Quantitative Finance

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Module – 08

Lecture – 43

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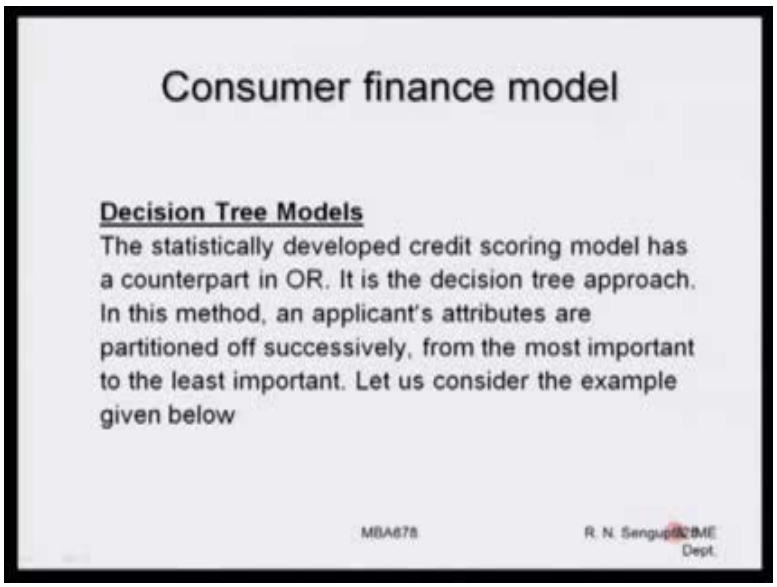

So, continue our discussion for the different type of credit models, we will now study if you what technique very simple concept about the decision tree models. The statistical development of the credit scoring models has a counterpart in OR. It is the decision tree model. In this approach of an applicant's attributes are partitioned off successively different stages, from the most important to the least important. And let us consider to make it a listen little bit clear, let us consider with a very simple example.

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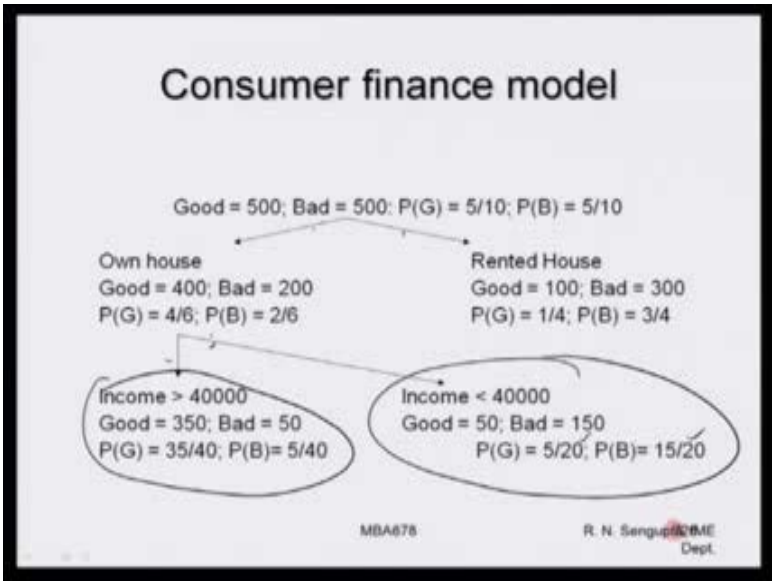

So, consider the consumer finance models are termed as either good and bad, it can be many more also. And consider the if it is good you give us core of the office, for example the probability on the scores are given and if they and the total number is given, and then if you have a own house depending on the good or the bad one, it can be their own house and it can be it is basically a rented house and based on that you go for if it is own house, you have any income analysis to do and you have basically, if income less than 40000 in the income is greater than 40000 basically to analyse accordingly. What is important notice that you use the numbers which are written or in the since sample with draw on and based on the sample what is the probability do you want to, and analyse if you considered this case very simple, this case is states that give is good own house and given that income is greater than 40000. What is the probability which is given is given basically given by 30 by 40 relative frequency, and then the probability of the bad 1 mean 5 by 40.

Similarly we consider the income is less than 40000 again as the corresponding probability 5 by 20 and 15 by 20. Now remember this is only there are 2 arms. So, it could have been extended to more than super example 3 arms and more, if we remember friendly in one of the classes we did not consider the binomial tree model; binomial tree models very, very fond of the concert of a risk neutral price in on. So, on for be considered the prices can increase or decrease trinomial model, the multinomial model I did draw do not in detail the I did mention in the prices increases by probability P 1, P 2,

P 3, P 4 such that some of the probability was 1, and the corresponding increase and decrease of the price of a given and based on that you find out how the over this pricing, this neutral pricing can be done here. Also we are considering very simple by binomial tree or in the case of decision trees were the only 2 arms are there can be extended to more than 2 arms.

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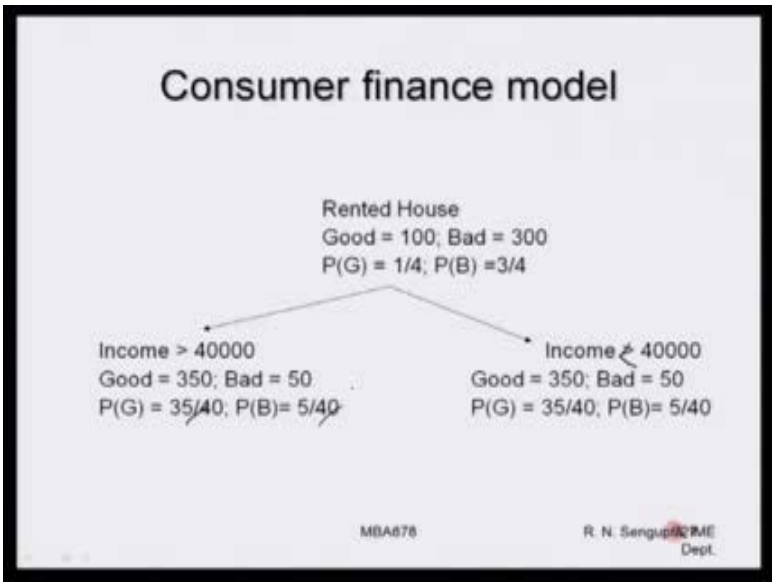

Again continuing the same key as the rental house, it can be income greater than 40000, income less than 40000, it should be income less than 40000, and they are the good and the bad 1 have been for the partition accordingly, word probability a given by 35 by 40, 40 by 5 by 40 for the good and the bad, and in case income less than 40000. The probability is good or bad again you invite 30 by 40 and 5 by 40; these are thought experiment values can change depending on that you can the calculation accordingly.

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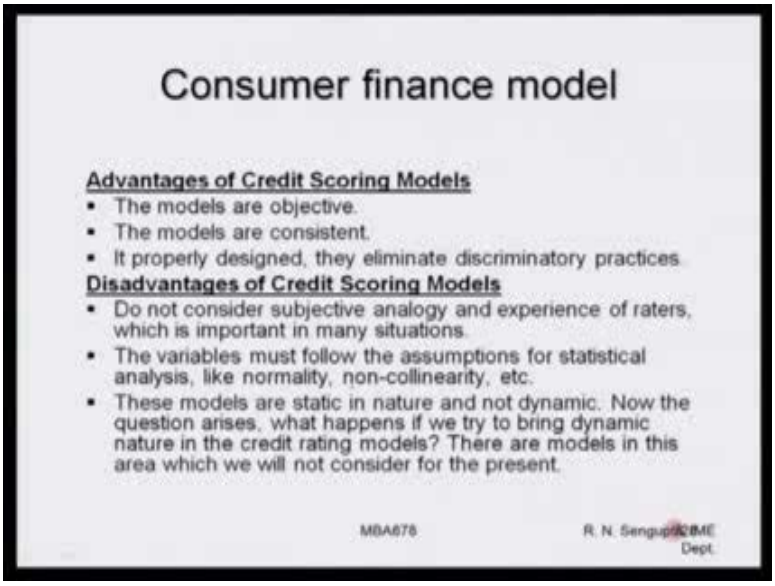

So, advantage of credit scoring models, and models, and objective, the models are consistent and if properly design the eliminate the discovery practices disadvantage of this manager; obviously, are there we chat do not do not consider subjective analogy and experience of ratters; that means, the ratters experience or not being consider here, because of subjectivity which should be a part, and parcel is required for the rating concept are not take into picture. They variables must follow the assumption for statistical analysis line normality non collinear and so on. And support these models are static nature and not dynamics as that they do not consider time factor into consideration; these are models in areas which we will not consider in nature, that is dynamic models would not be considered in this course in details discussion.

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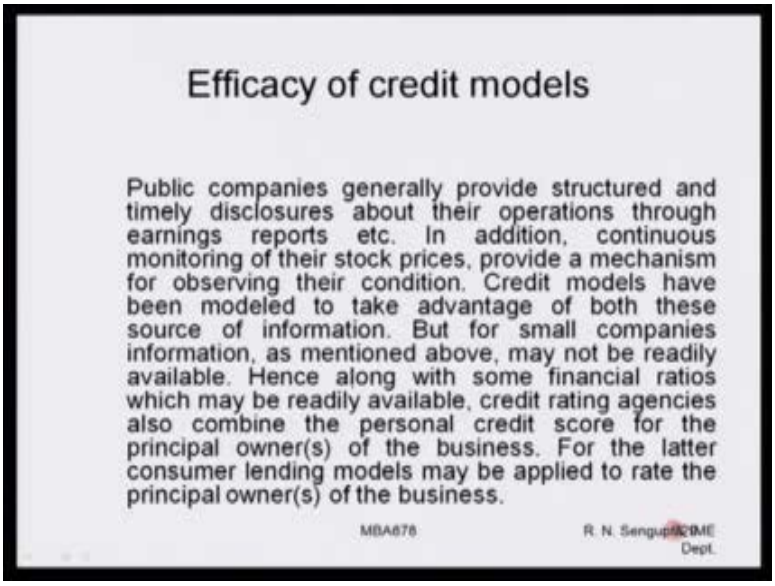

So, now what is the efficacy are the efficiency of the credit models, and how good are bad there are public companies really provides structure, and time discusser about their remote operations to earnings report accepted. In addition control monitoring on the stock prices provide a mechanism for also observed in their conditions trend models have been model to take advantage of these both of these sources information, but for small companies information as mentioned above, may not be readily available. So, here will try to utilise the credit rating agency also come, and the personal growth score for the puppies were known as a small businesses and tried to analyse all this problems; all these models are collectively says that you get a better picture about the consumer all the credit models, we can be used for any individual organization search.

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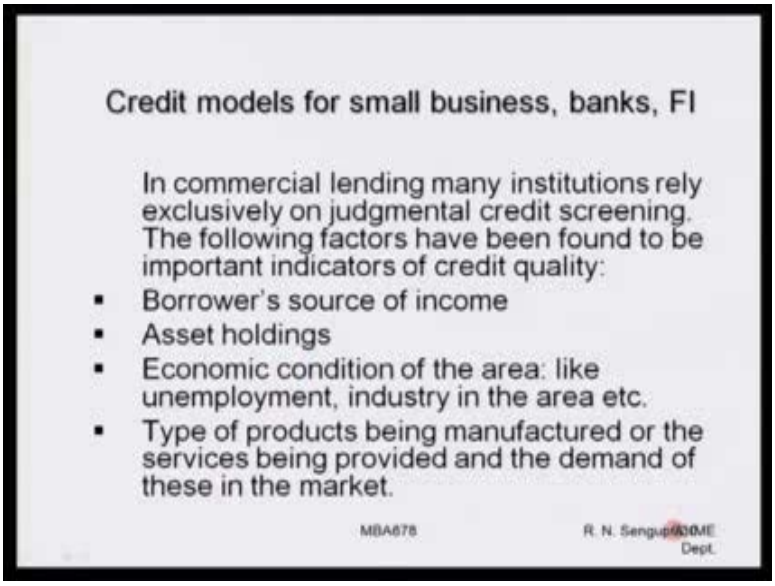

Credit models for small business on banks in commercial lending many institution realise exclusively on the judgement of credit screening. The following factors of been found to be very important with the boarding source of income for our source income asset holding what is the liability, and acid list conditions of the area the types of products which are the manufacturer services, which are being rendered by the actual company whose credit rating on consumer rating is being done.

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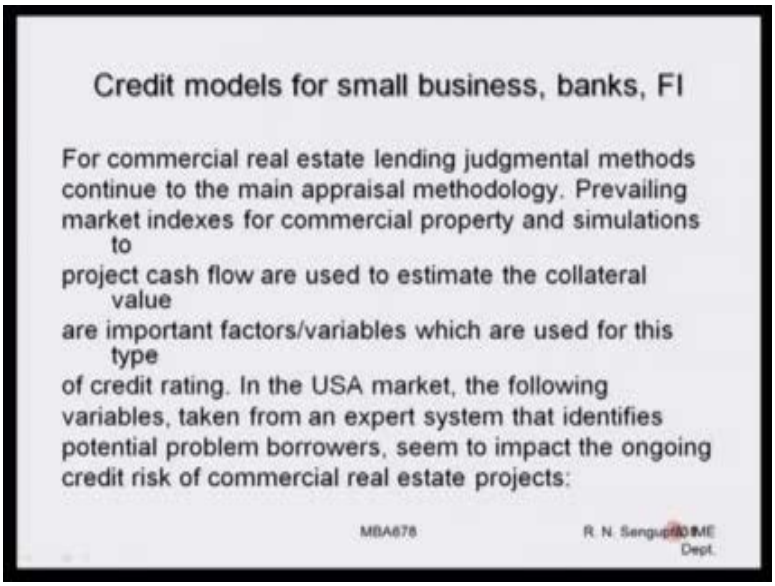

For commercial real estate management methods are also used and in general, when you are trying to estimate the total value, it is some important factors and variables should be considered in the into the analysis with; that means, the time factor should be considered what is the wallet is the market should be considered who are the only people for whom, you are trying to do a trying to analyse, I should be considered is due this actual rather than the market you should also try analyse that how the other different level consumer men models and doing what is the price of petrol, what is the price of diesel, what is the price of the consumer price index. So, now you see that would give you a lot of information in which way overall economy is moving.

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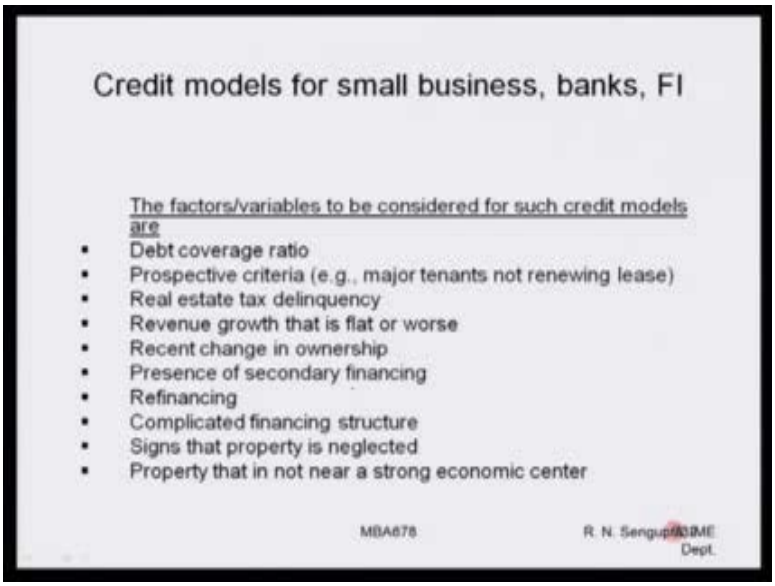

So, the factors are variables to be considered for such credit models - debit coverage a ratio, prospective criteria, real estate's delinquencies, revenue grow that is flat or worse, recent change in ownership, finance worked in the last 1, which is property that is not near as strong as an economic centre; those also have a in a, b P implication maybe and subjective or objective manner.

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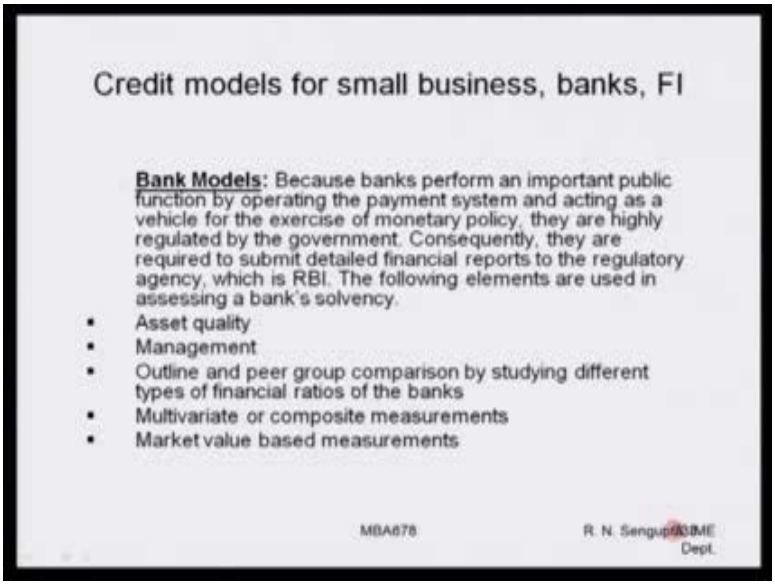

Bank models: Because banks performs an important public function by operating the payment system, and acting as a vehicle excise monetary policy that highly regulated by the government consequently, they are required to submit detailed financial reports to the regularity agency which is RBI, the following elements are to be strictly considering when you consider the bank there, what is the asset quality, what is the management policy, what is the overall depreciation of the assets in the sense trying to close, what is over reliability answering, we are a bad debts that should also be considered.

So, multivariable composite manager should be used, and market value uses that gives you a much, much better realistic sense of how the market is doing fact is that, and the reason is that bank or are you already have the information in the bank, but banks loans almost been dictated by the external forces that what is the interest rate, what is the gold price, what is the diesel price of different type of policies is the government going to show; all this things have a much more baring on the banks over trading, then the individual information they have always with you should be considered in much better perfect.

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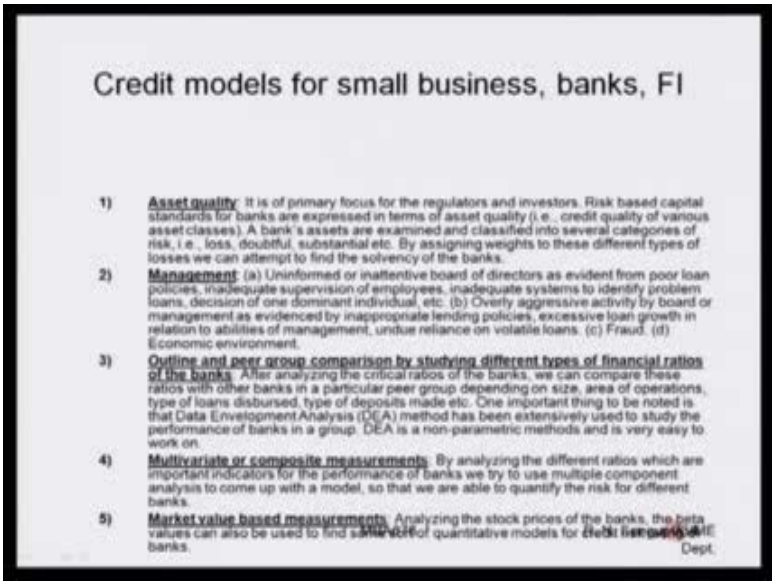

So, when we consider the credit model for small business banks, we should consider asset quality in the management type, whatever management is in place out, what is the outline official comparison, I standing different types of financial issues to be considered, what is a multi variables in measurements which are being used, what is the market value of the ones, which is being used which have just mention a little bit more details.

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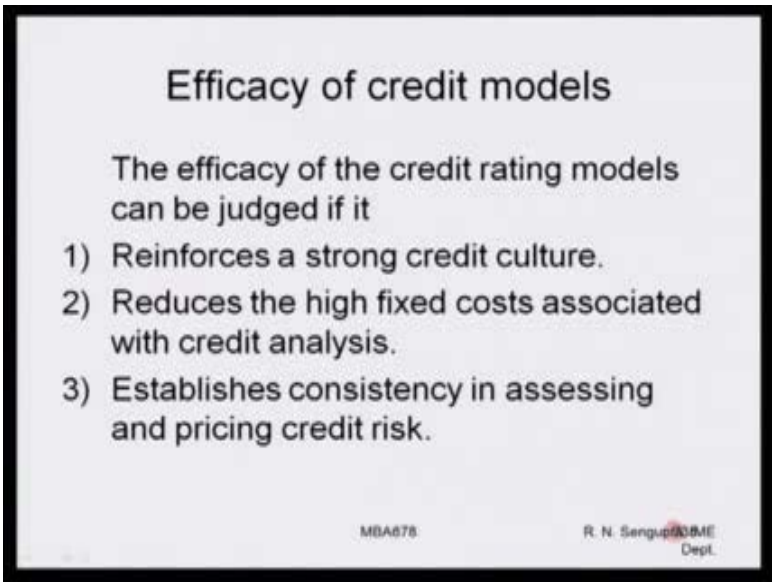

Efficacy of credit models depends on it basically gives reinforces a strong credit culture, it uses the high cost associated with credit analysis, and establishes consistency is trying to analysis the prices credit based good or bad the company doing .

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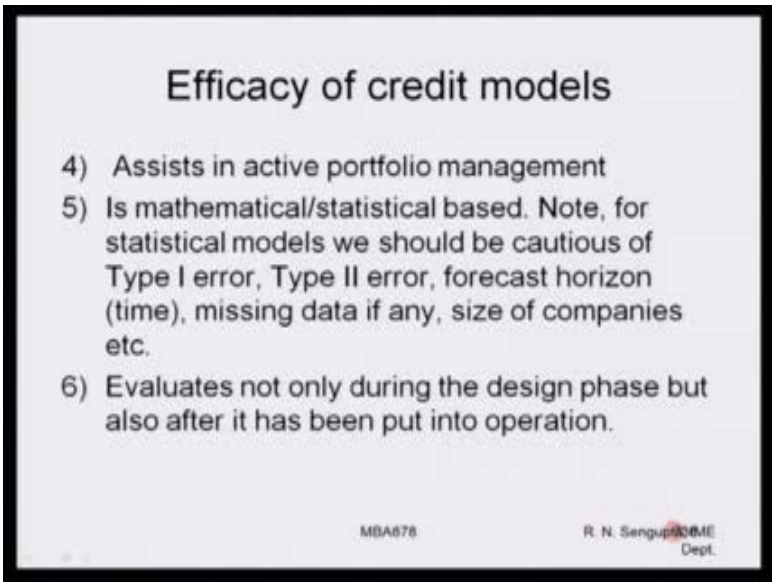

It is also active portfolio management, in mathematical statistical based it is mathematical statistical based. So, hands it is you much better perspective for the finals mathematical point of view that you have to the exact information all the models are doing evaluates not only during the design phase, but also after the input in operation, and can basically get the loop have a loop size that all the outputs for the model being used come can be utilised for the inputs in the later stage, and the model can be important match made much better.

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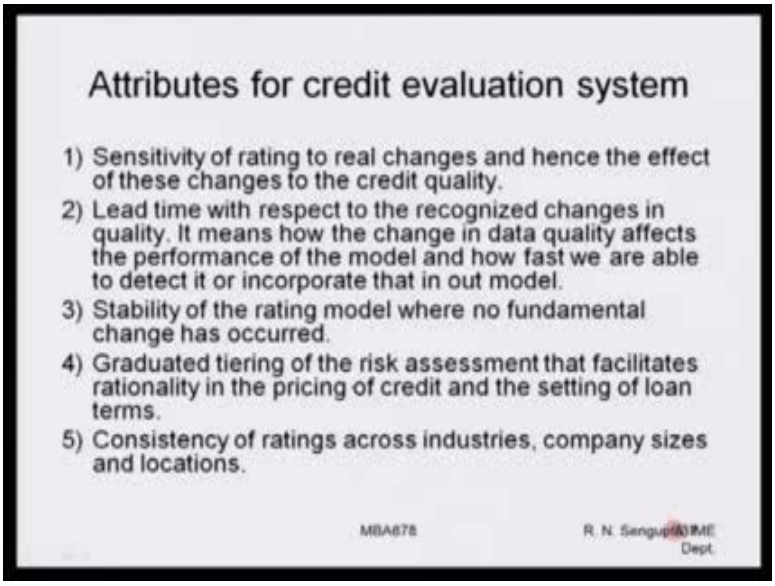

Attributes for credit evaluation system basic sensitivity of rating to real change lead time with respect to recognise changes stability of the rating model graduated tiring in this should be done, and consistency or rating across industries and companies sizes should be followed. So, these are the main and attributes on main characteristics, which should definitely be noted.

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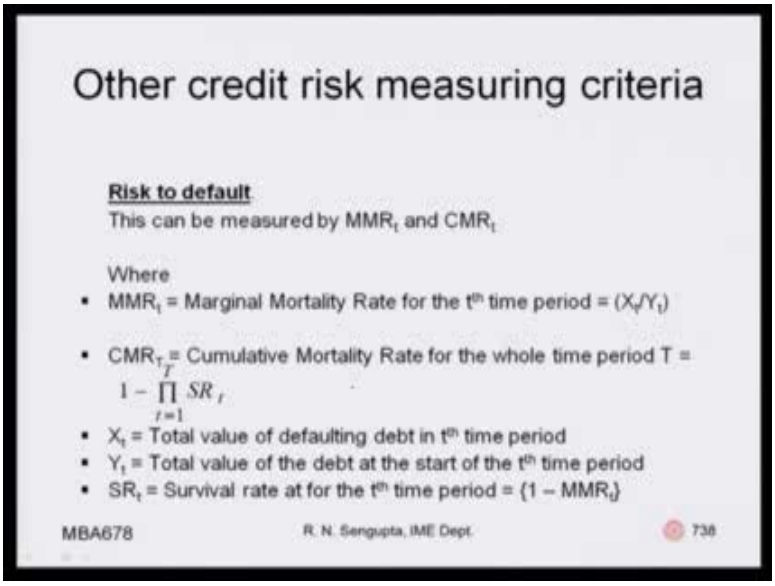

Now considered that other is measured models, we have basic list default measures which will be considered as the MMR, which is the modular mortality rate is basically a

trying to analyse the model from the point of view motel date of the survival data survival function. So, here marginal rate for the time period is given which is the ratio by x to y, where x is the total value the defaulting debt divided by the total value the debt and the starting on the point, and you are the humidity of that the humidity modularly rate add up, all the MMR in time by special that this time 1, time 2, time 3, so on.

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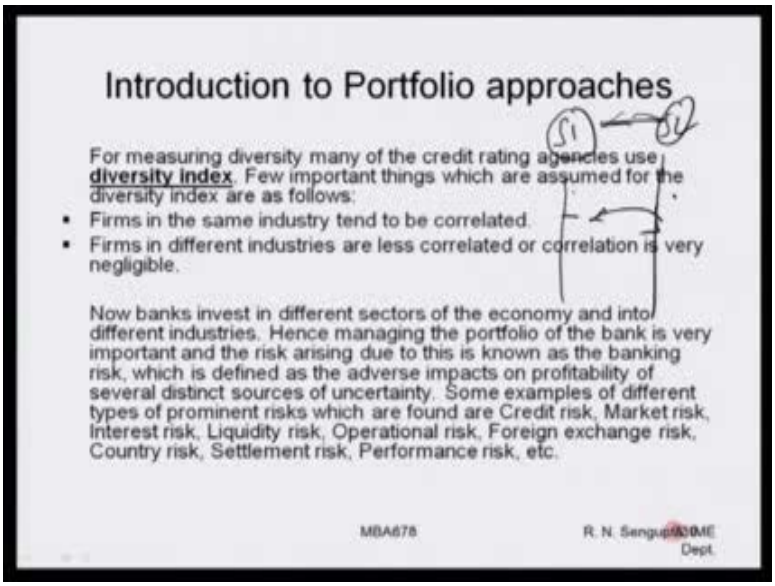

For measuring the diversity many of the credit rating agency user diversity index to important things with resume for the devoted diversity index are forms in the same industry tend to be coded lizards, and correlation coefficient becomes important forms in different industry list, and cooperation is very negligible, it may be 0, and is not 0. Then trying to find out the correlation coefficient between counter companies from different sectors may not be possible. So, what you can do is the difference right to find out the correlation between the sector and try to extrapolate that set of information is the correlation coefficient listing between different sectors companies to different companies into different factors influence, like if you a sector 1 and near sector 2 and their different company this on sector 1 and sector 2.

So, rather than trying to find out the correlation between companies in sector 1, sector 2 you tried to find out the correlation here, and use this as proxy the best measure of the correlation coefficient new bank invest in different sectors of economy and into different industries. Hence managing the popular bank is very important for hence for the bank

this liquid ratio operating this ratio foreign exchange ratio country special settlement ratio all the things are importance.

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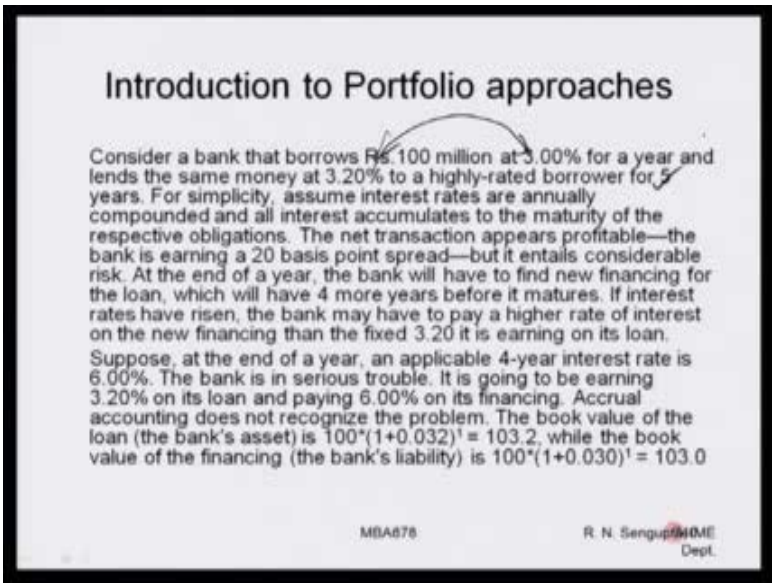

Consider bank that barrow the 100 millions at 3 percent for the year, and length same money at 3.2 person at higher rate borrow for a 5 years. So, there is a different 1 year giving for 5 years, 1 year basically taking for 1 year for simplicity assume interested annual compound or condition compound whatever it is an all interest accumulate much of the respective application; that means, 1 your boring, 1 your learning the net translation of us profitable, the bank is only 20 basis points which is basically the difference between this 3 on 3.2 percent, but entire constable risk why because in the first place when your boring 3 percent time from 1 year, and case when earning money which is 3.2 interested over all time period.

So, for example the person moving a barrow suddenly ask for the money, then you are really nice, because you are actual amount of money invested for a long time period. So, hands it would be done in such a way that that time concept money should always, we considering the pictures of that any demands on happens from the person, you have barrow on the money you are able to take care of the return and return the barren money in the right propel time, but its interns by saying what is the interns considerable my risk at the end of the year bank will have to find a new financing for loan, because if 1 is over suddenly the company, which is barrow the money ones back money always see, that is

to be written, but does return has to be done in such a way that if you are going barrow from the second person, you take 2 things into account point number 1, you enable return the person from the money have taken to the first bank of the first person, and number 2 is that the money or a time frame based on, which you are taking the second borrowing should exactly match the overall return which is going to happen for the amount of money which you have landed.

That means, that 5 years should we match with the 4 years, where the 5 years is for the set of person to whom earn the money at 3.2 interested, and the 4 years is the second set of person or certain is the second of entities from where you have land the money, after the first person has demanded bank the money from you. So, if they interested I have listen the magnolia hi interested; that means, in case it was 3 percent, it was fine. Now when you are trying to sign contact at the end of first year, and the beginning second year, and obviously in interest rate may definitely different than 3.2 percents. Obviously, we will make a loss, suppose the end of the year and applicable 4 year interest rate is 6 percent the bank is in a serious trouble, it is going to buy earning of 3.2 percent, but the overall interest rate it has to be paid is basically 6 percent. So, accrual accounting does not recognise this problem, hence it becomes a little bit problematic how you want to analyse the problem practical situation.

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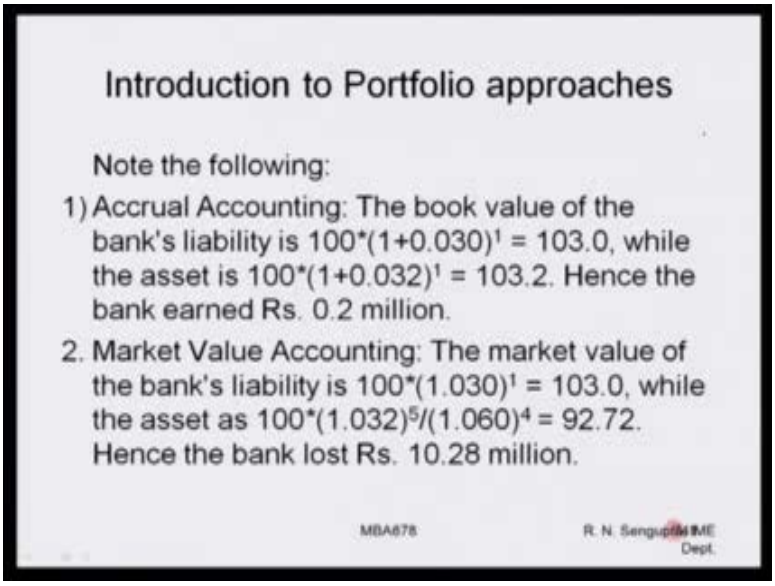

So, now according to note according code in the accrual accounting principle, hence the bank earned 0.2 million rupees as soon as calculation by the market value in the bank has last tem 0.25 million. So, increase to analysis the problem from the very practical aspect with you are trying to take the accrual accounting principle in to consideration on the market value into the consideration depending on what you do your action should be in likewise in the name with the actual recording principles you go to fallow.

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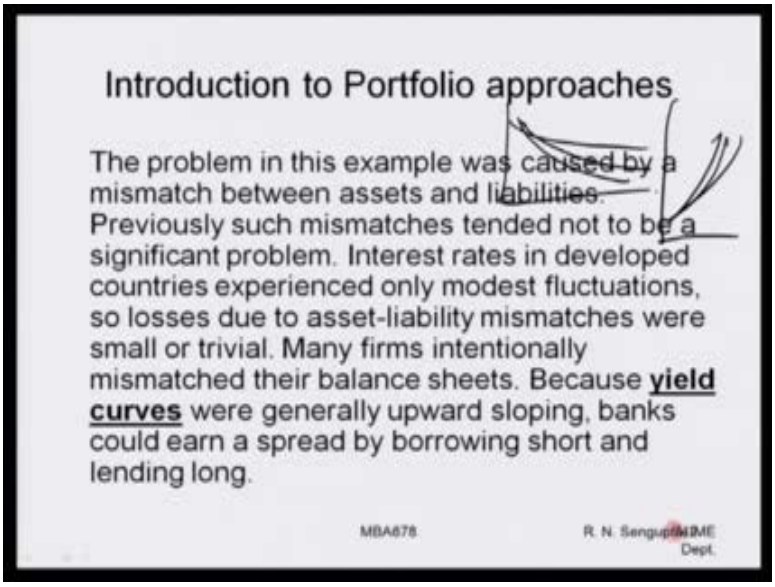

The problem in this example was caused the problem, which we discuss is caused by a mismatch between assets and liabilities. Previously search mismatches tended not to be a significant, but the moment you can see in the time frame the division that basically blows up; that means, as I mention standard deviation has a relationship with time and it is related to square root of the. So, as you are going more down the line like 4 years, 5 years, 6 years, 7 years, enhance for the world in the deadly increases interest rates is developed in developed countries is experienced only modest fluctuations. So, losses due to assert liability mismatches was modern in travel, but for the developing countries the mismatches is much higher, because yield late curve were generally upward sloping. Hence bank could earn a spread by borrowing short and lending long, but if the interest rates are changing in different direction, if they are downward sloping; obviously, this week is makes a problem.

So, if we remember when you considered featuring interested, the forward interested, the 0 interested and we draw the curve, which were like this or it was like this. So, they would basically depend on which direction the yield rate calls are (( )). If they are upward slopping or downward slopping, then obviously we have to take actions accordingly.

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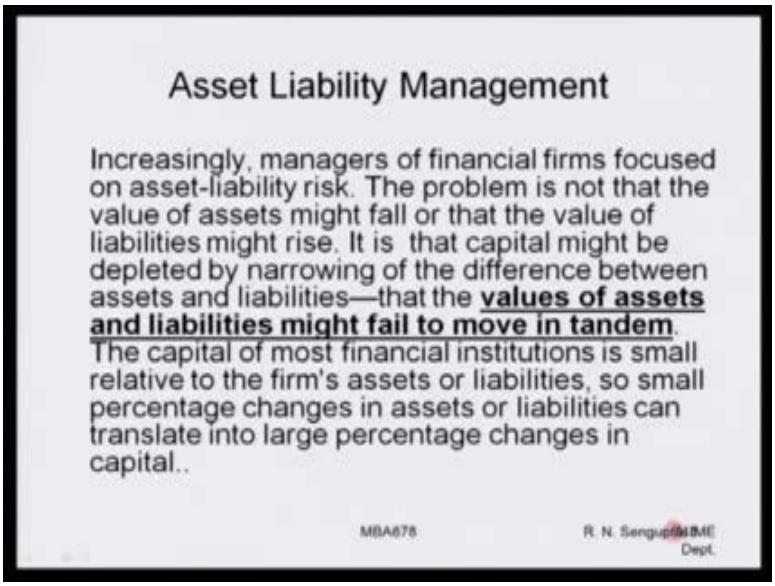

Increasingly, manager financial firms focus on asset liabilities. The problem is not that value of the assets that might fall, what is important is the value of assets, and liability is must fall and move in tandem; that means, they should go hand in hand with respect to the time.

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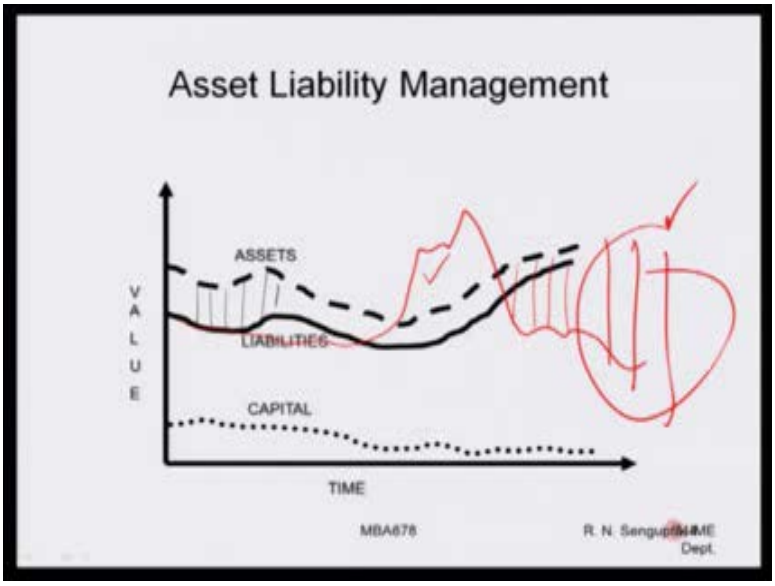

So, this is what I have given a very simple example; obviously, assets moving in some deduction. And similarly the liability are capital based on which you can invest for an asset or basically get take 1 loan on the liability design, they should move intended. So, difference which you are may increased or decreased are the different question, but what should not happen is this consider asset like this as shown. And hence suddenly consider the liability is goes like this. So, here it me... So, happened that this is plus which is good for what is problem is that this loss, we expect to happen 3 years down the line, but suddenly we start increasing then it becomes a problem for the bank in order to basically have a good match or have a good tandem movement of both the assets and liabilities.

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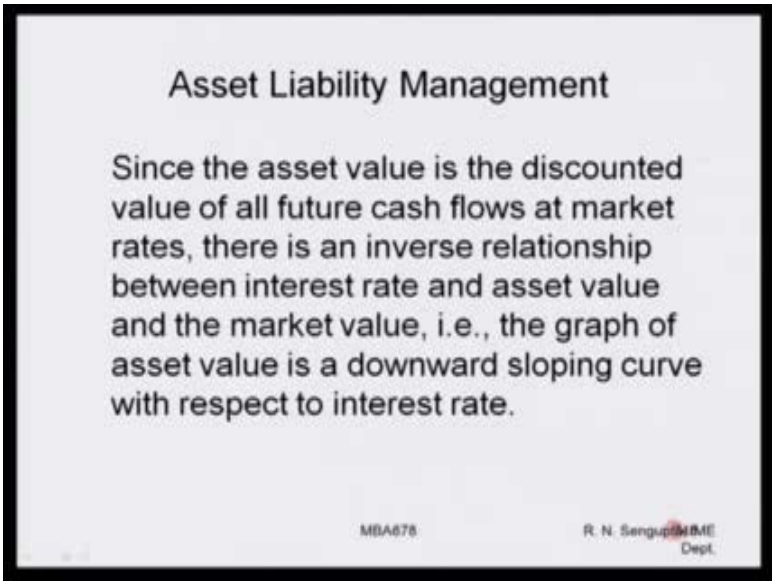

Since the asset values is a discounted value the future cash flows at market rates, there is an inverse relationship between the interested in assert values on the market value and the market value that is… The graph of the asset value is it download slopping curve with respect to the interested rate.

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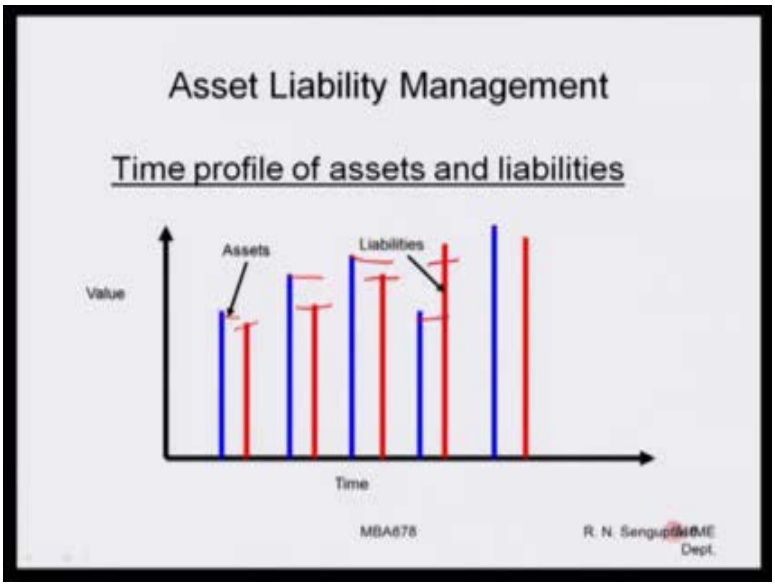

So, if I consider time profile of asset and liabilities again there may be a difference, but the next match should not be with just booked, I am missing you deserve respect to time understand, and it become very problem to balance on asset and liability.

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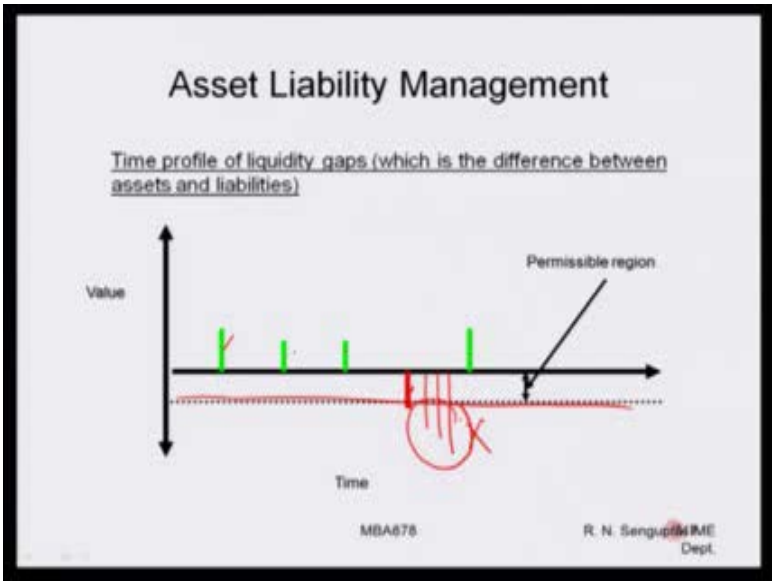

So, this difference between there is no problem, but did not plan should not fluctuate grammatically with respected time. So, time profile of the liquid gaps which is the difference between assets and liabilities. So, these are the plus when assets is more. So, these are negative when assets are less; obviously, this is the permissible zone and in case you are the red 1 or disagree blown. And these are the non permissible values of the of the difference of the assets and liabilities in negative sense we should not cross over; that is basically going to face a huge amount of loss or you have basically going to face credit risk.

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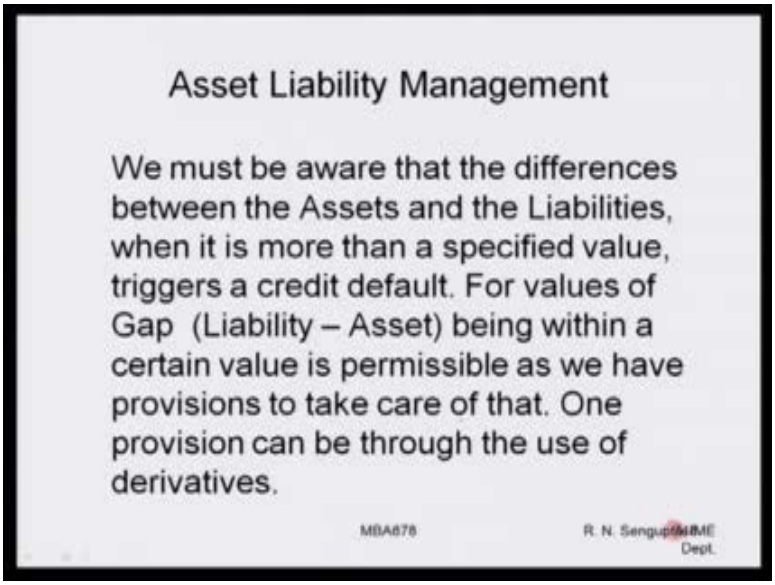

We must also be aware that the differences between the assets and the liabilities, when it is more than a specified value triggers, a credit gap or credit default the values of the gap which is the different between liability, and asset being with an certain value is permissible any value over, and that is not permissible is like basically a bandwidth and any dispersion any variant should always be between that bandwidth; that is the moment you have any extra fluctuation over and above the bandwidth, we have a mismatch, we should not be there; that is what I am doing trying to analyse, and see 1 provision can be through the use of derivatives, and the we use the derivatives then you can basically activate the derivatives accordingly.

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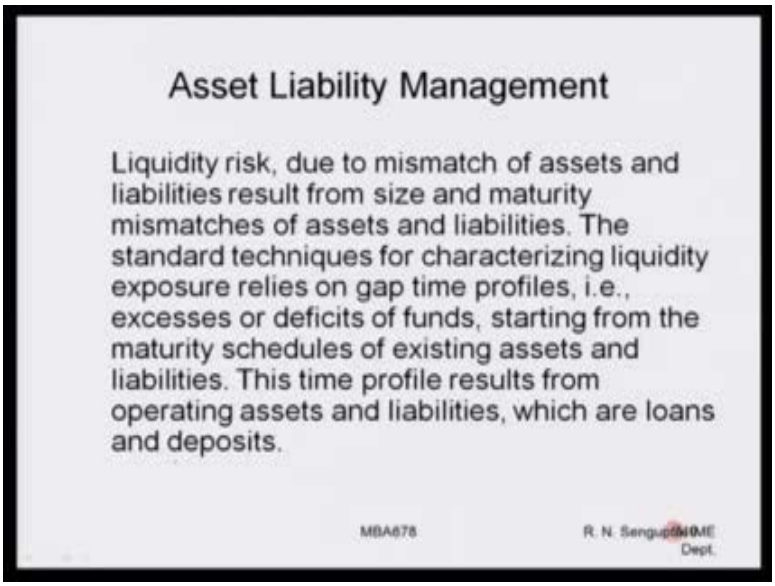

Liquidity risk is… So, due to mismatch of the assets and liabilities result from the size of the maturity of the assets and liabilities, the standard techniques for characterizing liquidity exposure relies on the gap for the time profiles, that is the excesses or deficiency of the values of the funds, which is assets minus liabilities this time profile results from operating assets, and liabilities which are loans and deposits and which should be match in such a way that the example which we will consider that we have taken a loan at 3 percent, and lend the loan 3.2 and mismatch the timing 1 for 1 year, 1 for 5 year.

So, this mismatch should be definitely ruled with respect to time with respect to interest rate also. So, if you are trying to packet for the floating interested going, in such a way

that you are floating interested remains, if you are packing it for the for the fixed interest rate. Obviously, fixed interest should be there, now you question is that if I am not, if you are not comfortable with floating interest rate and fixed interest rate, then if you remembered we have done and details about the interest rate swaps, and the currency swaps. So, you will try to utilize some swaps we are able to convert your assets and liabilities from a floating to a fixed or a fixed to floating on you are also able to change your currency from a domestic to foreign 1 and vice-versa. So, these 2 things should be taken into account, such that you are saying that we will try to analyse and counselling the different about derivatives also.

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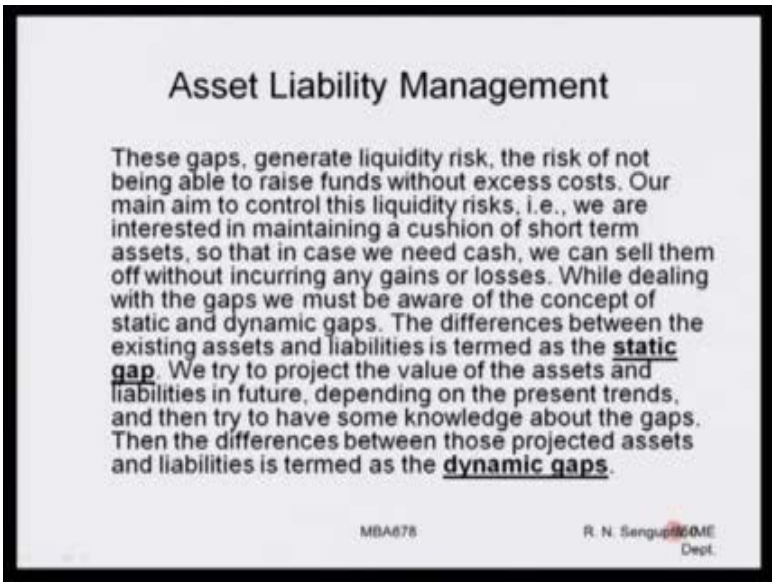

So, now the gaps, which were talking about this gaps with difference between the asset and liabilities. So, they generate liquidity risk the risk not being able to raise funds without excess cost. Our main concern is to control these liquidity risks, that is we are interested in maintaining a cushion of short term asserts as there able to overcome the liquidity risk, while dealing with the gaps must be aware of the concept of static and dynamic gaps.

So that means, static means that gaps are not changing with respect to time and gaps, which we are changing with us to do time, they would be dynamic the difference between existing assets and liabilities is termed as the static gapes, while if we tried to project the value of the asset and liabilities in future depending on the present value on

the depending on the time value on the money, they would basically in dynamical, that means, the time value is going to permanent in this lecture.

With this we will end today's lecture, and I will continue consuming the asset liability manager from the point bank point of view the bank, and then try to see how simple port full automation and model can be considered in order to analyse ALM model.

Thank you.