Financial Management for Managers
Professor Anil K. Sharma
Department of Management Studies
Indian Institute of Technology, Roorkee
Lecture No: 37
Estimation of Project Cash Flows - Part IX

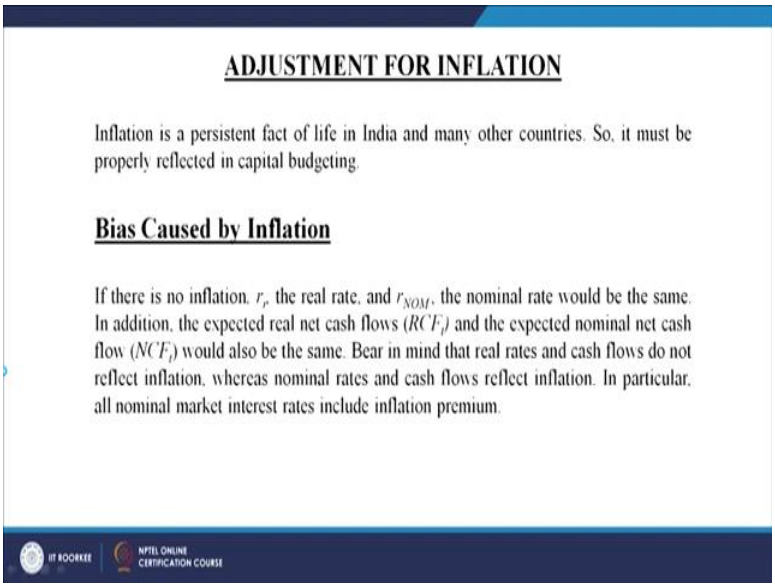
Welcome all, so continuing the process further in the Estimation of the cash flows for the new investment proposals, we will discuss in this class the last concept which is big regard to the inflation that is the adjustment for inflation in the cash flows that is an important component, important part of the estimation of the cash flows because, inflation is a very very necessary say feature of any developing economy like India.

And when we estimate the cash flows naturally because we are means getting affected, this economy is getting affected by the inflation and the prices are going to change over a period of time they are not going to remain stable, so the effect of the inflation must be reflected in the estimation of the cash flows also.

So, how to deal with that particular part and how to adjust for the inflation, how to reflect the impact of the inflation on the cash flows and how to take care of that we will discuss in this class and then in the next one or two classes I will discuss one or two more problems with regard to the estimation of the cash flows and then we will close the discussion on this particular topic and move to the next part that is the say risk management in the capital budgeting proposals that is the next topic.

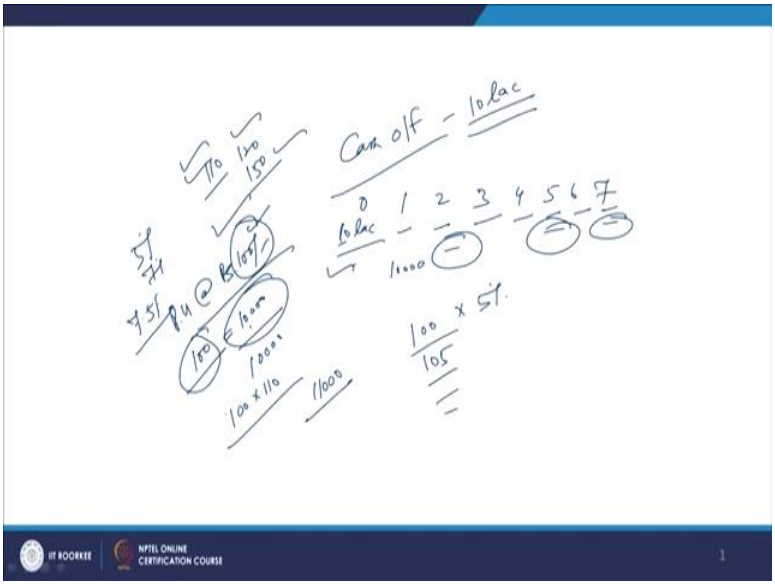
So now, in this class we will learn very clearly that in estimation of the cash flows how to adjust for the inflation, because inflation is a very very important necessary you can call it as the feature of any developing economy.

(Refer Slide Time: 02:02)



It is written here that inflation is a persistent fact of life in India and many other countries, so it must be properly reflected in the capital budgeting process. So, because when we are estimate the cash flows we are not going to means give shape to the business or to the project now, that will be in some future period of time, so when we are going to estimate the cash flows because, the cash outflow.

(Refer Slide Time: 02:26)



When you go for the cash outflow that is in the current period so, for example we required to invest say 10 lac rupees in the project or the 1 million rupees investment is required. That we are going to make in the current period, so inflation is not going to impact that. But, when you going to say that our than expected life of the project is say going to be next 5 years or 6

years, so in that case for example 1 2 3 4 5 6 7 years, so in this case we are going to, now the, say estimate the inflow so this is a 0 period when we are going to invest 10 lac rupees.

This is going to be the cash outflow and in the subsequent years from the year of one onwards at the end of every year we are expecting some cash flows, so when we are expecting the cash flows so it means, we are expecting this may be say at the end of the first year how much cash inflow will be there, so when you say that cash inflow, so price level of the different may be input as well as outputs is different today and after one year it will be say different, certainly it will be different because, the price does not remain the same because of the influence of the inflation.

So, we may estimate that for example if inflation is 0, there is no impact of the inflation, then the cash inflow in the at the end of the first year will be 100,000, but because we are estimating that the price level will be the one which is say presently adjusting, the adjusting price, for example, the product we are going to manufacture per unit we are going to sale that in the market at the rate of rupees, 100. But, this 100 is the current price, 100 is the current price and, for example, we are going to manufacture 100 units per year, so it means total cash inflow will be 10,000 rupees but, this is going to be 10000 rupees if the price remains 100 rupees per unit.

But if the price becomes 110 rupees or price becomes 120 rupees or price becomes 150 rupees, so it means though the number of units are going to remain same, which we are manufacturing and selling in the market. But since, the price is changing from the 100 to 110 and 120 and 150, so it means this value of the 10,000 will also change accordingly, so what will happen, when we are estimating the cash flows these cash flows must be adjusted for the inflation that we are saying that at the end of the first year, by the end of the first year the per unit price will be that is expected per unit price is 100 rupees or say current price is 100 rupees so, maximum you can expect to change of 110 rupees.

So, this revenue for example we are expecting this revenue of a say 100,000 rupees or may be 10,000 rupees for 100 units at the rate of rupees 100. 10,000 rupees, so it will not be same at the end of the year because, price will change from 100 to 110. So, in this case what we have to do is, you have to adjust for this and the 100 units must be multiplied by 110 and when you multiply it by say 110, so the amount is going to be different their amount is going to be 10,000, but the amount is going to be 11,000 so, this inflow is going to change.

Number of units is remaining the same to 100 but the price is changing. So, requirement here is, that whatever the cash flows they are estimating here we have to adjust it for the inflation, because we are going to talk about the next 7 years, we are not going to talk about the next 1 year or 6 months or 3 months. We are going to talk and estimate the cash flows for the next 7 years period of time.

Where your say price of the input will also be changing, price of material will be changing, level will be changing, overheads will be changing, and when the price of input is changing, when the input cost is going to go up, so certainly the price of the output is also going to increase. And since, inflation is going to play the role, for example, inflation today is 5 percent, tomorrow it becomes a 7 percent, it becomes say 7.5 percent. So, what is happening? Accordingly all the prices are going to change, so whatever the inflow we are going to predict here or estimate here.

There are two ways for that one for that is, that either you say show these figures these cash flows as a real cash flows or second could be that is the inflation adjusted cash flows, real cash flows or inflation adjusted cash flows. If you talk about the real cash flows it means you can say you are assuming that the price of our finished goods which will be selling in the market will be as same as the price is today. It will not be influenced by the inflation and that is not acceptable, that is not a correct process, because certainly the price will change, price will increase.

You can be sure about the production that what capacity of the plant we are going to have, what capacity of machinery we are going to have, what kind of the technology we are going to have, what kind of the raw material is available in the market, we are sure about that. But we cannot be sure about the selling price in the market, because when the input price will change certainly the output price has to be change, keeping our profit intact.

If you do not change the output price so what will happen? Either the firm will start incurring a loss or we have to compromise with our own margin, our own profit, and if we are not earning any profit and margin then what kind of the business we are doing. So, it means we have to deal with this inflation factor. So, when we are looking forward into future and not for one or two years, we are looking forward into future for the next 7 years, so inflation rate will be different here, it will be different here, it will be different here, it will be different here, and it will be different here in all the years. It may go up or it may come down.

But since, we are the developing economy, we are a growing economy, so we expect that the rate of inflation is always going up, so we will have to say first we have to find out the real cash flows and then we have to means multiply them with the inflation factor and then the real cash flows will be able workout. So, it means in nutshell we can say that when you are going to say predict the cash flows, estimate the cash flows always account for the inflation factor and adjust those.

Even the cash outflows also. sometimes it may be possible that cash outflows are not required in 0 period, they are required here also, they are required here also, they are required here also, so when it is required here, fine it is at the current price, but when it is required here also, when it is required here also, when it is required here, then how, it means the price of input will change.

So, we are expecting that we will be investmenting here, 10 lac rupees and we will be investmenting as per today's price is 1 lac rupees again, 2 lac rupees again, or 2.5 lac rupees again, that is as per the today's prices. At the end of the second year what will be the price of input, so it means outflow will be changing certainly the in the fifth year what will be the price of input, so you are estimating the inflow on todays as per the todays real price that will not be the same.

So, both outflows and inflows have to be adjusted for the inflation and we have to then calculate the net present value depending upon that at what rate your inflows are growing and at the same time second important concept is the discount rate. Because if the discount rates are say remaining the same what is the discount, what is the cost of capital today. The cost of capital today may be 12 percent but, because cost of capital is otherwise related to the rate of return.

Cost of capital is not only simply the say cost of borrowings from the market, that is more than that and that is basically the as per the required rate of return. So, when you are talking about the cost of capital ,we are taking into consideration the weighted average cost of capital WACC which includes a cost of equity also, which includes a cost of debt also, so it is not simply the cost of equity and cost of debt plus some premium for the risk we are taking.

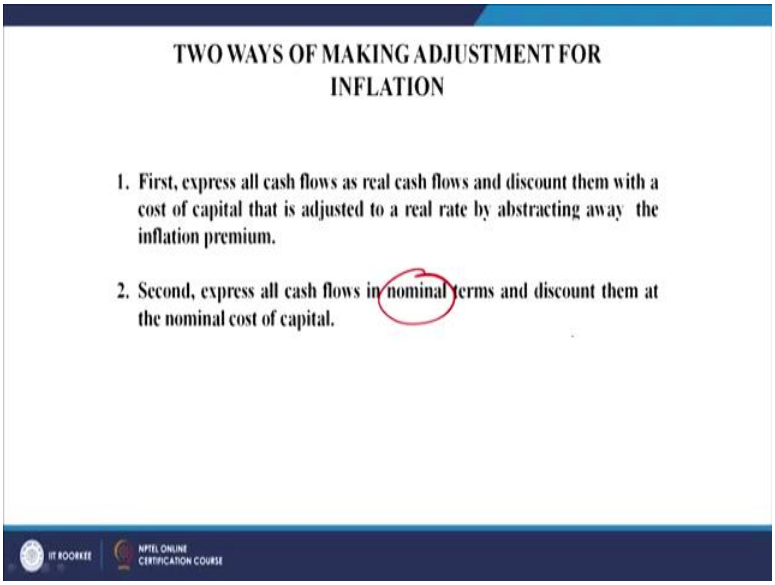
So it has to be more than the say standard cost of the borrowings. It means it is not the rate of interest that which we are going to borrow the funds, we are going to add up the equity cost also. And equity cost includes the premium for taking the risk because, the promoters are into the business they are not into any activity which is without any kind of risk, so once we are

taking the risk we are expecting the compensation for that so, it means weighted average cost of capital when you are going to use as a discount rate that is also going to increase over a period of time because, value of rupees going to decrease, value of money is going to decrease.

So, rate of return expected or cost of capital which is 12 percent currently cannot be after one year cannot be same after two years or three years or five years or seven years down the line. That has to change, so certainly when your numerator is changing, when your cash flow is getting adjusted for the inflation certainly your discount factor also has to be get say go adjusted for the inflation then the real say you can call it as the correct NPV figure can be worked out.

So, it is a complex decision it is very means because, dealing with the inflation is not easy process it is not easy job, it is a complex decision, it is a complex process. But, somehow we have to find out the solution to the nearest possible extend so that inflation does not create the problem. So, here what we are going to do, we have the two ways of making adjustment for the inflation what are these two ways.

(Refer Slide Time: 12:24)



First is express all cash flows as areal cash flows and discount them with the cost of capital that is adjusted to a real rate by abstracting away from the or by abstracting away the inflation premium. A real cash flow we assume that no inflation is going to be there, what is the current price level that will be same after one year, after five years, after seven years. And at the same time the discount rate will also not change, that is what is the cost of capital today that will be same after 5, 7 or whatever the number of years are.

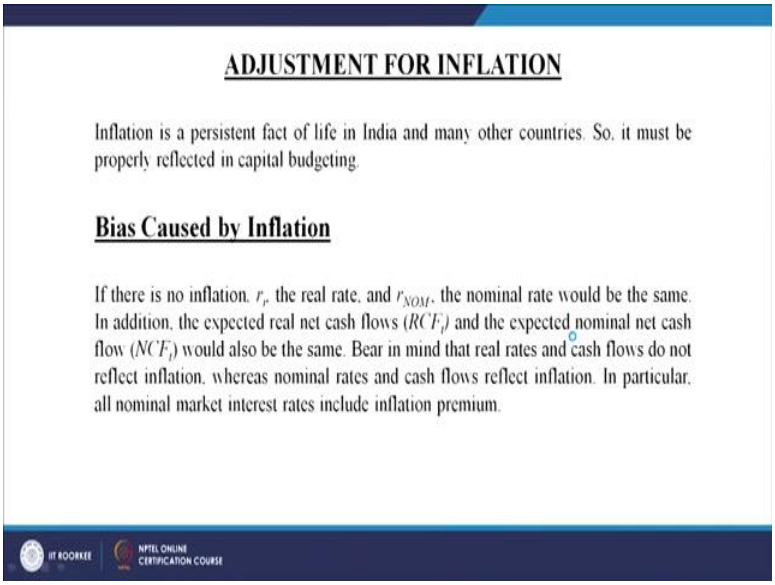
So, it means when the numerator and denominator are not adjusted for inflation then, yes there is no issue then whatever the NPV you are calculating that is going to help us to arrive at the right decision. Second is, second option available is,, second method available here is, second, express all cash flows in the nominal terms and discount them at the nominal cost of capital. And when we use the nominal here, nominal means it is the inflation adjusted cash inflow.

It is the inflation adjusted cash flow, so it means in the nominal term you can say that the say our inflation will be this so can price is 100, selling price is 100, and inflation will be you call it as the 5 percent, so what will be there, the next year the selling price will become 105 and after that whatever the level of inflation is going to be there, so accordingly your price will be changing.

So, as a selling price is changing per unit, number of units remaining the same your total revenue expected from the project will also be changing towards the higher side towards the upper side so we have to means adjust for the inflation. And similarly discount rate will also be changing because, of cost of capital will be changing required rate of return will be changing so, both have to be done, and when you talk about the in the real life so, it means second way is more relevant because, inflation is a un avoidable phenomena of any developing economy of any growing economy.

So, when the inflation is going to impact the cash flows inflation is going to impact the cost of capital, inflation is going to say impact the discount rates so, why not to say take care of that why not to adjust the inflows for the inflation and the discount rates in the same way for the inflation that will give us the better results. But the million-dollar question here is, it is a very tedious job because, predicting the inflation over the next 5 to 10 years period of time. And then multiplying the real cash flows with the inflation factor will sometime be a cumbersome job, but we have do it in anyway.

(Refer Slide Time: 15:10)



So inflation is a persistent fact of the life in India and may other countries so it must be properly reflected in the capital budgeting it is a point of question here then only the real cash flows will be possible to be worked out. Bias caused by inflation, bias caused by inflation or read this statement very carefully, if there is no inflation, and then the r r real rate and the nominal rate that is the r nominal rate, the real rate and the nominal rate would be same.

If there is no inflation, then what is the difference in the two because, what is the selling price today that will be same but 10 years down the line, so when there is no change in the selling price because, there is no inflation, then there is no issue problem is solved, life is very simple. But, that is not happen. In addition, the expected real net cash flow RCF for a given period t year t, and the expected nominal net cash flow NCF for the given period t which is affected or means say multiplied by the inflation factor would also be the same.

Then real and the nominal cash flows will be same which means both the things are going to be same, your discount rate is going to be same because, cost of capital is going to remain stable your cash flows are going to be same, there is no difference in the real cash flow and the nominal cash flow, so inflation is assume to be say in this case as 0, and it is not going to affect, there is no inflation at all.

And there is not going to be any difference between the real cash flow and the nominal cash flow, where in mind that the real rates and the cash flows do not reflect inflation when you are assuming the price will be same what is today that will be same after 3 years, 5 years, or 7 years then, you can say that will be the real cash flow whereas nominal rates and cash flows

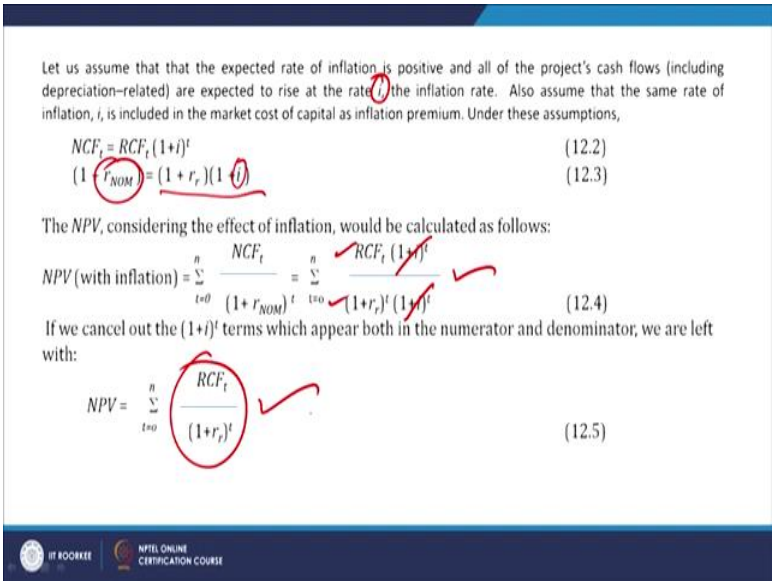
reflect inflation, where in mind that real rates and cash flows do not reflect inflation, whereas nominal rates and cash flows reflect inflation.

In particular, all nominal market interest rates include inflation premium. So, it means what will be the problem now, estimation of the cash flow is in our hands but, discount factor is not in our hands because, cost of capital will change in the market. Interest rates will also change, cost of equity will also change, so when the discount rate is inflation adjusted then why not the cash inflow, the numerator but we write that, that is the cash flow in the year t divided by 1 plus r in the year t.

So, we give the power so it means when both numerator and denominator are inflation adjusted because, denominator is largely inflation adjusted, because whatever the cost of capital we use, the discount rate we use, that is in the, that is the market based and that is already discount, inflation adjusted.

So, when you cannot change the denominator, we should make the numerator also same, as the denominator is and then calculating the NPV in that capital budgeting process will give us the better results. Better way of comparing the present value of the cash outflows with the present value of the cash inflows and the NPV worked out of the project will be more correct or nearer to the truth.

(Refer Slide Time: 18:45)



Now, this entire process will explain us the whole thing very clearly, these all, all these equations will help us the entire thing very clearly, first thing is let us, assume that the expected rate of inflation is positive, and all of the projects cash flows including

depreciations of the projects cash flows including depreciation related are expected to rise at the rate i that is the inflation rate we are assuming the inflation rate here as a i, and that is the inflation, I mean this inflation rate.

Also assume that the same rate of inflation is included in the market cost of capital, it is anyway included in the market cost of capital as inflation premium. Because, cost of capital keep on changing. Cost of capital keep on rising in the market, so as a inflation premium, under these assumptions, what these assumptions are, your inflow is also, inflation adjusted and your discount rate is also inflation adjusted. So, what will happen?

Here we are creating now this situation NCF, nominal cash flow for the period t, any year is equal to real cash flow multiplied by 1 plus i for the year t so, it means 1 plus i is what, 1 plus i is basically the i is basically the inflation rate. For example, inflation in the market is 3 percent from 0 to 3 percent so it means certainly your price will grow by 3 percent. Price of the input will also grow, price of the output is also expected to grow by 3 percent and certainly, when your 100 units are going to be sold for 100 not for 100 rupees per unit but for 130 rupees per unit.

Next year it is going to become 105 rupees per unit certainly it is going to impact your net nominal cash flows. So, it means nominal cash flows can be worked out that first you calculate the cash flow without giving any effect of inflation to that and that will be known as the real cash flow. And then you multiply the real cash flow by the expected inflation factor that is only thing we are doing here, RCF real cash flow for the period t multiplied by 1 plus i power t.

And in the simples terms we have written here 1 plus this is the, say this is for the cash flow this is for the upper part is for the cash flow that is equation 12.2, since for the cash flow and the lower part is for the discount rate, so discount rate we are taking here as 1 plus nominal discount rate, nominal discount rate means which is the inflation adjusted discount rate, which is not a real discount rate.

So, how it will be calculated? It will be calculated on the basis of this that is 1 plus r, that is 1 plus real rate of return. Yes, real rate of return multiplied by 1 plus i that is the inflation, so it means when the real cost of capital or rate of return will be multiplied by the inflation growth or the inflation factor which is i here in this case also. So, it means you will be able to find out this particular thing which is called as nominal rate and cost of capital will become nominal because, the real arte is multiplied or adjusted for the inflation.

What is next thing written here? The NPV considering the effect of inflation, NPV considering the effect of inflation would be calculated as follows. How, NPV with the inflation, NPV with inflation when the cash flows are inflation adjusted and discount rate is also inflation adjusted, so NPV with inflation is, nominal cash flow, which is real multiplied by the inflation factor for the year t divided by the 1 plus r that is a nominal r is nominal now, because it is also adjusted for the inflation that will be equal to RCF, real cash flow multiplied by the inflation factor and the discount rate also 1 plus r multiplied by the inflation factor.

So, in this case what is common, this is common, if you subtract it, so you are left with this part, you are left with this part and we are left with finally this part. So, NPV will be calculated now, that is the real cash flow divided by the say 1 plus r that is the real discount rate. So, it means what I mean to say here is that, if the inflation factor is not taken into account, if the inflation factor is not taken into account then what will be there will be, say discounting those cash flows which are the real cash flows with the real discount rate which is not influenced by the inflation factor at all.

So, in that case it is then, a say immaterial whether you calculate the net present value with the nominal cash flow and the nominal discount rate or real cash flow or real discount rate, because both the things are going to same. Your numerator is same denominator is same in this case whether this is the inflation adjusted say cash flow and discount rate and this is the real so if we cancel out, 1 plus i power t terms which appear both, in the numerator and denominator we are left with this part, and basically it is called as the say real cash flow to be discounted with the real discount rate or cost of capital.

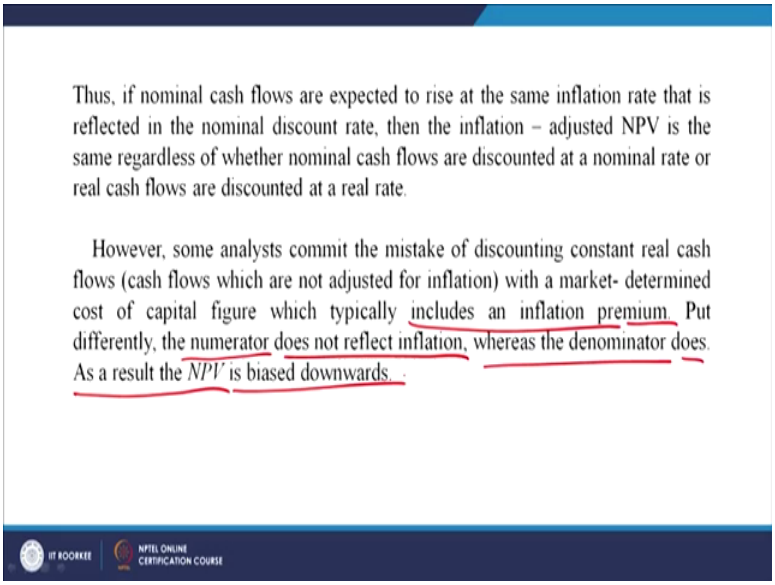
So, in that case, if you are following this or if you are following this it does not make any difference, while calculating the NPV of the project, because here both are inflation adjusted, numerator and denominator in this case and here both are not adjusted, when the problem comes up that when the real cash flows are going to be discounted by the nominal discount rate then the NPV of the project will be downgraded. Then the NPV of the project will be downgraded then comes a problem.

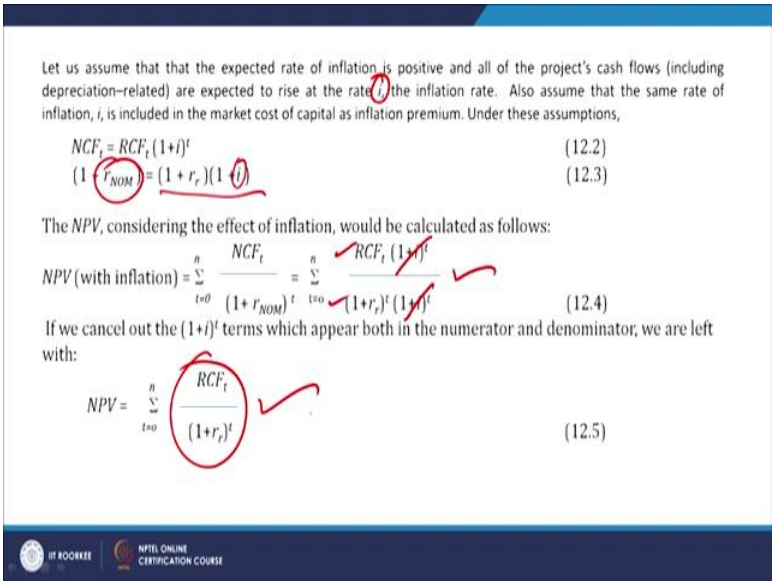
When you have not in say adjusted that numerator cash flows are real but discount rate you are picking up from the market being it as a cost of capital and that is inflation adjusted so it means there will come the problem that you are deliberately keeping your numerator smaller as compared to the denominator and then whatever the NPV we are calculating, even in that,

in even in that case a project which is going to be a profitable proposition, which is going to be a beneficial proposition, may turn out to be a negative say proposition because we may find up, find out or we may be end up with the outcome that the project is giving us a negative NPV because, NPV has been wrongly calculated.

So, it means we have to abandon the project. So, we have to very careful while discounting the cash flows and we have to be means very clear in mind that if the discount rate is marked or the inflation adjusted your numerator cash flow also has to be nominal which is inflation adjusted and if it is, the real discount rate then, yes, the numerator can also be real, because no influence of the inflation is there on the numerator as well as on the denominator.

(Refer Slide Time: 25:37)

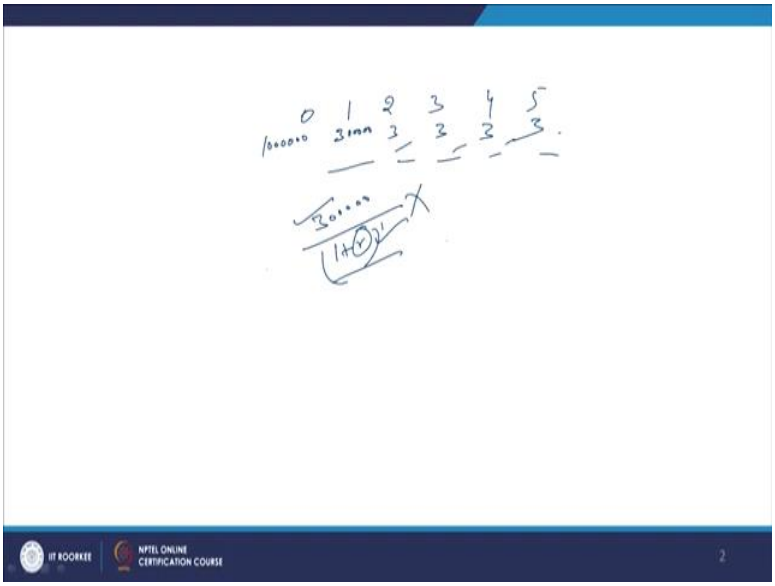




Thus, if nominal cash flows are expected to rise at the same inflation, thus, if nominal cash flows are expected to rise at the same inflation rate that is reflected in the nominal discount rate then the inflation adjusted NPV is same regardless of whether nominal cash flows are discounted at the nominal rate or the real cash flows are discounted at the real rate.

This is what I am saying here, if you are multiplying both, if you are adjusting both numerator and denominator in this case so it is the nominal cash flow discounted by the nominal discount rate and this is the real cash flow discounted by the real discount rate so, it means no issues, no problems are going to be there. However, some analysts commits the mistake of discounting constant real cash flows, cash flows which are real constant means the cash flows which are not inflation adjusted or adjusted for inflation.

(Refer Slide Time: 26:47)



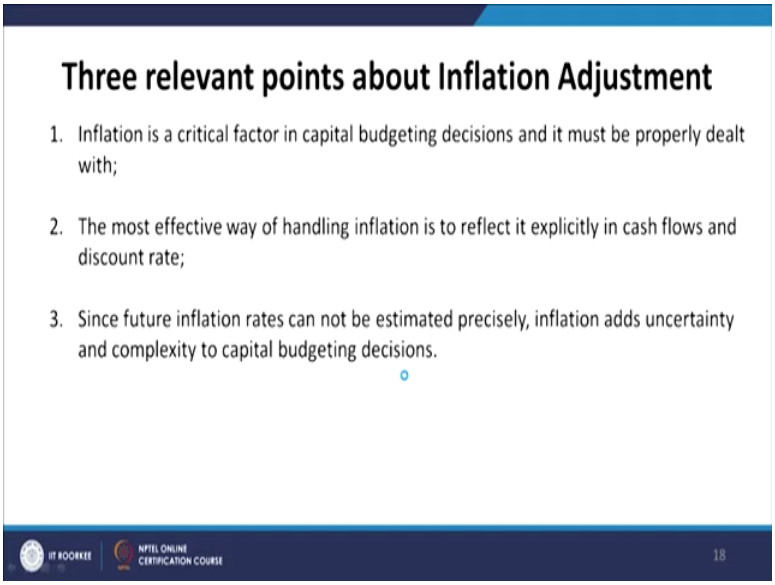
Normally we have seen that when we are going to find out the cash flows what we do here is, we show that say we have the 0, 1, 2, 3, 4, 5, so we show here that we are going to have say a 10 lac rupees is going to be the investment we are going to make here, and then the inflow will be something like a say 3 lac rupees every year, 3 lac rupees every year here also 3, here also 3, here is also 3, here is also 3.

This is we are going to create a problem here, because then there is a inflation in the market and when we will use the cost of capital is a discount rate for discounting these, so what we will do, we will write 3 lac here, and discounted by 1 plus r and this r for the first year when you pick up the r, then r will be picked up from the market and this r will be already adjusted for the inflation, it will be little higher because the inflation adjusted discount rate will be certainly higher than the real discount rate.

So, what will be there? We are treating it as a constant same, same here all, but this is considered as a influenced by or adjusted for inflation and the problem will come, so this is a wrong approach. Do not follow this approach we will have to always take care of both numerator as well as the denominator. So, it is clearly written here however, some analyst commits the mistake of discounting constant real cash flows, cash flows which are not adjusted for inflation, real cash means cash flows which are not adjusted for inflation with the market determinant cost of capital figure, which typically includes an inflation premium, which typically includes an inflation premium.

Or in other way around which is adjusted for the inflation. Put differently the numerator does not reflect, the numerator does not reflect the inflation, whereas the denominator does reflect the inflation as a result the NPV of the project is, Biased downwards. We are wrongly committing a mistake and we are calculating a wrong NPV because we have under mind the importance of the project because, you are discounting the lesser, lower stream of the cash flows with the higher discount rates, so NPV has to be negative or certainly lesser than what is normally expected.

(Refer Slide Time: 29:18)



So, finally I would say that 3 important points are relevant in say when you talk about the inflation adjustment in the capital budgeting proposals. First point is, inflation is a critical factor in capital budgeting decisions and it must be properly dealt with. It is a critical factor in the capital budgeting decisions and it must be properly dealt with. So, whatever I discussed just now, it should be seriously taken care of, and both your cash inflow as well as cash

outflow is not a problem if it is only in the 0 period, if it in the subsequent years also, then yes, then you have to adjust the cash outflow also.

Suppose, the numerator and denominator has to be adjusted but the problem comes here, the bone of contention still remains is at what rate you are expecting the inflation to grow. So, that is a tedious job, but still to the extent we could say predict the inflation we should do that. Point number 2, the most effective way of handling inflation is to reflect it explicitly in cash flows and discount rate, both you mean multiply both the numerator also and denominator also, you multiply by the inflation factor.

And third point is since, future inflation rates cannot be estimated precisely. This is what I want it to tell you, since future inflation rates cannot be estimated precisely inflation adds uncertainty and complexity to capital budgeting decisions, inflation adds uncertainty and complexity to capital budgeting decisions. So, means overall the capital budgeting decision overall itself is a complex decision because on here in the academics, how simple it looks like it is not that simple in that way.

I told you many times as I refer to the example, for example that anchors proved projects, they also had done all these calculations, DPFR was also prepared, the market demand survey was also done, technical analysis was very sound, and everything was got weighted and approved from the say the practical or the practitioners or consultants in the market. And after that when they made the investment of 350 crores cash outflow of the 350 crores that ended up with the say the failure of the project.

So it means despite doing all, everything, estimating the right cash flows say you can call it as adjusting it for inflation and identifying the right, say discount factor, depending upon the cost of capital in the market at that time, it is all means all precautions are taken all say cares are taken but, sometimes the complexity still remains, uncertainty still remains in the overall decision of capital budgeting and in inflation adjustment or say finding out the inflation adjusted cash flows and discount rate adds further to the complexity and uncertainty of the capital budgeting decisions.

But still we have to be very careful and while say estimating the inflows even subsequent outflow and discount rates we should mean either go for nominal or real but, both at the numerator level and at the denominator level. In both the cases then the problem is not going to be there, largely we are going to solve the issue before any problem comes up, so this is all I means stop the say conceptual discussion on the estimation of the cash flows. We have

discussed almost everything concerning the estimation of the cash flows, all important issues I have dealt with and I have discussed here with regard to this particular topic.

So, conceptually the discussion is over, theoretically the discussion is over, and in the previous class is also we have done one or two problems, one was with the, the simple problem, one or two further simple problems and the one was the replacement problem, so in the next one or two classes I will do one or two more problems, one may be the simple and another may be the replacement of problem again and after that we will close the discussion on this particular topic.

And for the detailed reference, you can again refer to the book that is Financial Management by Prasanna Chandra and detailed discussion very nicely given in that book. I also have taken most of the things from that book, so you can means refer to that book for your further readings and further understanding and clarity on the different topics including the estimation of the say cash flows in the capital budgeting, say project evaluations and decisions. Till then thank you very much.