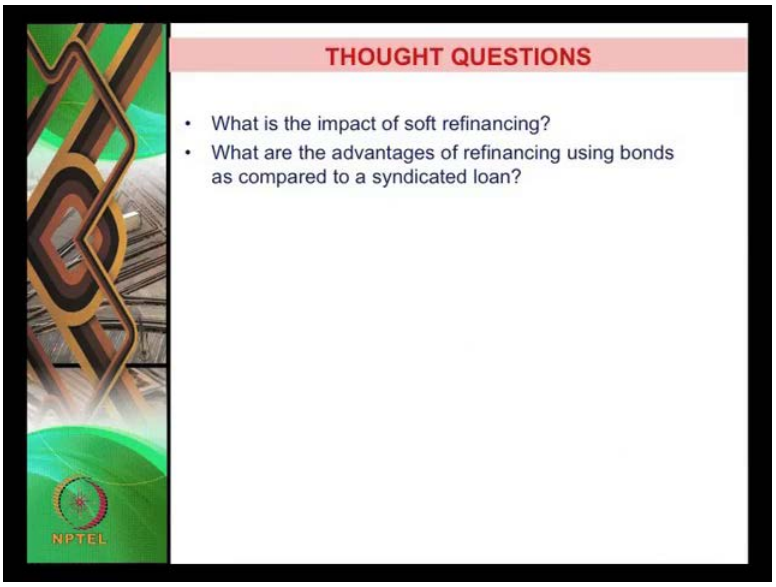
Infrastructure Finance
Prof. A .Thillai Rajan
Department of Management Studies
Indian Institute of Technology, Madras

Lecture - 25
Project Finance Markets - Project Bonds

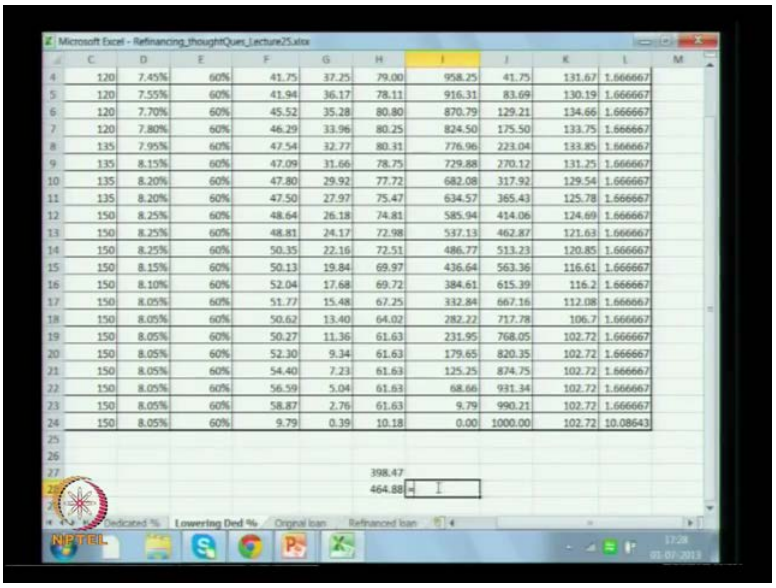
Welcome back to this course on Infrastructure Finance, this is the lecture 25 and this lecture we will continue our discussion on Project Finance Markets, which we have doing for a couple of lectures now. And most specifically the focus on today's lecture is going to be on project bonds, but before we start discussing topic on project bond we will try and discuss on the thought questions that we actual had for the previous lecture.

(Refer Slide Time: 01:00)



So, we had two questions in the end of the previous lecture, and the question number one was what was the impact of soft refinancing, and if you kind of recollect. When we said soft refinancing, essentially, it meant that changing the contractual payment patterns of the loan, and so the question here is when we actually have this kind of soft refinancing. Let say for example, me for loan if a 15 year loan gets webbed and then it becomes a 20 year loan then what is the impact of this kind or refinancing on the project cash flow.

(Refer Slide Time: 01:44)



So, let us try on discussion with a example, so here what I have shown you I have shown you actually the a cash flow of a particular project, and I will first explain you the various column in this cash flow, so that it becomes familiar in terms of what is being talked about. And if you look at it the first column on installment you know talks about number of installments on loan, so we have 16 installments. So, essentially this actually is an installment for every half year, so that means there are 16 installments so; that means, it is a 8 year term loan.

So, it is not one installment does not mean a year in this case, one installment actually means 6 month and then the next column we talk about the base rate value. The base rate value indicates the rate of the loan, so this is the base rate of the loan and as you actually see the base rate starts at 6 percent. It gradually increases is to 6.85 percent and then subsequently it again reduces to 6.55 percent, and then you actually have what is called as your spread. Spread is given terms of basis points, so bp is a nothing but basis points and you may be aware 100 basis point is equal to 1 percentage.

So, when you actually have a loan which is bark the interest rate on a floating rate basis, you actually have a base rate and then you also have a spread, and the total interest rate is nothing but the base rate plus the spread. So, if you look at for installment one the current rate of interest is 7.45 percent, so 7.45 percent is nothing but the base rate of 6.25

percent plus 120 basis points, 120 basis points is nothing but 1.2 percent, because 100 and basis point equals to 1 percent.

So, the current rate is 7.45 percent 6.25 percent plus the basis points of 120, which gives 7.45 percent, so we actually calculate or estimate the current rate based on the given base rate values and the spread for the different installments. So, the interest rate for the reaming installments are calculated, the way that we have discussed for installment one. And then the next column takes about the capital repayment, and is you notice the capital repayment is constant that is 70 percent, and the question that you may have is 70 percent of what.

So, when you have a constant capital repayment and this is as a percentage of what, this method of repayment is called as you know there is a dedicated percentage repayment method. So, dedicated percentage repayment for that is 70 percent you capital repayment is made for each and every installment, so this capital repayment percentage is percentage of operation cash flow, so you have this operation cash flow. So, you this capital repayment is a percentage of operating cash flow, so the total amount that is actually repaid for debt servicing is 70 percent of this operating cash flow.

So, you have what is called as your debt service which for installment one is 92.17, so how is this 92.17 determine, 92.17is nothing but 70 percent of 100 and 31.67, so to illustrate let me calculate 70 percent of 131.67, so this similarly 92.17. So, is this a number that is showed as debt service, so the total debt service is calculated, as a dedicated percentage of this operating cash flow that we have here, now this operating cash flow is obtain from the project cash flow that you may have obtained a previously.

So, out of this total debt service of 92.17 part of it is towards principal debt service and part it is interest, so how do we calculate, how much of it for principal repayment and how much of it for interest. First we calculate what is the interest payment that is being made for example, beginning there is a outstanding debt of 1000 and for installment one the rate of interest is 7.45 percent. So, therefore, the interest for installment one is calculated and that is 37.25, so how do we calculate this interest.

So, again let me illustrate, so we have the total interest outstanding which is 1000, and then we have the current interest rate which is 7.45 percent. So, the current interest rate are 7.45 percent, but you should remember that this interest rate of 7.45 percent is for an

entire year, and as we have discussed previously each and every installment is for 6 months that is for half and year. So, therefore, the interest that is due for installment one has to be calculated for 6 months, so that means we divide this expression by 2, so you actually get the interest of 37.25, so which I have indicator here.

So, once you actually know the interest that you pay for the installment the balance of the debt service is going to be capital repayment, so for the sake for your understanding let me do it once again. So, capital repayment is nothing but this equals your debt service net of the interest that is paid, so that is your 54.92 which is the same figure that we had previously. Now, during this particular installment we have repaid principal of 54.92 and therefore, the outstanding debt at the end of 6 month is 945.08. So, how do we get that we have the outstanding debt of 1000 and then from that we subtract the capital repayment for this particular installment.

Let me illustrate again for the quarter one for installment one, so this is nothing but your outstanding debt of 1000 and subtracted by your capital repayment and this gives you the outstanding debt at the end of installment one or at the end of 6 months. So, this is 945.08 and the next column talks about repaid loan, which is accumulative number, so the end of installment one the repaid loan is 54.92 and at the last column talks about DSCR, which is your Debt Service Coverage Ratio.

So, in this case the net service coverage ratio is simple number which is nothing but the operating cash flow divided by debt service that is due for the particular installment. So, if you want to calculate this is nothing but the operating cash flow which is 131.67 or divided by the debt service for that particular half year period, which is 92.17, and if you divide you actually get the debt service coverage ratio which was there previously.

So, debt service coverage ratio gives an indication of how much the operating cash flow or how many times of the operating, how many times for debt service with does operating cash flow is to kind of meet debt service obligation. So, this is how we actually calculate this now capital and interest payment table for this particular example. So, like the same way I have illustrated for installment one you calculate for the entire 8 year period.

So, now you actually have a debt service coverage ratio, since the capital repayment is dedicated percentage of the operating cash flow the debt service coverage ratio turns out

to be a uniform number, for all the installments except the last one. So, in the last one; obviously, we actually have an outstanding debt which is lower than what it is actually need to be paid and therefore, which is lower than the 70 percent of the operating cash flow. So, therefore, we pay the entire debt service in installment 16 and given the fact that the operating cash flow are much more, than what the outstanding that is we actually have higher debt service coverage ratio of 3.41.

So, this is let say what is been they agreed upon loan terms at the beginning, and later on let us assume that there has been a soft refinancing, and I am actually going to show you the table for the soft refinancing. So, this is let us assuming that the soft refinancing, there are two things that happen here one is the dedicated percentage gets reduce from 70 percent to 60 percent, so easier the dedicated capital repayment was 70 percent.

Now, it becomes 60 percent and when it; obviously, become 60 percent the number of years over which the repayment will happen will also going to increase. So, therefore, the installment has increase from 60 into 21, so what was initially an 8 year loan, now it is become a ten and half year loan. So, there are two things that have actually happened we are actually reducing the capital repayment percentage, and we are increasing the tenor of the loan.

And the base rate value and the spread in terms of basis points are given for each of the installment periods and we calculate the current interest rate for the respective installments. And if we actually calculate of the reaming column as well, we will be able to find out we will be able to get the numbers that I have shown in the spread sheet. So, in this case the debt service coverage ratio happens to be 1.6667, so the debt service coverage ratio has increased as the result of this soft refinancing.

Now, what is the objective of this kind of soft refinancing what are we trying to achieve or what could be the benefit to the project to be the project because of this soft refinancing. This is a single most important benefit would be the additional cash reserves that gets release, so normally what happens when you actually have a loan repayment that is a need to be creating what is called as your debt service reserve account.

So; that means, you need to service you need to create a reserve account, which will have which will have a certain amount of cash in it. So, that if there are any delays if there are any shortfalls in cash flow from the project operations, the debt will be repaid from the

debt service reserve account. So, the amount of cash that is there in the debt service reserve account is not available for any other purpose, so that is the cash that is stuck on the system.

So, if you are able to do a refinancing, if you are able to do soft refinancing, we will be in position to release the cash, at least if not the entire amount or at least some amount of cash that is there in the reserve accounts. So, let us see how this works, let me go back to the first spread sheet that we talked about which is your the original repayment schedule of a 70 percent capital.

Now, if you assume that needs to be a debt service reserve account that is created, which will have a minimum of a reserves, that will equal you know next of 5, you know debt service amount that needs to be paid. So, for example, in this case if you need to find out what should be amount that should be there in the reserve account, it will be the sum of let say the first 5 amounts in the debt service. So, that if you create let say for example, we create the sum of the debt service amounts for the first 5 periods.

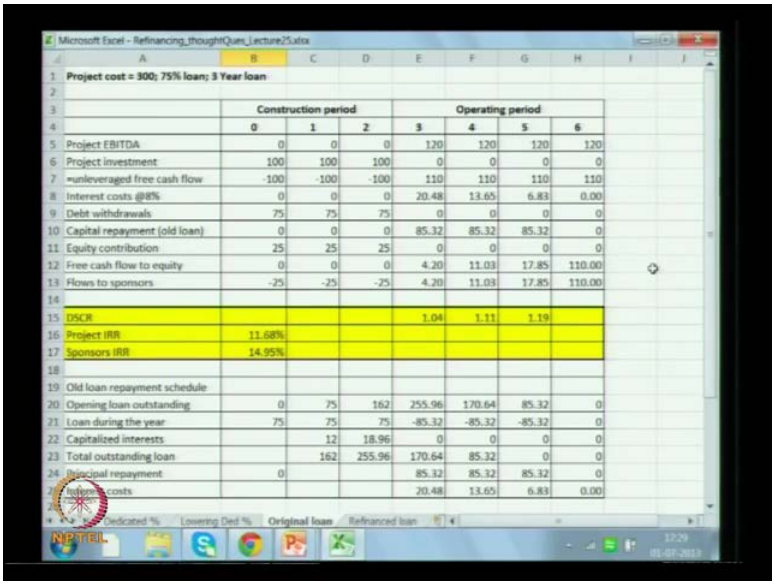
This will be the total amount that will be needed in the debt service reserve account, so this works out to be 464.88, so much of cash needs to be there in the debt service reserve account. Now, I will go to the scenario after refinancing when we lower the capital repayment of 60 percent, let us see how much cash needs to be there in the debt service reserve account. So, I am going to actually calculate the sum of the cash flow for the first 5 periods of debt service, so this is a debt service requirement for the first 5 installments. So, a sum total of all these is needed for the cash for the debt service reserve account, so this happens to be 398.47.

Now, when we compare the cash that needs to be there in the debt service reserve account as per the original, which is your 464.88, so you know there is a differentiate here. When you actually do a refinancing the amount of cash that is needed in the reserve account is lower than what it was the original repayment schedule, so with we actually see release of about 66.41 that was stuck up in the reserve account.

So, this cash that gets release can be very invaluable for project company, so this is one of the benefit of a soft refinancing. Next, we actually go to what is called as you are the second thought question, the second thought question is what are the advantages of refinancing using bonds as compare to a syndicated loan. In this case we are talking

about hard refinancing, we are not talking about soft refinancing, we are talking about a hard refinancing. We have a new set of investors who are buying out the existing lenders and what are the advantages of this kinds of refinancing.

(Refer Slide Time: 19:17)



Now, there are several ways, in which you can look at it, but I am going to present one perspective of this refinancing, again let me take example of a typical project and then see how it works. So, let us look at the original loan repayment period, so the project cost is 300 and the project is financed by 75 percent loan and the loan term is 3 years. So, if you actually look at project period the first 2 year is or the construction period, and then the next four year is the operating period.

And we have what is called as your project estimator ebitda, during the construction period; obviously, there are no revenues. So, therefore, the project investment the project ebitda is 0, but then during the operating period the project gets some revenues and we estimated to 120 in each of the point, remember you should also consider the fact that this is a very simplest example. And therefore, we have kind of assume the project ebitda to be uniform in all the 4 year and so on, but in reality in project you may actually not find instant spread the project ebitda is a same for each of the operating x.

And then we have what is called as your project investment, the investment actually happens during the construction period. Again, we have assumed the investment to be uniform in each of the 3 years, 100 now, 100 during first year 100 during the second

year. So, you have a what is called as a 300 and 300 investment happens equally in 0 1 and 2 and then we talk about the cash flow, and when we actually talk about the leverage cash flow.

Then you actually have a during the project construction period, there is no other cash flow, the only cash flow is the investment that is being made in the project, which is the nature of cash outflow. So, therefore, the free cash flow is nothing but a negative value of a 100, 100, 100. Actually, you actually look at in the operating period the free cash flow is nothing but the project ebitda, so actually you find scenario where there is small error here, this is not 110, but this equals the project ebitda.

So, I am going to make it equal to the project ebitda, so this becomes your 120, and then we have a interest cost during the construction period so; obviously, there are no interest that are paid. So, it is 0, but we assume that the interest is 8 percent, and during the operating period when the firm has cash flow then; obviously, they interest gets paid, then we have what is called as debt withdrawal. So, out of the total investment of 100, how much it being made by debt and we talk about loan component is 75 percent the balance coming by equity.

So, therefore, the debt withdrawal is 75, because of investment is 100, 75 percent is loan, so therefore the total debt is 75, so we have 75 for ad each of the 3 periods and then during operating period we are; obviously, not utilizing any for the debt. So, therefore, it is 0 0 0 0, and then there is capital repayment is a basically the capital that is being repaid during the construction period there is no capital repayment, so this figure turns out to be 0.

Equity contribution is 25 which is nothing but the project investment minus debt withdrawals, so this is 25 annum each of the periods and then free cash flow equity is 0, during the construction period. The equity holders do not get any profits, because there is only cash outflow, so this is 0. And then cash flow sponsors is negative 25, this is basically the investment that are actually making the project during the construction period.

So, next we actually calculate you know some of the other values in the operating period we actually pay interest, so this is 8 percent one of the interest that is outstanding. And then we have a capital repayment it is a 3 year loan, the capital less we assume is paid

uniformly during the 3 year period. And then free cash flow equity is nothing but after the debt has been paid, what remains to the equity holders, so this cash flow equity is cash flow sponsors, so therefore, both this sells are equal for all the periods.

So, next we now we actually look at how do we calculate the interest, there 0 we have taken a loan 75 and which becomes an opening loan of 75 in year 1, in year one we again take a loan of 75 and then we have a interest. For example, we have to actually when which start withdrawing a loan we; obviously, have to pay interest, but during the construction period, this interest is not capitalized, this interest is not paid, but it is capitalized the sense that it becomes pot of the principal.

So, therefore, when you look at and you look at a 2 the opening loan outstanding is also including the capitalize interest. So, this is one 62 is nothing but 75, the beginning of the project 75 of loans taken during the year 1 and then the capitalize interest. So, the total outstanding loan at end of the year 1, becomes a opening loan outstanding year 2, and we take a loan of 75 in year 2 and the total interest during the year 2 works out to be 18.96 which is nothing but 8 percent of 162 plus 75 is this 18.96.

So, the total outstanding loan at the end of year 2, becomes 255.96, so this 255.96 is the opening loan outstanding, when the project begins operations. So, the project begins operations the total loan outstanding is 255.96, and this is the loan amount that needs to be repaid in 3 years. So, therefore, what becomes what is the loan amount that has to be repaid every year, so we actually divide the total opening loan outstanding at the beginning of the construction by 3, and that I actually becomes 85.32.

We repay 85.32 in each of the 3 years and because of this repayment the outstanding loan at end of the year gradually reduces. For example, at the year of three the outstanding loan gets reduce to 170.64, because we have paid interest, because we have paid an interest of a you have pay you have repaid a principal of 85.32. We also have to calculate interest cost, the interest cost are nothing but 8 percent of the opening loan outstanding, so the opening loan outstanding is 255.96, and we pay 8 percent of that and the interest cost becomes 20.48.

So, this interest cost and this principal repayment is what is indicated here 20.42 and 85.32, so now, the free cash flow equity is nothing but is nothing but the cash flow that goes to the equity holders after servicing the debt. So, how do we do that, so for

example, I will you an illustration, so this is nothing but the free cash flow unleveraged free cash flow 120, and we subtract the interest that is being paid, and then again we subtract the capital repayment or the principal repayment. So, what you get is 14.20 which is the cash flow equity, so what calculate of the remaining values for year 4 and 5 like have indicator for indicator for year 3.

After doing this what will be able to calculate the project IRR and the sponsors IRR, project IRR is calculated using this cash flow details. So, what have an investment of 100 in the first 3 during the year 0 1 and 2, and then we have a cash flow of 120 each of the year from year 3 to 6, so project IRR is nothing but this IRR, I am going to use IRR function in excel.

And then used this cash flow to calculate the IRR, so it comes 14.55 and then if you look at this sponsors IRR. The sponsors IRR is calculated using the cash flow information given in this row, we have a cash flow sponsors and this cash flow sponsors are used to calculate the sponsors IRR, so this sponsors IRR turns out to be 22.78. Now, if you have actually looked at the debt service coverage ratio, the debt service coverage ratio as we have seen in the example of soft refinancing it is nothing but the free cash flow divided by the total debt service requirement, which is the interest and the principal repayment.

Remember, I mean what we are trying to do here is the debt service coverage ratio is a very simple approximation, that detail a debt service coverage ratio calculation will have to consider the tax, when we actually the tax the company will have to be paying for, so this will actually give you a figure of 1.13. So, before refinancing we have the following indicators the debt service coverage ratios 1.13 1.2 and 1.3, and the project and sponsors IRR happens to be as follows.

Now, let us assume that loan has been refinanced; that means, at the end of construction period the entire loan that is outstanding is being refinanced by a new form of flow. So, the project cost is 300, which is what it is and just what has been used for construction and 75 percent has been has been a loan like 15 year loan. But, then the original loan is refinanced after construction period by a 4 year loan, and this 4 year loan has an interest now 9 percent.

Why interest is 9 percent, because it is a long term loan and that for the interest rate is higher, we have already seen that the yield curve is positive slopping generally; that

means, as the loan maturity period increases we also will have an increasing interest rate. So, that is what we see here, so what we actually find I am actually going to change a free cash flows 120 here like a you have seen year all right. So, now, the refinancing happens of the total outstanding loan at the end of construction period, so we have 255.96 which was a loan that was outstanding at the end of construction period.

So, that loan is being refinanced by a 4 year loan with an interest rate of 9 percent, so this 250.96 repaid over a 4 year period the equal installment over a 4 year period is being repaid, so that is your 63.99. So, for example, if we divide 255.96 by 4 that will give us the amount needs to be paid every year, so that is 63.99 if is 63.99 every year, and we pay an interest of 9 percent on the outstanding loan.

So, the outstanding loan was 255.96 and we actually look at paying an interest of 9 percent on this outstanding loan at the beginning of the operation, so this is 23.04. So, similarly we will have to calculated the interest cost on the loan outstanding at the beginning, the loan outstanding at the end of year 3 was 191.97, because we have paid a principal of 63.99 during the year, and this outstanding loan at the end of year 3, becomes the opening outstanding in year 4 191.97.

So, we therefore, have to calculate the interest for year 4 based on this opening loan outstanding, so for example we have to calculate 9 percent of this opening balance which is 17.28. So, your actually calculate all the values for the remaining period as well, now let us compare some of the indicators in the original loan and the refinanced loan. Let us talk about project IRR, if you go to the original loan the project IRR was 14.55 percent and in the refinanced loan the project IRR is 14.55 percent, so the project IRR has not changed then what has changed.

Let us look at the sponsors IRR, the sponsors IRR in the original loan was 22.78, but if you look at the refinanced loan it is 24.71, so the sponsors IRR has increased, because of this refinancing. So, this is an important objective of refinancing you are able to increase the IRR of the sponsors, if you also notice the debt service coverage ratio has also increased it is 1.38 after refinancing, but whereas, in original loan it is 1.13.

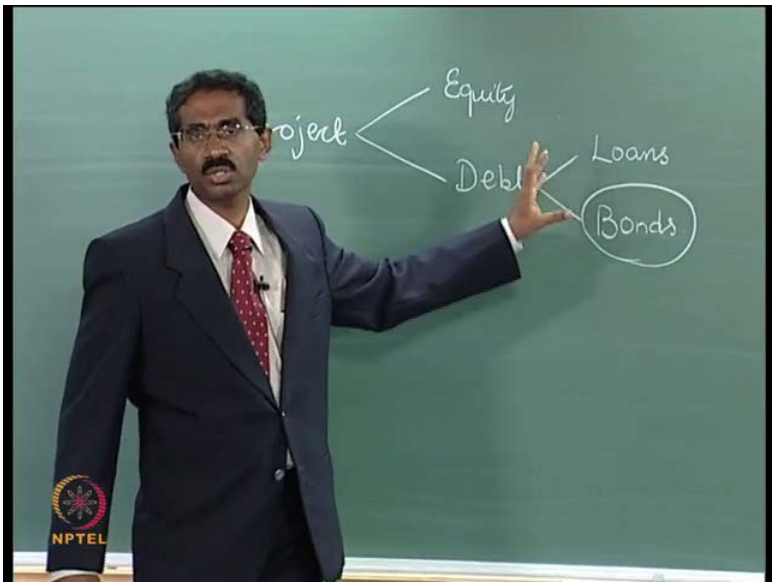
How has this increased this has increased, because the amount of debt service needed for each of the year has reduced, we are actually paying the loan over a longer period. So, therefore, the installment for each of the year has reduced, and therefore the debt service

coverage ratio has increased. So, these two examples will give you some benefits of refinancing, we are able to actually release a additional cash into system, and using a hard refinancing we are also able to increase the sponsors internal rate of return.

(Refer Slide Time: 37:36)

Now, after having discussion the thought questions, we will come back to what we wanted to discuss today, which is about project bonds, we have also talked about and loans in the previous lecture, but let me quickly submit up as to we want to mean by project bonds.

(Refer Slide Time: 37:52)



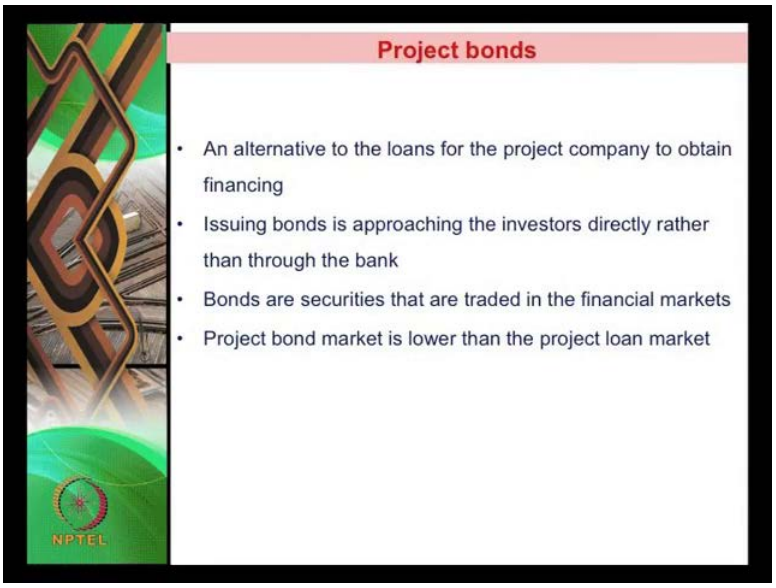
So, essentially if you want to look at a project is financed by two resources a very broadly, we have equity and then we have debt. And debt can be again classified into two categories one is your a syndicated loans, and others are bonds. So, when we talk about project bonds, I have largely mention to this are essentially in it is very, very similar to let say a loan. In the sense it also has a maturity period, it also has an interest that needs to paid, but it just that the investors are different in a loan as compare to a bond.

In a loan it is largely banks that actually common participate whereas, in the bond we actually have financial investors as well, and if the bonds are placed, if the bonds are you know publicly sold then you will have retail investors. And why do firms issue bonds, firm has two alternatives loans and bond, then why should firms issue bonds, so the logic is when you actually take a loan from the bank, where do the banks get their funding from.

The banks get their finding from the depositors or the banks get their funding from other financial institutions, so the bank does not have a you know generate cash on it is bank is financial intermediary by trying to get capital from others sources. So, the logic here is instead of approaching the sources of capital through a bank, the project company can directly approach a sources of capital, so you can directly approach financial institutions, you can directly approach retail investors.

So, that is a logic of issuing bond, if we actually bypass the bank has intermediary, there are some benefits. Obviously, there are some advantages of going through a bank, but there are some advantages, if you directly approach investors instead of through the bank. So, that is a logic why bond is an important source of financing the project, another important difference is a bonds are security that are traded in the financial market. You do not actually find syndicated loans being trade under very unless until, they exception circumstances, but bonds normally are traded in the financial market.

(Refer Slide Time: 40:27)



There are some restrictions in some for example, if you look at the private placement bond are there are some restrictions, you know how long you should continue to hold the bond before, you actually can sell it to secondary investor. But, there are there are several instruments and a schemes are available which tries to minimize the holding period. So, practically speaking bonds are lot more liquid for the investors as compare to a syndicated loan, another important characteristic of the project bond market is not as large as project loan market for various reasons.

A project loan, projects are very, very specialized entities, and it is going to be very, very difficult for the project to directly approach investors. So, therefore, approaching to bank is lot more beneficial, so therefore the project bond market is lower, but it should also remember that the project bond market is growing a very fast, and that is a very, very important development and that we should be aware of.

(Refer Slide Time: 41:35)

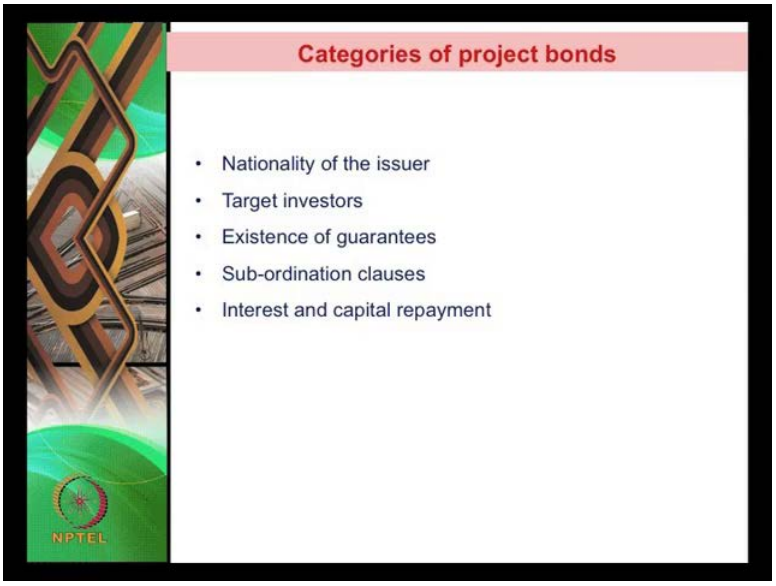
Next we are trying look at why is does a does a lot of growth in the project bond market, generally there are four main reasons one is the there is need for large infrastructure investment. And when the need for capital is, so large we need to tap as many sources as possible, we need to use as many instruments as possible, so therefore in addition to syndication loans, people are also using bonds as a source of capital.

And second institutional investors are looking for alternative investment opportunities, so in addition to existing investment opportunities that they have capital markets institutional investors like pension funds, mutual funds, university endowment insurance companies they are looking at investment in infrastructure assets. So, they have over a period of time develop expertise and understanding, and evaluating the risk of this. And if there is a good investment opportunity today they are willing to interested willing to invest, there is a demand from the institutional investors to a make this kinds of alternative investments.

And three and important feature in a bond is a, the bonds have to rated by credit rating agencies, and before we I should go out and sell the bond, the bonds should carry a credit rating. The credit rating is the indication of the quality of a the bond in terms of timely payment of principal, and interest and the retail investors look at credit rating as a very, very important information source in their investment decision making.

So, in recent years credit rating agencies have developed their expertise to rate project finance bonds, so therefore this is another factor that capitalized, the growth in the project bond market, because more and more markets are being rated by a credit rating agencies. And forth the experience of the project bond market has been positive, there is a lot of bonds issuing happened in the US initially, and investors in this bonds issuing have obtain positive returns. So, therefore, this positive experience is also another factor that is driving the growth in project bond market.

(Refer Slide Time: 44:03)



When you look at project bonds they can be categorized into various ways, we categorized based on the nationality of the issuer is it a domestic bond or a foreign bond. If the bond is being issued in the same country in which the issuer then it is a domestic bond for example, an Indian company is issuing a project bond market in the indian market, so that is actually domestic bond.

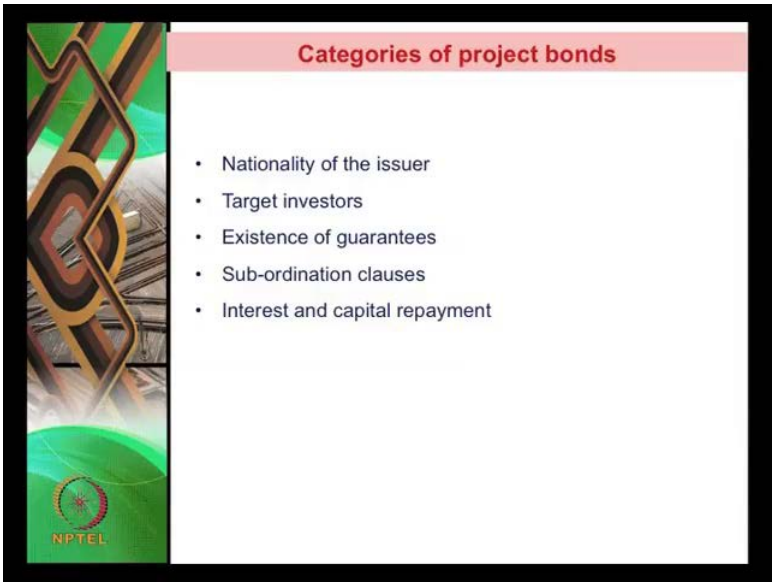
On the other hand, if an Indian company issuing the bond in the US then it becomes a foreign bond, so may nationality of issuer is a very important. And in most circumstances if the requirement of capital is very large, it is not possible to mobilize the capital from one market. So, therefore, you will have to look at getting capital from many markets, so you will have to look at not only domestic markets, but also foreign markets. Then bonds are also classified by an investors, in the bond see for example, whether you want to actually have institutional investors or whether you want to have retail investors.

And when you actually selling the bond to the institutional investors, it is called as what is known as private placement, so you actually instead of offering to the public you privately placed this bonds to institutional investors you make them subscribe to this bonds and then you get the capital. So, again there are both limitations and advantages of who your investors, are they going to be institutional investors are they going to be retail investors.

And then there is some there is a also existence of guarantees, should the bonds have guarantees and what kind of guarantees so; that means, we are talking about should the bonds be secured or it should be unsecured. When you talking about secured bonds so; that means, the cash flow to the project, to the bond holders or secured by the assets of the project. So, in this case in the project finance the assets are nothing but the cash flow, so therefore the lend the lenders the subscribers should of bond will actually have the first right, the cash flow that approach to the project.

So, there are there are there are unsecured bonds as well we talked about earlier, this are largely called as sub ordination bonds. So, normally when we actually look at it institutional investors will unlikely invest in a bond which actually has a junior claims that is subordinator. So, therefore, you always have a institutional investors investing in a secured, most cases your have institutional investors investing in unsecured loans.

(Refer Slide Time: 46:47)



And then we talked about the interest and capital repayment, how is the interest being paid, is it going to be fixer interest rate or is it going to be a floating interest rate. So, how is the capital going to be repaid, is a capital going to be repaid to during the loan term, or is it going to be repaid at the end of the loan term at one short. So, these are all some of the terminologies that we actually used to categorized the bonds, we will talk about terms some of this categories in garter detail in the following lecture, but to end this lecture I have the flowing questions for you.