Management of Fixed Income Securities
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Lecture - 49
Bond Investment Strategies - IV

Welcome back, so in the previous session we have discussed about the bond investment strategies. Mostly we discussed about the active strategy. In that part we have analysed about the interest rate expectation strategy, bond yield shifting strategy. Then also we discussed about the different type of swaps.

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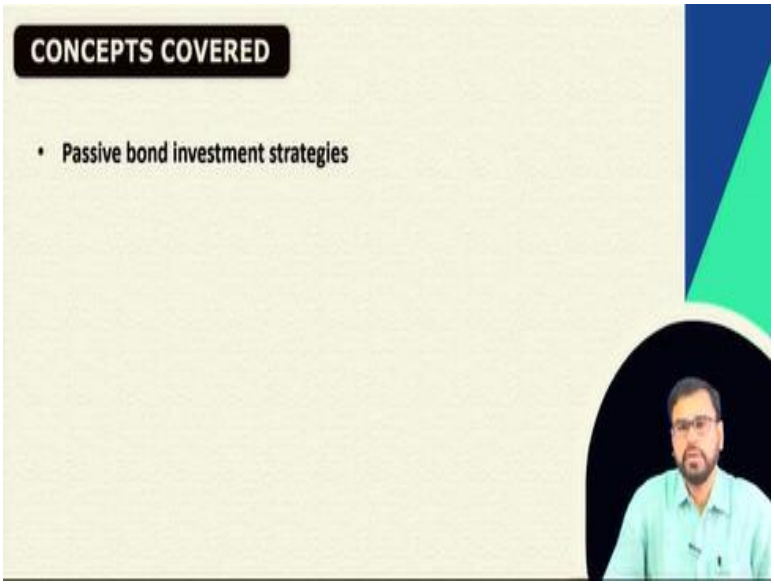

So, today we will continue with that particular discussion then we can move towards the different type of passive bond investment strategies for the investors can use whenever they invest in the bond market. So, today's session will largely focus on the different type of the passive bond investment strategies for the investors always use it to minimize the risk or to maximize their return?

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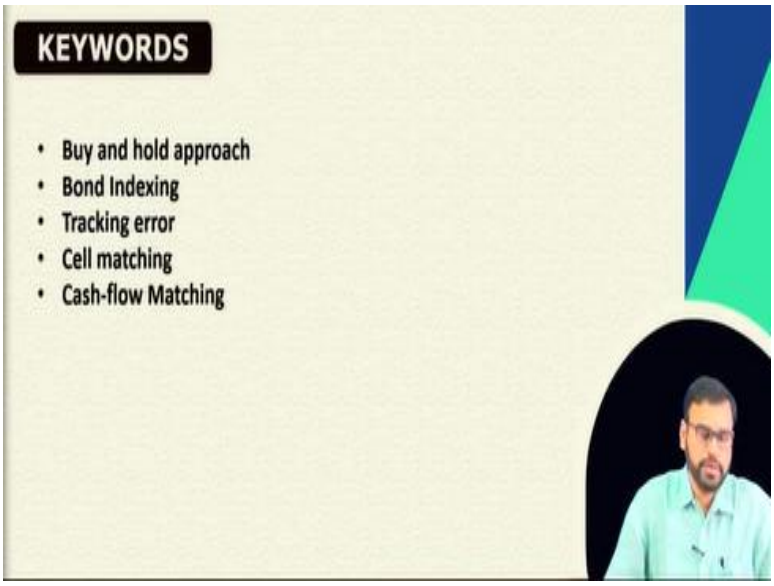

So, in this particular session you will come across certain words like buy and hold approach, bond indexing, tracking error, cell matching, cash flow matching this kind of concepts or this kind of keywords you will come across while discussing about the different types of the passive investment strategy what the bond investors always use in the market.

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So, already all of you know that the passive strategy is nothing but a particular type of strategy where the investors do not require beating the market or they do not want to always change their positions frequently. Mostly the basic objective is to find out the return for the market indices or benchmark index is providing. So, that's why these particular strategies once they are formed, they do not require the active management or changes.

Because active management or changes are required whenever we want to or the investors want to beat the market or they try to generate some abnormal returns or excess returns what we can also say. But in this particular case our objective is not that our objective is to get certain amount of return what we have expected on the basis of the return what we are expected to get from the market.

So, in this case the basic objectives of the passive investment strategy if you see or we can say that what are the different type of methods or approaches what the investors can follow. For the passive investment strategy these are basically buy and hold strategy then you have the bond indexing then also you can always observe that the basic objective is to construct the portfolios which can ensure there are sufficient funds to meet their future liabilities.

So, the strategies are made on the basis of the future requirements. So, what do you mean by this buy and hold approach. The buy and hold approach is nothing but here the investors basically try to hold certain type of bonds on the basis of their maturity or coupons or ratings whatever it may be with some intention that they will hold the bond up to the maturity. That means the face value of the bond what is there in that particular bond endangered provision that they are going to realize in the end of the period.

And the cash flows are also more or less fixed because the coupon rates are more or less fixed. Only the returns and all these things can be changed on the basis of the market interest rate but the investors are more inclined to hold the bond up to the maturity because they know that how much return they are trying to get in the future and how much money they require to fulfil their liabilities what they are going to have in the long run.

So, that is basically called the buy and hold. You just buys the particular bonds and holds it up to the maturity. Then we have another approach we can construct the indices or we can construct the index which can perfectly mirror or reflect the particular type of benchmark index. Any of the bond indices you can consider and always we can construct your portfolio accordingly. So, that is basically another approach also we can follow.

And lastly already what we have discussed that mostly the portfolios are constructed to ensure that the sufficient amount of the funds is generated or sufficient amount of returns are generated

which can satisfy the future requirements. So, this is basically about the overall objectives of the passive strategy.

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So, that's why we have three types of strategy what we can follow, one is your bond indexing, you have the cash flow matching, then you have the classical immunization. Some people called that classical immunization is a part of the hybrid strategy but you can also say that the immunization process itself is a part of the passive strategy. Anyway, that will see that whenever you are going to rebalance this immunization process that becomes a hybrid strategy.

Because hybrid strategy means it is a combination of both passive and active. But largely today's discussion will focus on mostly on the buy and hold strategy, bond indexing and the cash flow matching. So, these are the things basically what we are going to discuss in today's session.

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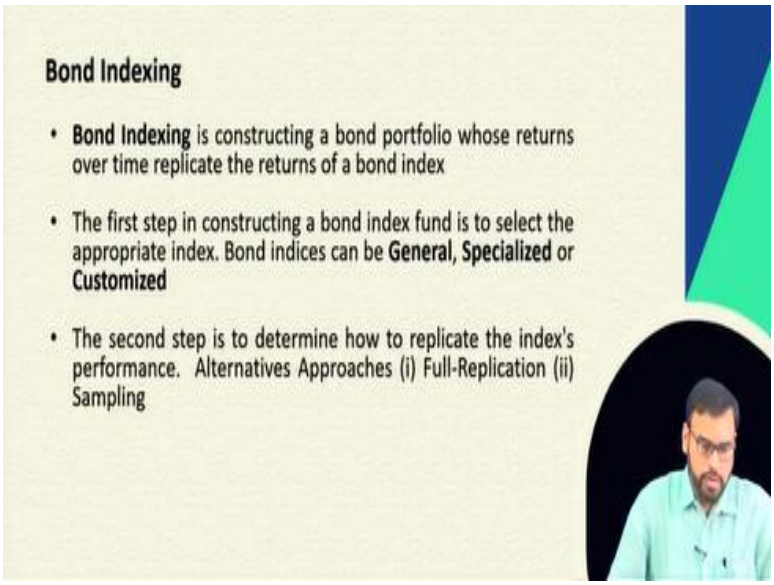

So, let us see what basically this bond indexing is all about. You know that we have many indices which are available in the market like stock index, we have the bond index also but it is not possible to invest in that particular index itself. There are certain regulatory restrictions there are some operational difficulties. So, because of that the investor is not basically able to directly invest in that particular bond index.

So, in view of this the investors generally do investors generally construct a bond index which generally reflect or generally replicate the particular index which is available in the market. It is a mirror image of the existing bond index which is available in the market. So, that's why the bond indexing is basically process where the investor is trying to construct a bond portfolio whose returns over the time generally replicate the returns of the bond index and bond index is already existing.

And whatever return or whatever types of the bonds which are included in that particular index investors generally try to consider those bonds and try to construct their own index exactly expecting that the return what the bond index is providing in the market the same return they are going to get if they are going to construct that index on the basis of that particular benchmark index. So, what is the first step the investors can follow?

The first step is to select the appropriate index which index they want to follow. Whether it is a common market index which is available or it can be a sectorial index or a kind of particular index which is constructed on the basis of certain parameters. We can call them the specialized

index or a customized index. So, depending upon the objective of the investor, the investor can choose that they are trying to replicate which index.

Whether it is a common market portfolio or it is a kind of customized index this is faster. First of all, index selection. And they want to follow that particular index and they want to consider those bonds which are a part of that particular index, this is number one. Number two second step is whenever you talk about the indexing strategy how to replicate, how we can expect that whatever the bond index is giving then we can construct our own index which will give you the same amount of return.

So, how basically they can do that. So, there are two ways the bond index can be constructed. What are those? One is full replication approach and another one is the sampling approach. What is the full replication approach? For example, let there are 30 bonds in a particular index so, what the investors will do the 30 bonds which are a part of that particular index they can construct their own portfolio on the basis of that same 30 bonds which are a part of that particular index.

And the proportion of the bonds what they are going to allocate to the different bonds that also will be based upon the proportion of the bonds which are or proportion of the weights which are given to that particular market index which is already existing. So, that is called the full replication approach. And another one is the sampling approach. Then what is sampling approach? Sampling approach in the sense the investors may not choose all those bonds which are a part of that particular market index.

They can select certain bonds which are a part of that particular index and decide that particular bonds to construct their own index. Assuming that, the particular sample is real replication or rear reflection of the particular bond index which exists in the market. So, investor has to follow certain approach certain kind of process to decide that which bond should be included in that particular sample and which bond should not be included in that sample.

So, that is basically another approach that basically we call it the sampling approach. So, the indexing can be constructed or index can be constructed on the basis of the full replication where the all the bonds which are a part of the index that can be considered or they can choose out of

let 30 bonds they are in the full sample instead of investing in 30 bonds they can choose let 10 bonds and that 10 bonds will be decided on the basis of certain characteristics.

Which can really a representative of that particular 30 bonds that is what basically we call the sampling approach.

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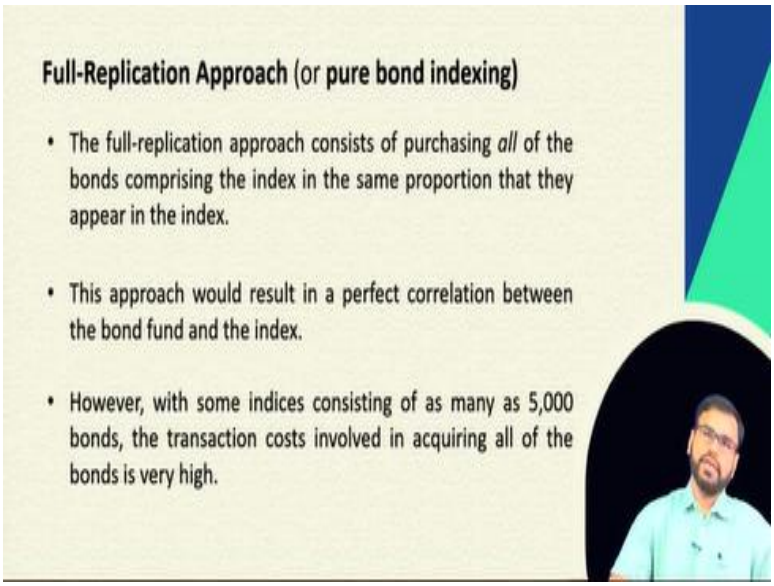

So, in this full replication approach otherwise it is also called the pure bond indexing the other name of that thing is called the pure bond indexing. Here what the investors generally do this is already what basically we have just now discussed. It is consisting of all the bonds comprising the index in the same proportion that there appear in the index, whatever types of the bonds or whatever the bonds which are available in that index they will consider all the bonds.

And as well as the investment amount also the proportion of investments what particular investor is trying to allocate to the different bonds that will be also based upon that particular proportion which are there in the index itself. So, that means that will basically result a perfect correlation between the bond fund and the index which is already available in the market. That means the correlation between them is basically close to one.

Because exactly it is replicating that particular index so there is a perfect correlation, we can expect between them.However, generally what happens some indices generally let consisting of let 5000 bonds let one particular bond index is available in the market which generally has 5000

stocks in that particular index.So, if any investor wants to go for an indexing strategy and try to construct their own index by considering that all 5000 bonds.

Then what will happen that the transaction cost for construction of that particular index will be quite high. The transaction cost basically involved acquiring all the bonds is relatively very high from the investment perspective. So, if they want to exactly replicate then they have to consider all 5000 stocks. So, whenever they will acquire all the 5000 stocks for construction of their index then obviously, they are exposed to high transaction cost.

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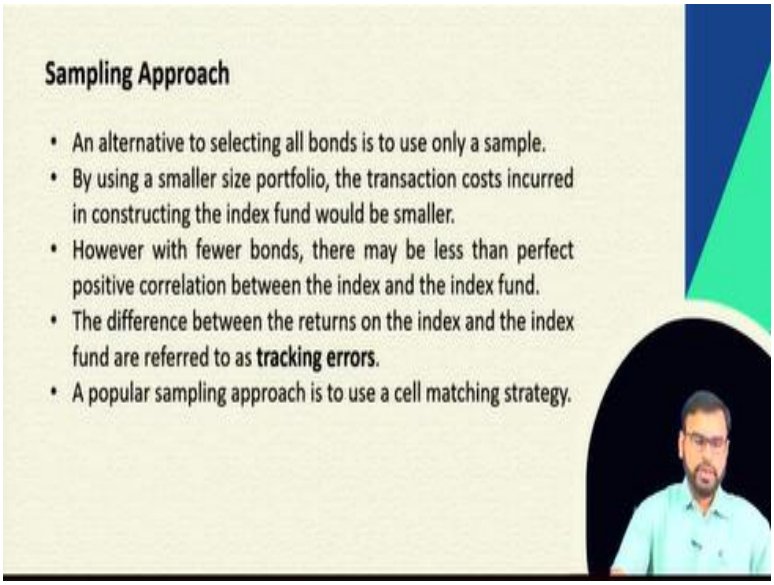

So, in that case what basically the investors try to do investors generally go for the sampling approach. So, here what general happens in the sampling approach it is basically an alternative to selecting the all bonds. So, in this case what the investors can do instead of investing in all 5000 stocks they can choose 50 stocks or they can choose 50 bonds depends whatever assets they are considering where we are talking about the bond market.

So, that's why we are let generally confining our discussion with respect to the bonds. So, in that case they can reduce the portfolio size. So, once the portfolio size is reduced then the transaction cost also will be reduced. Relatively if you go for a full replication approach if you are going for a sampling approach then your transaction cost will be relatively less.

But another problem also arises, if you are going for a kind of sampling approach the investors also may certain problem. So, what is the problem basically they face? First of all, it may not be

perfectly correlated with the index itself first of all. Because our basic objective is to replicate that index but whenever we are following a sampling approach to decide the bonds which are the bonds we should consider for the investment.

In that particular case the correlation between these two may not be perfect this is number one.Another difference basically you can observe you see whenever you go for the bond indexing strategy our basic objective is to basically minimize the tracking error.So, what exactly the tracking error is? Tracking error is nothing but it is basically a difference between the returns on the index and the index fund.

Whatever index fund you are constructing and whatever index is already existing in the market then we are trying to find out the difference between them difference of the returns. But exactly it is not the actual difference of the returns it is basically variance of the return differences. Quantitatively you keep in the mind tracking error is basically a variance of the return differences. How? Basically, the return differences are fluctuating that basically call it the tracking error.

So, in this case what basically also we have to think that whenever we are going for a sampling approach the possibility of tracking error may be high. Because we are not considering all the particular bonds which are a part of that particular index into our portfolio. So, therefore there is a high possibility that the return differences between the two different portfolios may be quite high. So, that means whatever return your particular portfolio is giving.

And whatever return you can expect from that particular bond index which is available in the market there may be some differences exist between them. So, that's why the probability of tracking error is relatively high if you are following the sampling approach. So, the next thing is that even if you are going for the sampling approach then how basically we decide this particular bond.

Then which bond should be part of the index and which particular bonds should not be part of the particular portfolio what we are constructing through this indexing strategy. So, one of the popular sampling approaches generally in the market investors always use that is called the cell matching strategy. What exactly the cell matching strategy is?

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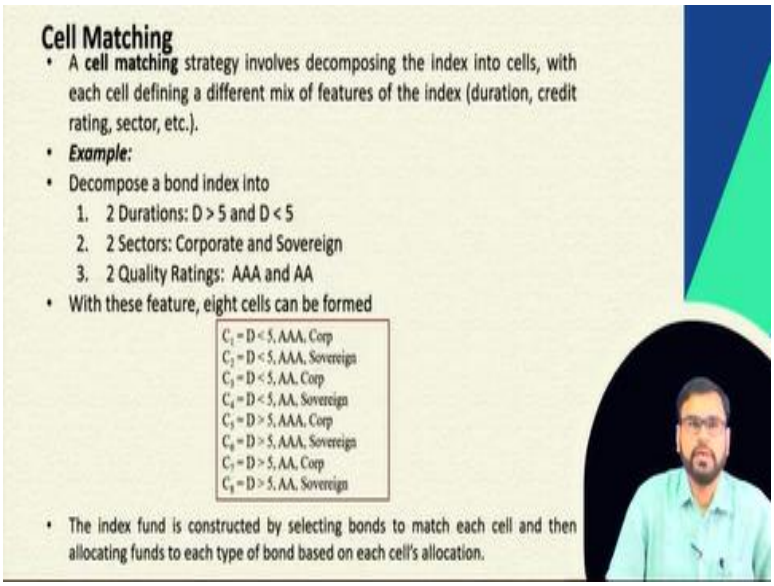

So, cell matching strategy means what, it basically a strategy which involves the decomposing the index into different cells, with each cell defining a different mix of the different characters or the mixtures or the features of the index. The different features of the index will be available like the duration, credit rating, from which sector the bond is so all type of characters are there whenever you are talking about a particular financial asset like bond.

So, what these investors can do, they can choose a repetitive of the particular index which is available on the basis of certain bond characteristics. Like let you have considered the there are three features like duration you have considered, the sector or the industry you have considered and the ratings you have considered. Let you have, consider you have categorized these particular bonds which are already part of a particular market index into two categories in terms of the duration.

Let the sum of the bonds with duration is less than five years and some bonds which duration is greater than five years.So, let two categories, then you can also consider let two sectors lets one type of bond is the corporate bond and another bond is basically the sovereign bond. So, let there are two categories of the bonds so you have you have categorized you have classified. Then the ratings let some bonds are triple rated bonds some bonds are double rated bonds.

So, let you have considered these three characteristics or three pitch features of the particular bond one is duration, second one is the sector, third one is the quality ratings. So, now you have

said that for each category you have classified them into two parts bonds less than 5 year duration and greater than 5year duration. Then you have the corporate bonds and the sovereign bonds then you have the quality ratings like triple A and the double A.

So, then what will happen, now whenever you have 2, 2, 2, there are 8 cells can be constructed from that. So, let first cell the duration is less than 5, it is triple A and it is a corporate bond then another cell it is duration is less than 5, it is triple A it is a sovereign bond third case duration is less than 5 years, double A, corporation bond; less than 5, double A, sovereign bond then like that greater than 5, triple A, corporate bond; greater than 5, triple A, sovereign bond.

Then greater than 5, double A, corporate bond; greater than 5, double A, sovereign bond. So, these are the ways basically there are let eight cells you have constructed. Then the index fund basically what the investor is trying to construct, this can be constructed by selecting the bonds to match with each cell and then allocating the fund to each type of bond based on eachcell's allocation. So, instead of let there are 72 bonds so instead of considering 72 bonds let you can consider the let 9 bonds.

So, then what you can do for each cell you can consider 1:1 bond so mostly they are fulfilling the criteria of the particular bonds which are a part of that particular sample or on that particular cell. And accordingly, what you can do, you can reduce your number of bonds in your portfolio. So, that is basically we call it this cell matching.

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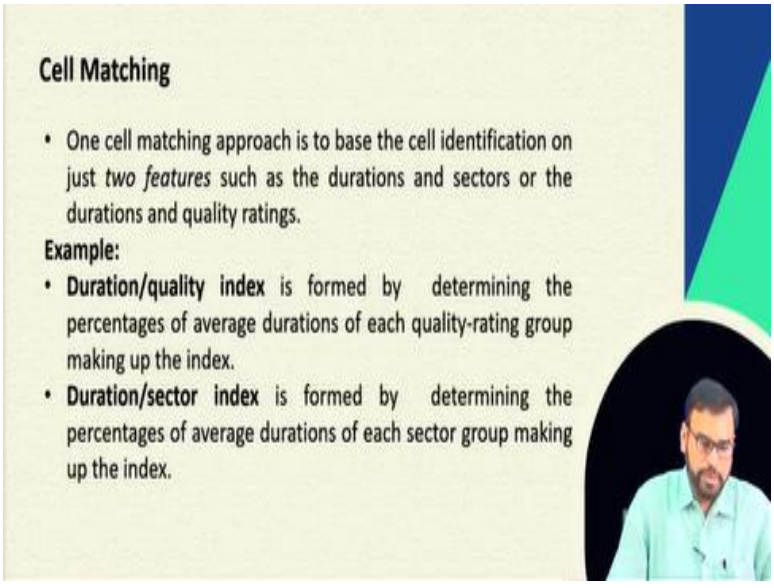

Then in that process what will happen one cell matching approach is to base all call identification on just two features generally like duration or sectors or duration quality ratings. Instead of going for the more number of features we can also classify the bonds for our simplicity for a better understanding you can basically go for the two features one. Then accordingly you can make your cells, let you are making a particular kind of index which is based upon the duration and quality.

Then how this can be formed this can be formed by determining the percentage of the average duration of each quality rating group which basically making of the two for making of that particular index like duration and sector index. This can be formed by determining the percentage of average durations of each sector group making of the index. So, like that you can decide your own features and make the different cells and you can consider that particular bonds which are basically perfectly matching with that particular cell.

In that particular process you can reduce the number of assets or the number of bonds for your analysis or for your construction of the index.

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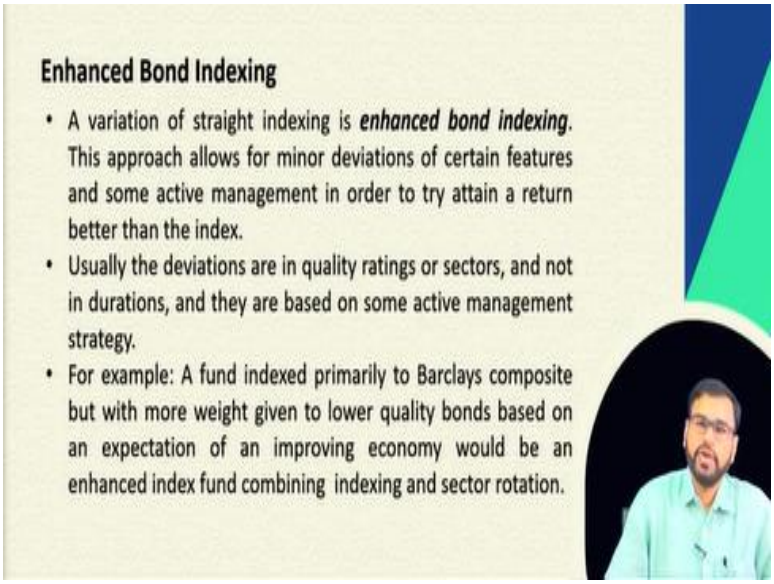

Then we have another thing here also we can always see that is called the enhanced bond indexing. What is the enhanced bond indexing? This is basically a variation of the straight indexing strategy. A variation of straight indexing is basically called the enhanced bond indexing and in this approach what basically we can expect or what this approach basically allows. This

allows for the minor deviations of certain features and some active management to attain a return better than the index.

So, some minor deviations of certain features can be made on the basis of the different other exogenous conditions. So, usually if you see that the deviations are in quality ratings or the sectors and not in the durations mostly. We mostly rely upon the rating part or the particular sector from which the particular bond belongs to. For example, popularly a fund basically indexed primarily to Barclay composite.

But with more weights given to the lower quality bonds based on the expectations of on improving economy, that can be considered as an enhanced index point and this is basically followed on the basis of the sector rotation strategy.The sector rotation strategy that already we have discussed in the previous class also.So, that particular bond will have some enhanced characteristics so because of that we call it the enhanced bond indexing.

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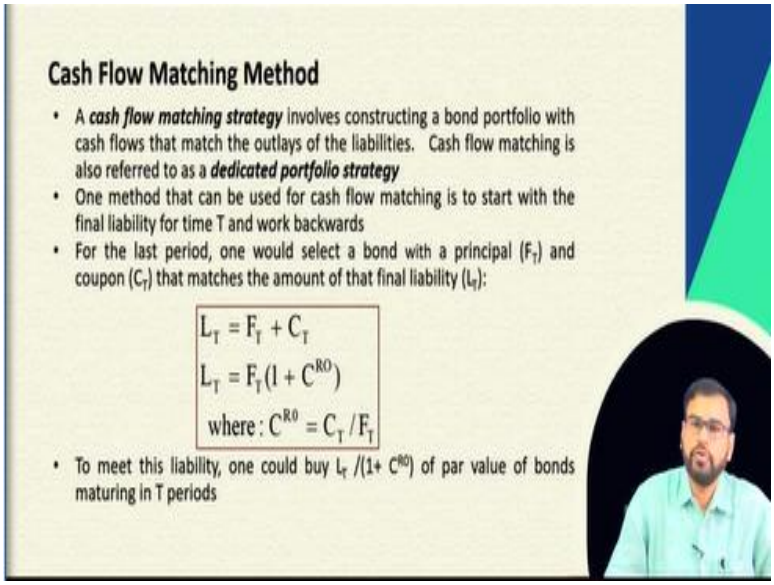

So, in this case if you go for another method for the passive strategy that is called the cash flow matching method. What is cash flow matching method? This basically involves the constructing a bond portfolio with cash flows that match the outlays of the liabilities. So, that is also popularly known as dedicated portfolio strategy. This cash flow matching is generally referred as the dedicated portfolio strategy.

So, generally what we do this method that can be used for the cash flow matching is to start with the final liability for time T and you try to discuss try to examine that thing in the backward. So, let for the last period we would select a bond with a principle of let F_T and coupon is C_T which matches the amount of liability let that is L_T so, if I say that your total L_T should be equal to F_T+C_T.

The coupon whatever you are getting the face value whatever money you are getting that will be perfectly matching with your liability whatever you have. Then your L_T is equal to what $L_T=F_T$ into $1+C^{R0}$ and here I have just taken F_T as a common so then here we are writing one and here it is basically your C^{R0} is nothing but the C_T by F_T. So, what this investor can do? To meet this liability, one could buy the L_T by $1+C^{RD}$ of the power value of the bonds which is maturing in the T periods.

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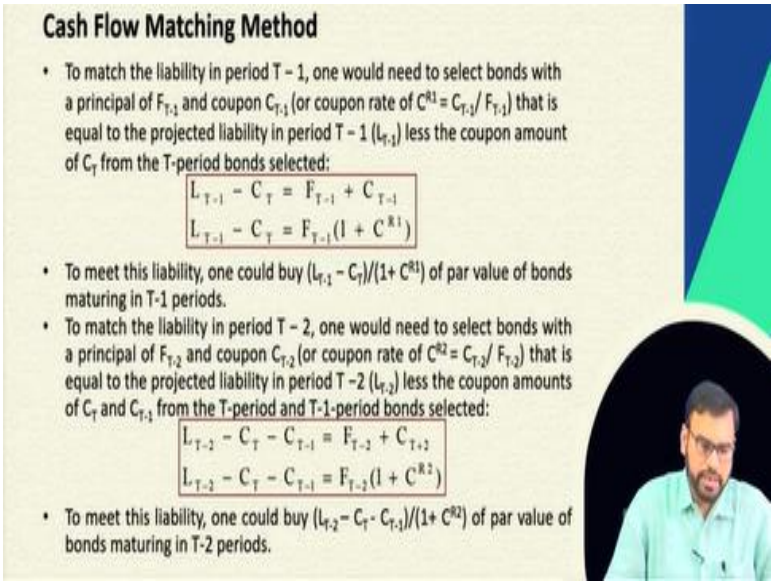

So, like that to match the liability in the period T–1, one should select the bond with a principle of $F_{T-1}$and coupon C_{T-1} or coupon rate will be C_{T-1} divided by F_{T-1}.So, that is basically equal to the projected liability in period T-1 less the coupon amount that is C_T that means your $L_{T-1}–C_T$ should be equal to your $F_{T-1}+C_{T-1}$.So, then your $L_{T-1}–C_T$ is F_{T-1}if you take common then you will get $1+C^{R1}$.Let that particular rate we are referring at C^{R1} then what the investor can do to meet this liability one generally can buy your $L_{T-1}–C_T$ divided by $1+C^{R1}$ of the par value of the bonds which is going to mature in T - 1 years.

Like that you can go for T - 2 also here if you see that finally you get that $L_{T-2}–C_T–C_{T-1}=F_{T-2}$ into $1+C^{R2}$.And again, to meet the liability the investors can by the $L_{T-2} – C_T – C_{T-1}$divided by $1+C^{R1}$ or C^{R2} of the par value of the bond which is matching in T-2 years.

So, that means perfectly whatever cash flow you are getting in the end of the period that is basically matching with your requirement or your liability.

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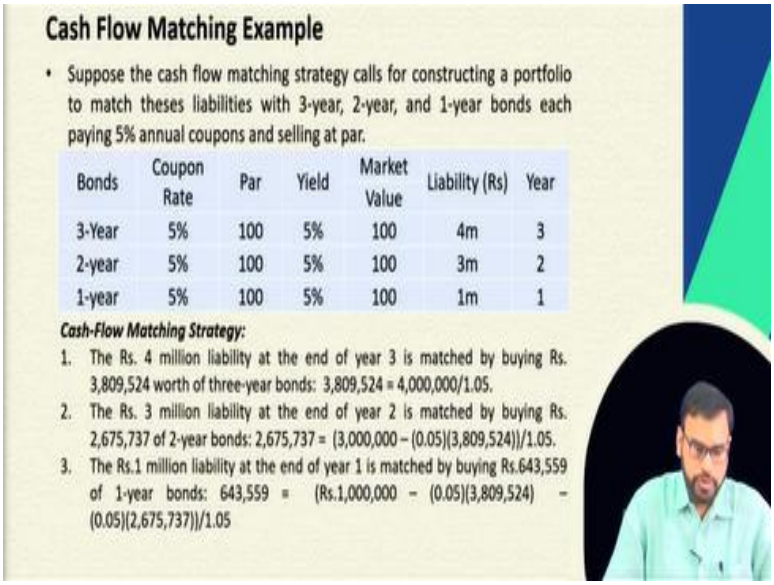

So, if you take an example in this case, suppose the cash flow matching strategy generally calls for constructing a portfolio to match this liability with three years, two years or one year bonds. And each are paying 5% annual coupons and selling at par. So, let bonds are bonds durations or maturities are three years, two years, one year coupon is at 5%, yield is also 5% because it is issued at par then your market value and par value is same.

That means 100, 100, 100 the liability let 4 million, 3 million, 1 million and years are basically 3, 2, 1.So, if you are going for a cash flow matching strategy then the 4 million liability at the end of the period three is matched by buying basically a bond worth of let 3809524 worth of the three years bond because your 3809524 is nothing but you are 4 million divided by 1.05 because discount rate is 5%.

So, like your 3 million liability at the end of the two is matched by buying 2675737 of the two years bond how you can get this 267537; this is basically your 3 million - your 0.5 into 3809524 divided by 1.05.So, like that the 1 million liability of the end of the period one also is matching

let 643559 of the one year bond. So, how you got this 643559? That is basically again 1 million –0.05 into 3809524–0.5 into2675737 divided by 1.05.You have to discount it with respect to the interest rate in the market.

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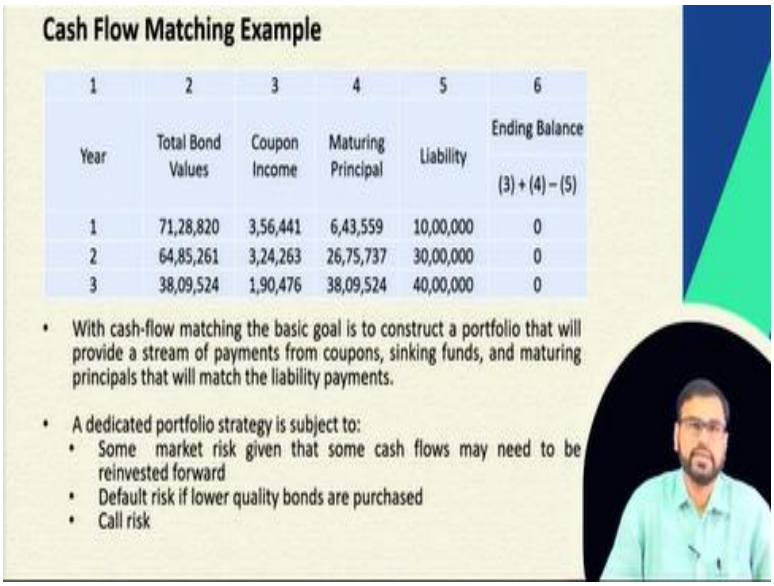

So, that is why this cash flow matching strategy will generally works. So, in this case if you observe so the cash flow matching example if you observe then for year one you will find your coupon income, you are finding your maturing principle, you have the liability with you and you also you have the total value of the bond. Then the coupon income and the par value or the measuring principle if you add then you deduct it from the total liability, then the differences basically will tell you that whether really this particular bond risk is managed or not.

So, with cash flow matching the best goal is to construct a portfolio which will provide a stream of the payments from the coupons sinking fund and the maturing principles and will match the liability payments after a stipulated time. So, the dedicated portfolio strategies generally subject to some market risk given that small some cash flows may need to be reinvested forward.

And default risk if lower quality bonds are purchased and always there is a possibility of the call risk.So, these are the different kind of problems also we can our constraint also we can face whenever the dedicated portfolio strategies approach is basically followed.

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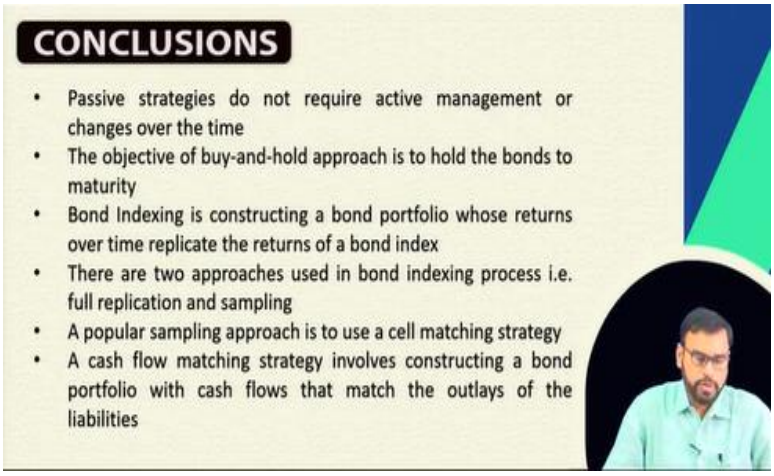

So, what basically we have discussed here the passive strategy does not require active management. The objective of the buy and hold strategy is to hold the bonds to the maturity. And bond indexing is basically constructing a portfolio whose returns over time then replicate these returns for the bond index and there are two approaches to construct the bond index one is full replication approach another one the sampling approach.

And popular sampling approach is basically to use the cell matching strategy and a cash flow matching strategy generally involves constructing a bond portfolio with cash flows that match the outlets of the liabilities of the investor at a typical point of time or after a particular point of time.

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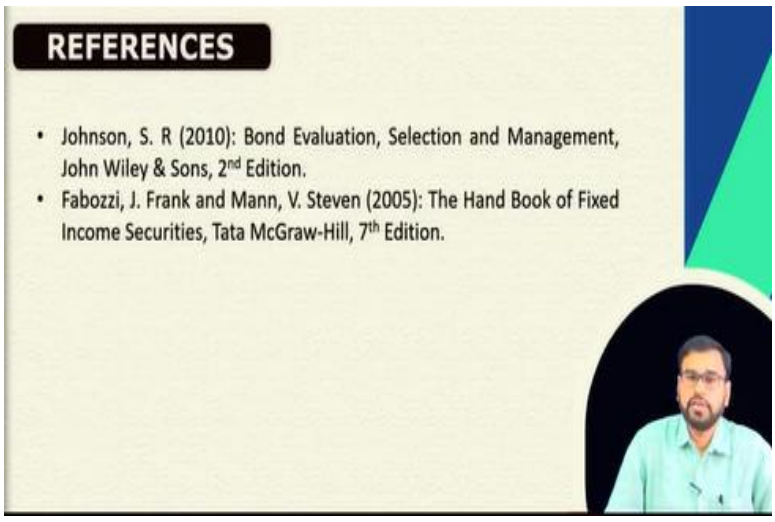

So, these are the references what you can go through.

Thank you.