

**Economics of Banking and Finance Markets**  
**Prof. Sukumar Vellakkal**  
**Department of Economic Sciences**  
**Indian Institute of Technology, Kanpur**

**Lecture - 29**  
**Rationale for regulation - I**

(Refer Slide Time: 00:23)

***Value at Risk (VaR)***

*Value at Risk is the worst possible loss over a specific time horizon, at a given probability.*

**VaR is a measure of risk that we will find very useful in discussing the management and regulation of financial institutions.**

By restricting the sorts of financial instruments banks can hold, bank managers and financial regulators try to limit the chances of a financial collapse.

Such a collapse is an example of infrequent but potentially catastrophic events sometimes called *tail risks* or *black swans* (like the enormous 2001 earthquake in Gujarat).

To address the dangers associated with financial tail risks, banks and regulators employ the concept of value at risk.

Hi everyone, welcome back. In the previous session we had discussed various measures of risk. And between the measures of standard deviation and value at risk, we have discussed that why value at risk is the most preferred risk measure for the regulators. Because regulators would like to ensure the sound, economics, financial, health in the economy, they would like to avoid a collapse of, that means, the worst outcome.

So, as a result regulators will be preferring the measure of value at risk. And accordingly, they will be advising the financial intermediaries, financial institutions to avoid the worst possible loss over a specific time horizon. And the accordingly they will be giving the go ahead nod for only those investment decision for the financial firms if there is no worst possible loss.

(Refer Slide Time: 01:21)

**Sources of Risk**

1: **Idiosyncratic (systemic) risk:** Microeconomic and firm level

a) firm specific risk

b) sector specific risk

Example: change in the price of oil...when oil prices rise, auto sales fall, and the automobile industry suffers. But higher oil prices improve the profits of energy firms, such as ExxonMobil, Shell, and Texaco. An oil price change that is bad for Automobile firm and is good for the oil companies. Looking at the economy, this is an idiosyncratic risk.

2: **Systematic risk:** Macroeconomic level

The risk that everyone will do poorly at the same time

Examples: Macroeconomic factors, such as swings in consumer and business confidence brought on by global economic conditions or changes in the political climate, are the source of systematic risks that affect all firms and individuals in the entire economy.

Handwritten notes: Microsoft, P ↓, Covid →

So, in this session we will discuss what are the sources of risk, then we also see what the strategies are to minimize the risk. So, coming to the sources of risk, as you are aware that particularly for investment decision when it comes to debt investment in bond, you know that interest risk is there; similarly for a stock, there is stock price fluctuation.

So, there are different sources of risk, and for the discussion to put everything together, there are mainly two sources of risk, one is called idiosyncratic risk, and other one is a systematic risk.

So, coming to the first one idiosyncratic risk means, it mostly a microeconomic and firm level risk. So, for example, again this can be classified it into two, firm specific risk and sector specific risk. So, firm specific risk means, for example, take a particular firm for example, maybe you can look Microsoft for example, so, what is the firm specific risk this firm is facing?

So, maybe its own managerial and technical issues, technical problems that the firm is facing, maybe the managerial issues etc. Maybe some issues with the firm are facing with its raw material supply, you are maybe it is a labor market issues or something else more specific to this firm itself.

So, that is that are the firm specific risk that is mostly with that respective firm, and little bit elaborating this one we can relate in to sector specific risk. For example, change in the price

of oil; so, what would happen if there were an increase in the price of oil. And you know that when the oil price increases, know that auto sales fall and the automobile industry suffer. So, that is, a supply side shock in the form of increase in the price of oil would affect the automobile security price to decline.

So, that sector will be adversely getting affected because of increase in the price of oil; so, this is called a sector specific risk. this is also called as a systemic risk as well. However, we know that this kind of risk also affect in one sector badly, but the other sector, for example, when the higher oil prices improve the profits of energy firms including Shell and Texaco right.

So, that means, an oil price change that is bad for automobile firm and is good for the oil company. So, looking at the economy, from an economic perspective we can see that this is an idiosyncratic risk; so, that is as affecting some sectors of the economy.

Another risk is called a systematic risk, this is at the macroeconomic level at the aggregate level; that means, the entire economy. These are the risk that everyone will do poorly at the same time. So, the examples for this kind of risk includes macroeconomic factors such as swings in consumer and business confidence brought on by global economic conditions, or changes in political climate that affect all firms and individuals in the economy.

One example is the Covid, in fact, a systematic risk and you know that initially the Covid affected both supply side and demand side of the economy, and it became the problem the global recession, it aggravated and there was negative economic growth in most economies across the globe.

(Refer Slide Time: 05:30)

**Reducing Risk through Diversification** ✓

The principle of holding more than one risk at a time. A combination of risky investments is often less risky than any one individual investment.

E.g., Regulators encourage pensions funds to diversify to reduce the investment risk

**Two ways to diversify:**

**1: Hedging Risk:** the strategy of reducing idiosyncratic risk by making two investments with opposing risks. Example: buying \$100 stocks from both firms with opposing risk

	Payoff from owning only		
Possibility	Automobile firm	Oil company	Probability
Rise in Oil Price →	\$90	\$120	0.5
Fall in Oil Price →	\$120	\$90	0.5

**2: Spreading Risk**

Handwritten notes and arrows: "bond", "Equity", "govt", "corporate", "Soft ware", "Banking", "Junk", "High return", "Share", "Fundamental", "Risk", "Equity", "Bond".

Now, let us see what the measures are to reduce the risk. So, overall, it has been advised that a one of the major approaches of reducing risk is through diversification; that means, the principle of holding more than one risk at a time. That means, a combination of risky investment is often less risky than any one individual investment. And this part is very important that the reducing risk through diversification, especially policy makers especially regulators and government they often encourage, pension funds to diversify to reduce the investment risk.

You know that for example, the pension fund where the employees contribute to the pension fund during their working years. And they expect a lump sum amount at the time of retirement and, they expect a stream of pension income after their retirement. So, in that way you know that there is a kind of safety, say, stability or security. Pension funds earn their income in investing in bond market, and equity market etcetera.

So what regulators would say that within bond itself they will be advising the pension funds to make investment in a way that invest in high quality bond stream because you know higher the quality of the bond they will be getting low interest rate.

And if they invest in junk, you know that they will be getting a high interest rate, but there is the default risk is very high. An equity you know that is very fluctuating market; however, as

compared to bond market over time if you look at the equity market you can see that return from equity market is a slightly higher than the bond market.

To avoid the risk the investment risk, the pension funds, diversify their investment, they want to invest their fund in equity and in bond. Or even within bond, they will be making diversification, within equity they will be making diversification. So, this is one strategy: reducing risk through diversification.

There are two ways to diversify the risk; one is called hedging risk; so, hedging risk is the strategy of reducing idiosyncratic risk by making two investments with opposing risk. So, let us elaborate this concept by using an example, suppose you are buying 100 stocks from both firms with opposing risk.

So, opposing risk, that for example, we have seen that when there is an increase in oil, increase in the prices of oil you can see that some sectors benefit. For example, the energy producing firm, energy companies they benefit with stock price increase when there is increase in oil price. At the same time, you know that automobiles their price their stock price will decline because of increase in oil price, because the cost of production increase.

And not only that cost of production increase, even the people would not be buying automobiles, the demand for automobile will decline when there is an increase in a petrol price and as a result their sale will decline, and the stock price will also decline. So, look at these two examples, two opposing firms, both firms with opposing risk. Let us take oil company. For example, assuming that investment is made only two firms with opposing risk and the probability of rising oil is a 50 percent and the probability of falling price we take the value of 50 percent; 0.5 and 0.5.

What would happen if there is a rise in oil price, you know that oil producing companies, their income will increase, dividend will increase, their share price will increase. So, someone investing 100 dollars, because of increase in the price of oil you can see that the price of stock is going to become 120. What if the other way around? Suppose there is fall in price; so, what would happen to the stock of the oil company; you can see that this will be coming down to 90 dollars, right; so, that is, they are going to make a loss of this much.

And what if there is a rise in oil price, what would happen to the automobile firm? We know that automobile firm, their sales will decline, and their stock price will decline. So, that

means, they will make a loss of the investment 100, after that oil price rise, it will become only 90. And at the same time, suppose there is falling oil price then you can see that the stock price will be increasing.

So, what you can see, suppose either of these things will happen, either rise in oil price or rise in oil price or fall in oil price. If rise in oil price happen you know that if a stock you had invested 100 dollars in oil company and 100 in automobile firm you know that from oil company you will be benefiting, but here you will be losing. Similarly, if fall in price you can see that you will be benefiting from automobile firm stock, that here you will be benefiting, but here you will be making slight loss.

But overall, you know that because of this if suppose rise in oil price happen, the loss from automobile company stock investment will be compensated by the gain in stock from oil company; similarly, you can see if the fall in price also.

So, overall, what we have seen here is that the loss from one investment is being compensated from the gain from another investment; so, this is called a kind of a strategy called hedging a risk.

Then another risk is called spreading, risk spreading does not mean making investment in opposing firm's firms with opposing risk. Instead, making investment really making true diversification of making for example, make investment in bond market, equity market within bond market investing, for example, government bonds and private firms.

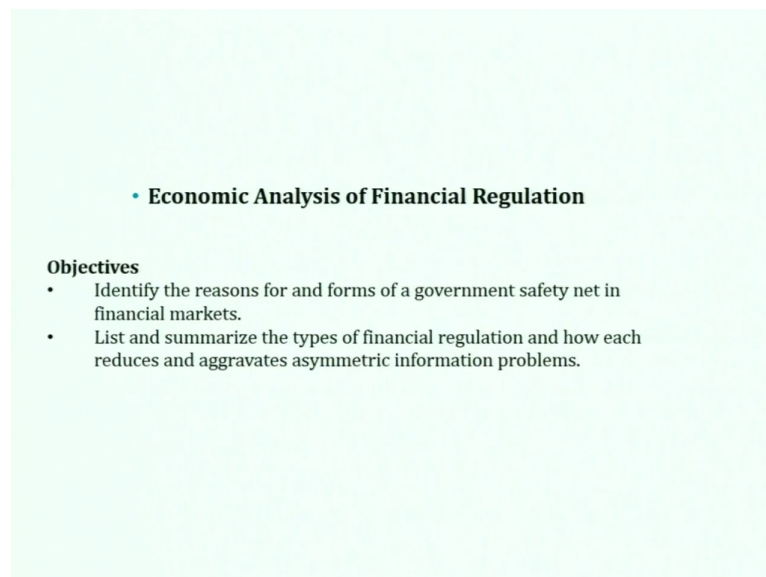
Suppose if you are investing corporate firm if you are investing make two unrelated firm. For example, you know that automobile and firm instead of opposing risk oil firm, let us consider software industry, software industry, then banking industry. Those are seemingly unrelated sectors like that; that means, government corporate; that means, even within corporate making different types of different sectors, which are not having opposing risk.

Similarly, government bonds also, you take central government, state government here long term, short term like that long term. So, in this way similarly equity also you make investment in firms that are seemingly unrelated firms. Through that we can spread the risk, and we can reduce spread the risk in this way through a proper diversification.

We have so far discussed the concept of risk measurement, then we discussed why value at risk is an important concept in the financial sector, especially in the context of regulation. And subsequently we had discussed the sources of risk that is idiosyncratic or systematic and other one is systematic risk.

Then subsequently we discussed the methods for reducing risk through diversification where hedging and spreading the two strategies of reducing for the diversification. Let us move to another related area as a continuation of our discussion of economic analysis of financial regulation.

(Refer Slide Time: 14:55)



• **Economic Analysis of Financial Regulation**

**Objectives**

- Identify the reasons for and forms of a government safety net in financial markets.
- List and summarize the types of financial regulation and how each reduces and aggravates asymmetric information problems.

We will be seeing that what are the rationale behind economic financial regulation. So, we have seen in one of the previous sessions that financial sector is the one of the heavily regulated sectors in economy, a fact throughout the across the globe you can see that financial sector is the most heavily regulator sector. Here we identify the reason it.

And subsequently we see that how government safety net itself has been contributing to making the financial crisis or the collapse of the financial system or affecting the health of the financial system. What we are going to see that one way we are going to see that a government safety net is important in financial market, because ensuring a sound financial system is very much necessary for ensuring a sound economic system as well.





Let us see now asymmetric information is necessitating the government intervention. And then we are going to see that how such a government intervention also aggravates the problem. Instead of reducing this problem and some of the government interventions aggravates the problem.

So, let us start with the case of bank, we have seen that bank is an important a key financial intermediary in the overall financial system. So, coming to the asymmetric information in the banking system, we can see that banks as financial intermediaries are having a better information. They have because of their managerial and technical expertise, and since because they have lots of customers with them who is doing financial transactions.

And because of that we have already seen that banks are having comparative advantage in the financial market in the form of collection of private information. And we have also seen that banks are good in that because they do not need to worry about free rider problem.

Free rider problem is not in the banking system, because you know that banks when they collect information, when they produce information, they are not sharing this information with anyone. They are, instead, benefiting out of their private information collection, because they make private loans, that is, what we have seen in one of the previous sessions; they make private loans.

Banks make loans, loans mean, these are the assets of the banks; so, we have seen that these are the assets. So, banks normally operate that they borrow short, that is borrow short from here that is borrow short and lends long-term, that is what the asset transformation, normally bank get engaged in.

You know that banks by collecting deposit from multiple investors, various investors various depositors, then you know that they will be lending this money to the loan market right. So, here depositors, each depositor, they do not know the quality of these assets. The quality of these assets is not measurable, there is asymmetric information about the quality of the loans, the quality of the assets the banks have acquired.

That means, they cannot distinguish, suppose the money I have invested in my bank I do not know whether the quality of the asset that they have acquired using this money, whether good quality or low quality, I have no idea about it. Suppose we take bank 1; then take another bank 2, they also working on the same way that accept deposits and lend loans; however,

again for the public, they do not know the quality of the assets of bank 1 and the quality of the assets of bank 2 and then they that we cannot say that which bank is good and which bank is bad. Suppose those banks which acquire very low-quality assets that the loans with a high default risk then; obviously, we can see that the probability of defaulting is high, then the bank's probability of not to refund the deposit will be very high.

The important thing that we need to remember here that about the depositors, they are having asymmetric information about the quality of the assets each bank is holding plus they cannot distinguish which bank is good bank and which bank is bad bank. So, then suppose a news spread out, a rumor is spreading out that one bank is unable to pay back the depositors' money.

And suppose that the news spread that there are many banks at risk, who may be at high risk, and many banks are having nonperforming assets. And if all depositors go to their bank, they would not be able to refund their deposit. So, in this case suppose we are getting this news that approximately 5 percentage of the banks are bad banks in the economy.

But depositors cannot clearly identify which bank belongs to these 5 percentages; whether the bank where I had deposited my money belongs to these 5 percentages or any other banks.

In this case what is going to happen that a kind of bank panics develop, bank panics develop here means that as banks operate on a sequential service constraint; that means, sequential service constraint means, a first come first served basis. So, in this way, depositors have a very strong incentive to be the first to show up at the bank you know. That means, the incentive to run to the bank for withdrawals, to be first is, when there is fear about the health of the bank, it is described as a bank run.

That means if this rumor is spreading out that some banks are unable to pay back the depositors' money. In that way what will happen that if the bank panics spread, the depositors will be running to the bank to do withdraw their deposit as early as possible at the earliest. So, this is leading to bank run, you know what happen if the bank run continues like that.

So, you know that if everyone is doing like that because already in each bank. We see that deposit is the most liquid item, deposit is most liquid, we can withdraw deposit at any time. But loans are illiquid, not liquid as deposits, because you know that these are the illiquid

because loan agreements were made for 1 year, 5 years, 10 years, 20 years, 30 years such like that.

Then you know that this money whichever is collected from the public has already been given as loans. It is very difficult to call back the loan amount because it is not that easy; we can see that these are illiquid. So, because of this fear you know that people all will be approaching the bank, that is, running to the bank occur.

So, there would not be enough money at the bank, and there will be some reserve with the central bank and there will be some loans will be coming back. Because start initially the problem will be with the bad banks, but from the depositor's perspective they do not know clearly how to distinguish the good bank and bad banks. The moment they come to know that some banks are not giving back their deposit, the people will start running to the good bank as well. So, when they are running to the good bank you know that this bank already given loan for very long term, though all their asset qualities are fine the low default risk.

Suppose they have given all their loans to lower risk customers and there is very guaranteed that they will be paying back. But the thing is that if all the customers a bank run, if all depositors approach the bank for withdrawing their deposit, then a good also would not be able to repay the deposit. So, then the good bank is going to become a bad bank right, because they would not be able to pay back the deposit.

That means, failure of one bank can hasten the failure of others, this is called contagion effect. This contagion effect is more prevalent, stronger, in the banking system because of idiosyncratic risks or systemic risk. They fail and that is going to affect not only the bad bank but the other banks who have been doing well. And they may not be able to pay back all the deposit if everyone run to the bank.

If nothing is done to restore public confidence, a bank panic can ensue and what we can see that at the end the entire banking system is going to collapse. The entire banking system is going to collapse because of this contagion effects.

If there is bank run, banks will be making a distress selling of their assets, may be the loans that they are having all the loans, they will be making resale of their loans. Because they need to pay back to the depositors.

Then, you know that, if they are making a distress sell, they will be making lots of loss. There will be excess supply of assets in the market, especially during financial crisis time, this kind of distress sale happen, but you know that there is excess sale of assets then the price will come down, then, banks will be incurring a huge loss.

One of the things we have discussed that the asymmetric problem is prevalent in the banking system. more specifically with the depositors, at between depositors and the bank, it can also aggravate asymmetric problem and lead to the market failure, that the collapse of the banking system can happen.

Let us conclude this session now, and in the next session we will discuss what is the response of government to overcome this bank panics, to avoid the adverse effects of these bank panics, what are the solutions proposed by implemented by governments across the globe etc.

Thank you, see you in the next session.

**Keywords:** idiosyncratic risk, systematic risk, hedging, investment diversification, bank panic, bank run, bank failure, asymmetric information, quality of bank assets, illiquid bank loans