## Principal-Agent Problem

Stock-holders own most of the Firms' Equity and are called Principals. They do not have the time and expertise to manage Company and thus appoint their Agents or Management.

Management Groups who own a small portion of Equity are called Agents and mandated to act in the best interest of Stock-holders. While laws bind Management to accomplish this but major portion of such responsibility falls in the domain of Morality and Ethics.

Agents work on behalf of the Principals to run and manage their firms.

Agents have better information than Principals about the affairs of the Company and can manipulate some of this information in their own interests. This problem is called as Principal-Agent Problem.

## Principal-Agent Problem in 2008 Crisis

Principals in this case were the owners of Sub-prime (lemon) Mortgages.

Agents were Banks and Financial Intermediaries who driven by greed took Mortgage Money, leveraged it multiple times (little limits if any) using Derivatives and shorted esoteric products across global financial markets.

It is possible to leverage mortgages in Chicago, create an esoteric product like CMO or CDO, leverage it and sell it Bankers in Frankfurt.

## Moral Hazard Problem

Put simply: Laws cannot control everything. Ethics and Moral Principles drive major bulk of outcomes in the Investment-Finance World. The problem becomes pronounced due to asymmetric information, existence of lemons and most important of all how to detect lemons and fix responsibility on such lemons?

The economic crisis of 2008 is a classic example of Moral Hazard problem, when responsibility could not be fixed on single actor who took advantage of derivatives for Steriod Profits.

## Conventional Tools to Curb Moral Hazard

- Private production and sale of Proprietary Information.
- Credit Rating Agencies.
- Government Regulations.
- Collateral and Strict Covenants.
- Defined rules of game for International Capital Flows across borders.
- Leveraging rules and other restrictions.
- Firewalls between different Bank functions.
- Compliance and reporting.

## Why Conventional Tools did not work in 2008?

Insiders shared private information to their own benefits, in particular in the Alternatives world.

Credit Rating agencies compounded crisis by downgrading en-bloc some good opportunities. This accentuated economic contraction. They did not do a good job before the event.

Collateral in most cases were spurious mortgages not properly valued or scrutinized. BASEL Rules for International Risk Management were not applied. Derivatives markets remains unregulated to this date with no explicit rules of game on leveraging.

Firewalls not existing between sales and investment banking side. No compliance reporting enforced.

## Financial Crisis and Moral Hazard

Financial Crisis 2008 was caused by Moral Hazard and Adverse Selection (Lemons).

What is a Financial Crisis?

It is a major shock to the Financial and Non-Financial System leading to panic, loss of asset values, sharp downward swings in capital markets, contraction of economy, job losses and free fall of currency.

Moral Hazard (when nobody owns specific responsibility and the underlying immoral act is not covered by law) has been the major cause of financial crisis in the past many decades.

## Interest Rates and Financial Crisis (I)

Recall 101 lessons: Interest Rates increase when governments run deficits or when Sub-prime (lemon) borrowers are getting loans and there is peak loaning activity going on in the economy.

If Financial Intermediaries cannot screen lemons and become part of greed culture to use money contributed by lemons to make big bucks, then there is complete breakdown of ethical practices, leading to Financial Crisis.

As the housing bubble burst, there were huge losses on balance sheets of banks which could derail the whole global economy. Government was left with no option but to inject massive bail outs.

## Interest Rates and Financial Crisis (II)

Worst of all the insurance companies which had executed Credit Default Swaps (CDS) to insure spurious mortgages defaulted as they could not cope with huge unexpected volume of defaults.

Government had to inject huge capital to keep interest rates from rising.

US Government is the ultimate printing machine for dollars. It can print trillions of dollars from thin air. So there was no danger of any abrupt currency devaluation of USD unlike the Asian Flu of 1997. But ultimately this massive injection of capital in the economy may lead to future hyper-inflation. The next slide explains how this could happen?

## Interest Rates and Financial Crisis (III)

The Fed and US Government injected about Trillion dollars or more in the US Economy since 2008 to save the system from derailing.

Where has that money gone? It is for sure that major portion of it did not trickle down to consumers or any productive outcomes.

This leads to classic Conundrum: Moral Hazard moves in a virtuous circle. One Moral Hazard problems leads to another one systematically. When interest rates would rise in future, due to this huge transmission of money with no productive outcomes, there could be problem of Hyper-inflation as predicted by some economists.

Remember Economics 101: Higher expectations of inflation lead to higher Yield Curve in future.

## Stock Market Effects of a Financial Crisis

The key barometer of eruption of a Financial Crisis is the Stock Market. It is leading indicator of what is going to happen in the economy.

Sharp declines in Stock Markets, as it happened in 2008 Crisis, portends of an economic downturn and resulting worst state of unemployment.

These downward swings in the Stock Markets exacerbates the Moral Hazard problem.

First Channel for this worsening of economic state is through sudden decline in valuations of the companies listed on the Stock Markets.

Second Channel is unexpected losses on Balance Sheet of these companies due to decline in Collateral Values pledged with lenders.

Third Channel is sharp currency depreciation and heavy hit by the imported raw materials by these companies.

## Financial Intermediaries and Financial Crisis

The state of Banks' Balance Sheets is a very important indicator of viability of economy.

If Banking sector halts and ATMs stop spitting Cash, there will be huge panic and duress on Government Funds to cater consumers.

Fragile Banks' Balance Sheets cannot accommodate any hit from Bad Loans which is an integral part of Financial Crisis.

Worst of all, weakened Balance Sheets can trigger panic and unexpected decline in the economic activity.

## Debt Deflation (I)

Recall Economics 101 lessons on Deflation. Deflation is sharp (and sometimes abrupt unexpected) decline in the price level due to collapse of economic activities and deleveraging.

The mother of all evils are "Moral Hazard" and "Adverse Selection".

Debt Deflation leads to gross under-valuation of Company's Balance Sheets and consequently dilution of the Collateral pledged with Financial Institution triggering margin calls.

## Debt Deflation (II)

In this difficult times, Credit Rating Agencies do not provide any help to the ailing companies and the economy. They accentuate the problem by downgrading Corporate Bonds of these companies across the board.

Defaults act through two Channels: (A)-Contraction of Economic Activity in terms of Unemployment which feeds onto lower Consumer Spending and contracted GDP; (B)-Deterioration of Banking Sector leading to further deleveraging in the economy.

## Interest Deflation

Japan faced Deflation for over two decades and is a classical example of how Financial Crisis could perpetuate for a long time if Prices freeze. Luckily this did not happen in 2008 crisis (for reasons to be discussed separately).

Recall Fisher Equation:  $\text{Real Interest Rate} = \text{Nominal Interest Rate} - \text{Expected Inflation}$ .

Bank of Japan kept shaving Interest Rates but the Real Interest Rates kept on increasing, thereby leading to deleveraging in the economy.

For example, if you put 0% (rates cannot go below zero) for Nominal Rates and -7 for Inflation (Deflation), you will get Real Interest Rate of +7 in above Equation.

This incapacity of Bank of Japan (BOJ) not to cut interest rates coupled with massive deleveraging by Japanese companies led to Japanese deflationary recession for over two decades.

## Asian Flu of 1997: Currency Depreciation (I)

Financial Crisis in case of Asian Economies led to massive Currency Depreciation in 1997. This crisis is often tainted as Asian Flu.

This massive Currency Depreciation did not happen in case of 2008 crisis. Why? This is because the USD has vast underlying power of the World's Foreign Currency (backed by many intangibles).

The Asian Flu of 1997 was a classic example of Moral Hazard which led to unprecedented currency depreciation under IMF's recipe of Structural Adjustments. The result was skyrocketing Inflation and massive break-down of Economic Activity and seizure of the Banking Sector.

## Asian Flu of 1997: Currency Depreciation (II)

Here is Summary of what happened?

- Free flow of Capital to the Asian Economies for the great Economic Miracle (mostly Speculative).
- Speculators pulled capital and shorted stocks.
- Asian economies lost valuations due to sharp decline of Capital Markets.
- Financial Sector collapsed due to Bad Loans.
- Assets lost values massively.
- Governments ran huge deficits due to sudden shrinkage of the tax base.
- IMF came for the Bail-out package.

## Asian Flu of 1997: Currency Depreciation (III)

Here is Summary of what happened?



- The first painful adjustment under aegis of IMF was sharp depreciation of domestic currencies.
- This further deteriorated Balance Sheets of companies (and wiped out their collaterals) who had leveraged on dollar-denominated loans.
- The default of companies with foreign loans snow-balled onto collapse of the Banking sector.
- Sharp currency depreciation led to skyrocketing inflation and unemployment.
- Overall it was very painful adjustment. Governments of Asian economies enforced stringent Capital Controls on the Inflows of Capital in the economy in the aftermath of crisis, in order to avoid any future disruptions.

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