Money and Banking
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Lecture - 3

What we did last in the last class is to talk about traditional money and how it developed. It was initially metallic coins made out of precious metals. Then, they shifted to non precious metals and then, some form of paper currency came. So, banking institutions were coming into existence. Then, what happened was, proper paper currency was invented, which we have now and I read out from Indian currency, what are the things written on it. Therefore, this became the most common form of currency in most countries and we have a fractional currency system in most countries.

So, coins are a small percentage and paper currency is a dominant one. But, that was not making everybody happy when it came to a means of transaction. So, what happened was, the checking system developed. Accounts in banks with checking facility and that really helped people. Because, you can write a cheque, make a payment or you write a cheque and withdraw your money. That helped people and that was a significant development after paper currency.

Now, there is also something in the literature, which they call near money. Near money is essentially money, which is not as liquid as money that we have just talked about, which is currency which we have in our pocket, in our savings accounts, or in a locker. That money is the money that is not as liquid as the money we have. Near money, I gave you examples of fixed deposit accounts, money, mutual funds etcetera, which are near money. In the sense, it is not exactly as liquid as cash. That is why the word near money is there. This, more or less sums up the traditional forms of money.

Now, in modern age, when you come to modern money, what we see is various kinds of cards through which you can make a payment and various kinds of, because of the internet, last 20 years or so, we have various kinds of e-money, electronic money. Now, you know you are more aware of these kinds of modern money than I am. For instance, when I was your age, I saw cards and I remember in one of the prime business locations or the office areas of Calcutta, there used to be this big office. I use to see that and some

person known to me used to work there, which was the American express office, where they used to probably provide facilities, card facilities to select customers, visa, etcetera; American express card, visa. This card, we used to call them charge card, where digital revolution did not take place, where these cards can be used to make payments. Then, when I went abroad for higher studies, I found no electronic money still. I found there are other companies also providing such facilities, like master card, etcetera.

So, the card system, the charge card, probably is one of the oldest forms of, other kinds of money, which is modern money, where you do not carry cash. You make payment with the help of a card and then, the company who sells you goods will carry those transaction amounts to your bank and your bank will remit that amount to that seller from your account. Alright?

So, naturally cards were provided to people who have sufficient amount of money in their savings accounts. Fixed deposit account would not help. The accounts which will help to make the payments are the savings accounts, which are called demand deposit accounts. In monetary economics or banking literature, they are known as demand deposit accounts. Not time deposit accounts. Time deposit accounts are fixed accounts. Demand deposit accounts are savings accounts, for instance. Alright.

So, cards were there. These cards, these charge cards also had another name called credit cards. These credit cards exist. But then, you know, these credit cards, in addition to that, when I was a student in the early 1980's, the bank told me, you can now also have another card, which is not a credit card. I never had a credit card as a student. Of course not. He said, they said, you can have an ATM card or they used to call, they are instant teller machines, ITM cards. It is also known in India as ATM cards, automatic teller machines. What happened with these cards is, if you do not have cash, you go to an ATM machine and withdraw money. So, you are not making a payment with the help of the card, but, you can use the card to withdraw cash from your account, which otherwise what we do usually is, go to the bank and withdraw it. So, beyond banking hours, you can use the ATM card or even during banking hours, you can use the ATM cards. So, the ATM cards came into existence.

Then, a number of other cards that have developed, which you know, I do not use them. I still do not have them. One is called a debit card, which is probably slightly different.

Because, in the debit card you have, electronically, essentially these cards enable consumers to purchase goods by electronically transferring funds from the bank accounts to a company's account. So, debit cards are making use of E-money. So, if you have a debit card, electronically you login in into your account and then, transfer money from your account to. So, the debit card and the E-money are simultaneously being used. But, the more sophisticated form of debit card that has developed in Europe first, in England and some European countries and now, it has come here are known as the smart cards.

The store value cards, where electronically this card carries some cash in digital format. So, when you go to a bank, when you go and make a payment with it, the seller of the good immediately knows that there is some cash in it and he can just take that cash out. Like, the one's we use smart cards in, for instance, even in children's hobby centers, in say malls etcetera. Like the z square mall, they gave us smart card with digitally stored cash with whatever cash I gave him. Then, as soon as my daughter or son plays something, some amount gets deducted and automatically, electronically, recorded in it. So, these are digital developments and cards becoming more sophisticated. It started happening simultaneously. They did not happen separately.

So, these are the modern forms of money, that, which is horrendous because, now how do you keep track of value of transaction. Earlier it used to be only through the bank accounts. So, now with electronic payments etcetera, anyway it is a different story. Now, smart cards can also be, these stored value cards, can also be used as ATM cards. They are multipurpose cards. They are used as charged cards, or they are used as ATM cards. They are used for various purposes. You can also use that for ATM machine to actually withdraw cash or you can use that to make a payment, like our credit card system, visa and MasterCard, the old system. They can all there.

Then, of course, you have e-accounts, electronic transfers in simple forms without a card. You need a login ID to a bank account and you can make the electronic purchases. As soon as the money is deposited in the seller's accounts, they deliver the goods, provided you trust the sellers. Once you transfer the money, it gets delivered. It has to be respectable seller whom you can trust. Problem here is, the buyer does not know the seller. With electronic system, you are buying a good in US market sitting in India. The buyer does not know the seller or even within the country, the buyer may not know the seller. You are not visiting the shop. You are doing an online shopping. So, there has to

be a degree of trust with this kind of money at different kind. Earlier, it was, is this coin or currency acceptable to everybody? That was the issue. So, they had the emperor's portrait or the queen's portrait on the coin. Then, they became the paper currency, which is backed by the central monitory authority with everything written.

I read out the paper currency. How much it is written. You should read how much material is just printed on it. We use notes every day, but, we do not read what is written on the notes. So much is written; so much. Quite a few lines of text is there. So, it is a question of trust also and confidence that emerges, whether if you make a payment, whether you will get the thing back or not. Electronic checking system has also developed; just not account to account transfer; electronic checking systems.

So, modern money has taken the form of, because of internet and this digital revolution, this card systems. Even IIT Kanpur ID card is a smart card. It has all sorts of information recorded in it. My blood group, my name, my house number, all such things are recorded. One day we may have these lecture rooms with this locking system, where you have to use this ID cards to get in. You cannot get in probably without it. Like the high security zones, we have these kind of digital cards used. Only a few or say finger print, another form of recognition. They use finger prints, then eye is also very distinct and these cards, in high security zones they use that usually, and government offices etcetera may be.

Now, this path is a short path to electronic money, which you know more because, you use electronic money. I still do not use electronic money. So, I have very little experience with the, except with the automatic teller machine cards, I knew. Now, automatic teller machine cards were also used and still can be used to make payments. They carry these contours, carry envelopes and when you make a payment, you can get the receipt, put it in the envelope, seal it and then, there is a post box like a box, where you drop it.

Automatic teller machines, abroad at least, I have found many years back, 30 years back. You can withdraw cash, but also you can use those machines to make payments with the help of cheques, checking systems and envelopes. There used to be envelopes and those machines, the envelope will come out, and you put the receipt. Or, you have a cheque book, you write a cheque, put it in there and put it right there. Bank has a responsibility

to make that payment to the, say the electricity supplier or the telephone bill payment or whatever you are making a payment. Alright. So, they have many facilities developed there many years back.

Now, I come to the debt instruments, which is very important. Before I come to the debt instruments, these are various kinds of systems, the institutional systems that exists in a country. Before I talk about, this is an introductory part I am doing. I am talking about money. How it is used and how commonly we have seen money in the country. Now, before I do that, the debt instruments, because this is a very important concept that is coming up, which is different from your macro economics, and much wider. You probably know or you may be wondering, sir, if in a wealth basket, you have all sorts of items. One is money and bundle of items, which are non money like shares, bonds, jewellery, property, even gold bars, all can have a price.

Suppose, you are algebraically formulating an economic model, where you write the quantity and the price. Now, the question is, what happens with money? Does money have a price? Often people ask this question, because there are n goods. Suppose, you are modeling for the financial sector. Now, you have taken all items, which has a price in the market. Shares have a price in the market, bonds have a price in the market, and property has a price in the market. It may be different price for different property locations, but, there is a price. What happens with the price of money? Well, the price of money is there, what economist says and it is measured indirectly. It is not a direct price. The price of money is the interest rate. Why is it so?

Because, the price is measured here in terms of the opportunity cost of holding money. When you buy a bottle of Pepsi, you are holding it. You buy it and you pay a price for it for keeping it with you. For holding some amount of cash, you pay a price and that price is the opportunity cost of holding money, because, if you do not hold the money with you, will put the money in an bank account, say, where you would earn an interest rate. So, that becomes a return interest rate. Alright?

So, you do not spend anything you are earning something. But, if you hold cash as you have in your pocket and you do not have that cash in the bank, you are paying a price. What is the price you are paying? You are not earning the interest income. So, price of money is indirectly measured in terms of opportunity cost of holding money, which is

interest rate. Very wonderful concept. So now, economists are very happy, basket of goods wealth money price concept which is not a direct price you pay, but then, indirectly you pay because, you are not keeping the money in the bank and not earning the interest. So, by keeping the money with yourself, you are losing that interest. So, that is the price you are paying. Alright everybody?

Now, problem with interest rate is; this is one interest rate I have said. But, in a macro-economic concept or context, in an economy, there are so many interest rates. You just visit the bank and look at behind the cash counters, there is a board. It talks about various fixed deposit interest rates. Two year fixed deposit, this interest rate. Three year fixed deposit, this interest rate. Five years fixed deposit, this interest rate. Savings account, this interest rate. Abroad if you go, there are four types of savings accounts and four types of interest rates. We have one usually here. Alright? Then, you go to the bond market, there is an interest rate, because the return on bond is interest. Then, you go to the secondary markets of bond, there is another interest rate called the yield to maturity.

So, you wonder, sir, so many interest rates are coming. So, what happens in the macro ISLA model etcetera, where you have LM function or IS function, function of interest rate and output, you were thinking, nice, one interest rate is there. But, when you do empirical work in macro-economics, you start wondering which interest rate to consider. Then, when I will teach you money market, there are more interest rates you will see. There is a call money interest rate, call rate, there is a treasury bill interest rate, yield rate, there is a repo rate, and there is a reverse repo rate. So many kinds of interest rates are there.

Now, what I would do, I will gradually take up these various kinds of interest rates. At least you know. Now, when you do research or any other work, you can think about which is the interest rate most appropriate for your study. You can think about that then. For the time being, my duty is to tell you about various kinds of interest rates that exist. So, I start from debt instruments commonly used or commonly that exists in a country, where interest is charged. Why is interest rate charged? First of all, what is the logic?

A basis for interest rates being charged. The interest rate is charged because, as a bank, if I give you some loan, I charge an interest rate. Reason is, that money is not with me. So, I cannot use it. I have given it to you. Now, you would return the money, say one year

later; one year loan. So, I have to wait one year to get an interest rate. Are you following me? The waiting price or return that you give me is the interest income. Alright? That is why interest rates are charged. Something, which you are postponing for future, you cannot do it now, requires a sacrifice and I should be rewarded for that sacrifice. Like, Anna Hazare, right now is fasting and what he is expecting is that, he should be rewarded for his sacrifice. Essentially this is what it is.

So, interest rates are essentially that exists in an economy is a reward or a price that one asks for some sacrifice. Alright? So, let us start with the concept of, the most simple form of interest rate that we learned in high, not high school, in secondary school is, say somebody gives a simple loan to somebody. See, a bank gives me a simple loan, alright? It may choose in one year. So, what happens? There is an interest rate. That can have interest. That is a simplest form of interest rate that you have seen, happens or exists in an economy, which we learned in school class 7 or 8. I do not know when you learn. In secondary school we learned that. Alright. Then, I will go to more sophisticated concepts of interest rates.

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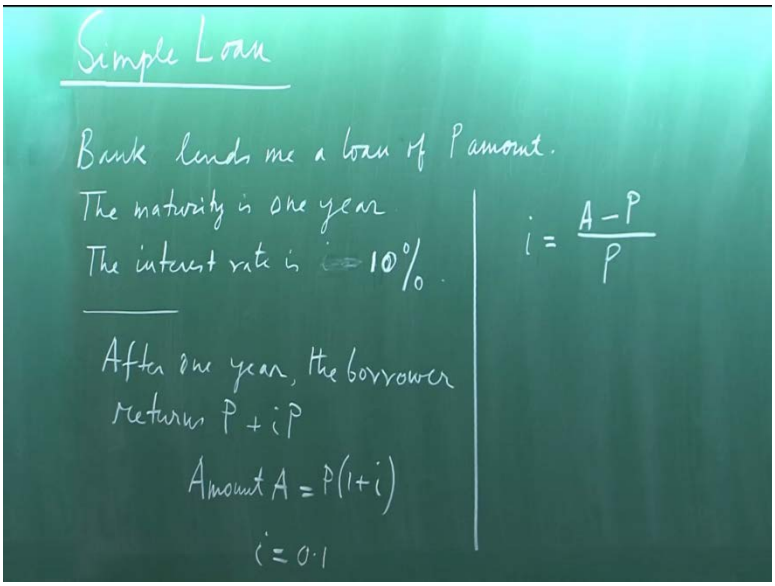

So, a simple interest rate will be; let us take the case of simple loan. Suppose bank lends me a loan of some amount, say p amount. The maturity of the loan is 1 year. That means, I have to return the loan in the loan period. I have to return the loan to the bank after 1 year and the interest rate is some i, which is, say something like 10 percent i, that is 10

percent. Now, what happens? After 1 year, the borrower returns, how much he returns? He returns p plus i times p the interest rate. So, the amount, which is known as amount that I get is, p into 1 plus i. That is the simplest form of interest rate that we learned in school. Now, from this formula, it is always it is obvious, that is from this formula, therefore, I can see, even if you do not know i, but, you observed market variables data, you have some data on A and if you have data on P, then you can easily construct i. Because, i will be equal to A minus P divided by P. It simply works out that. Alright?

Now, this is not in percentage terms. Here, I would work out to be 0.1 in decimal terms. 10 percent would essentially mean, i will be equal to, interest rate is say 10 percent; if I write 10 percent, then i will be equal to 0.1. That is all you have to write. Now, this principle, which we call P, principle, that somebody lends and then, gets back a larger amount A, because of the interest rate. This kind of a relationship is used in some areas of economics quite prevalently. It is very common.

What they do is the following thing. If I put it this way it may be clear to you. Suppose this money, somebody is having it with him and P and can go to rave and spend it and enjoy it today. Forget about the bank example now. Forget about the concept of simple loan that I have. Forget about it. You can use this framework to understand something else. Suppose I have 100 rupees with me. P is 100 rupees, which I can spend today. But, I decide to postpone my spending by 1 year and put it in the bank and earn an interest rate i and I decide to spend it tomorrow out of a larger amount. I sacrifice it. I wait out for 1 year. Then, that P becomes A after 1 year. Alright. Is this clear to you? I am coming out of the bank umbrella and talking about an individual having some money. I can either spend it today or I postpone my spending to future. Put it in the bank, earn an interest and spend A tomorrow. Tomorrow is 1 year later.

Now, imagine somebody is investing, either a company or a government in a project, a river valley project or electricity thermal power plant or something, I am talking about now real economics. Some amount of money today. Alright? Then, this project would be constructed over a 5 year period or say, simple case 1 year period and then, after 1 year, the output of the project will come out as electricity or whatever, which will be sold to the people and earn an income. After 1 year that income will come. My cost is incurred today. So, P is incurred today, and a return will come 1 year later. Now, somebody says, is it worth investing P to get that A tomorrow? Somebody can ask that question?

Companies often ask that question. Should I invest today to get an income, which is an estimated income tomorrow?

So, what they would be interested in knowing when they are investing today is that, that estimated income tomorrow, how much is it worth today? Because, the cost of today, the estimated return on my investment tomorrow is tomorrow. But, how much will it value today? Then, I can compare that return in terms of today's values and with the today's cost that I have to incur and can tell you, whether it is worth it or not. In simple terms, if the costs are less than that return, the present value return or future return, today's value of future return, if the costs are lower, then I would say go ahead. If the cost today are more than what the return I will get tomorrow, even in present value terms, then I say do not go. Do not invest. So, here comes a very important concept of economics, which is coming out from this very simple framework, which you think you learned in arithmetic, part of arithmetic in school, but, actual is very important to economists.

But, it is sometimes not that easy to calculate. Because, I will tell you, if I get into multi period analysis, I get a polynomial and incase of a polynomial, the solution is much more complex. One period analysis is easy. So, I am going to tell you how it can get very complicated. Now, no longer medium school or secondary school arithmetic beyond a point. But, the basic concept is very similar to what we find used in economics.

So, what I am talking about is that, one does get into the idea about present discounted value. Now, the word discount means reduction discount pantaloon shopping shirts trousers discount. What does it mean? Discount means reduction. You are discounting something means, reducing it; lowering it. So, discounted, present discounted value essentially means, something that you will get in future is worth much less today. Present discounted value means, presently reduced value of, what are you talking about? Presently, what you are reducing? Which value?

The value that you will get after 1 year is worth less than if you have it today. So, when you were saying you were investing in an electricity plant today costs, but, the returns will come 5 years later for a series of years may be, what you are interested is, those values in future, what will be its present value and that present value is given by the concept of present discounted value. How is this discount business coming in? Now, I go back to the simple interest formula here.

The discount business is coming in, if you look at this formula, money if I have P today, I spend it is one thing. But, since if I postpone its spending tomorrow, I do not need just P, I need more than P. So, the present value can be much less if I have it with me. But, for tomorrow if I have to wait, I need more. So, P plus i P, what it would mean? I have a cash P and I go to rave and spend. I get lot of enjoyment. But, my father says, “No, you cannot have this money until 1 more year”.

Now you would understand what I am saying. Then, you would ask your father I will wait for 1 year, but, I would not be happy with that 10,000 rupees. I need more than that. That I have to wait out. So, the tomorrows money, the present discounted value, the value today is much less means, today is worth more than waiting out for 1 year and spending 1 year later. Then, I am expecting much more money to come. So, the difference between A and P essentially, A is coming tomorrow, but, the present discounted value of A is P. Alright?

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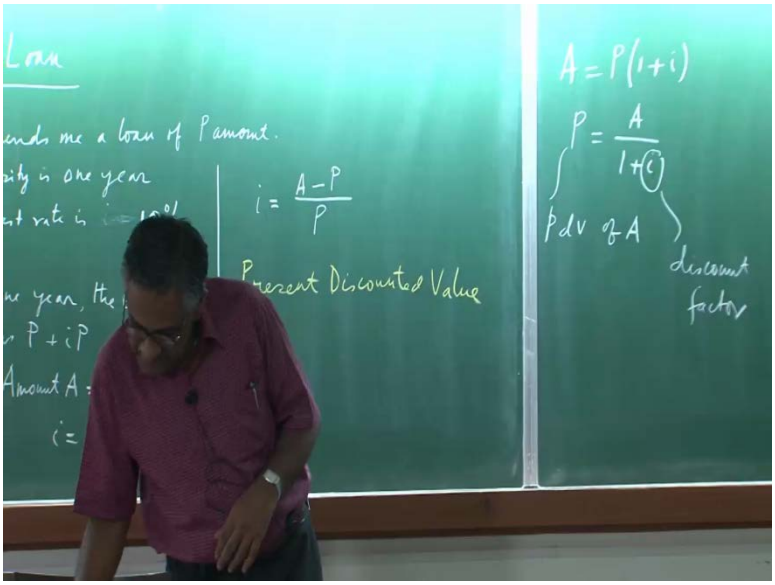

Because, then the interest rate is no longer there. So, what do you have? P according to this formula, what will be the value of P? If A is equal to P into 1 plus I, then P is equal to A divided by 1 plus i. This p is nothing but, the present discounted value of A. The simple interest formula I am using to explain this present discounted value. If I have the money today, I have the utility of the benefit and the privilege to use it. If I have to wait out, I need more. So, in this kind of a simple known concept, what you have is also what

is prevalent in economics, known as present discounted value of future values; future variables. Then, how you discount? You have to discount them. If I have to get its number today and the discount, you say, Sir, (()) discount The discount factor i, which is appearing in the denominator. In a fraction, anything that appears in the denominator, lowers its value.

So, if you are saying, sir, present discounted value (()). Discount factor discount factor interest rate interest rate future amount present discounted value where you have to discount it using a formula like this, where the discount factor is the interest rate. If interest rate is 0, what is the difference between present discounted value and a future value? Nothing.

So, what you see in a simple loan is also telling you that, interest rate that you think is a very simple thing. A simple interest rate like this. Not a compound interest rate. Here, you have a simple interest rate is a very important thing, even in the context of more complex economic issues like a person investing in a plant or in a factory (()) company return future invest future return estimate present discounted value where you require a notion of interest rate, which is the discount factor. Then, compare the two numbers. So there, this i is essentially the discount factor.

One can say, sir, in the context of a simple interest rate, you are trying to explain a discount factor and you are saying that interest rate is also discount factor in a different context. The context has changed. The formulas are same. But, one can also say, sir, there can be better discount factors than interest rate. Of course, there can be. In fact, that, what many areas of economics do. They try to look for the best discount factor. When I am trying to find out the present value of something which will happen in future, I scratch my head whole night; entire night. Night after night, may be to find out the most appropriate discount factor. Once I have it, then the formula is something like this. Formula does not change. Except that i interest rate is now replaced by more sophisticated variable, but, in a very simple context. Interest rate is often the discount factor, particularly in the money market because, money, when you are dealing with, interest rate is often a very lovely variable to use; very simple variable to use.

Now, you tell me one thing. If you are at all with this, present discounted value in a simple loan is ok, but now, you will see how complicated it will get, which is my next

job. If you have a multi period loan, simple loan, but, a multi period loan, what will happen? You can refer to Mishkin's book. I have two copies. Very expensive book in the library. If you want, I can Xerox the chapters. Mishkin has these discussions very well done. He is an American author, economist and very well known. Mishkin's book, I bought for you people. So, you can use that. Multi period loan (()).

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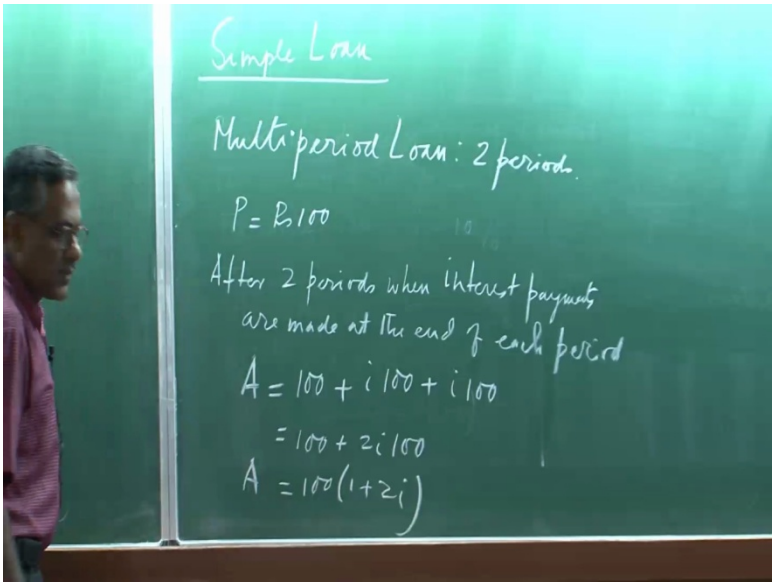

Suppose, I talk about that the loan matures at the end of 2 periods, multi period loan, say 2 periods. So, the loan matures at the end of 2 periods. What will happen? Suppose 100 rupees, P is 100 rupees; the principle you give. Alright? At the end of each period, suppose an interest payment is made. End of each period the interest payment is made. So, after 2 periods, when interest payments are made at the end of each period, interest payments are made at the end of each period, what will be the amount A?

First, you will get back after 2 period, you will get back the principle and then, you will get back the interest after one period, which is i times 100, plus you will get again after the second period in the interest payment i times 100. So, what you will have is 100 plus 2 i 100. So, this formula would be bit 100 into 1 plus 2 i. This is the amount you will get after 2 periods. Now, imagine a case where imagine a situation where interest payments are made only after 2 periods.

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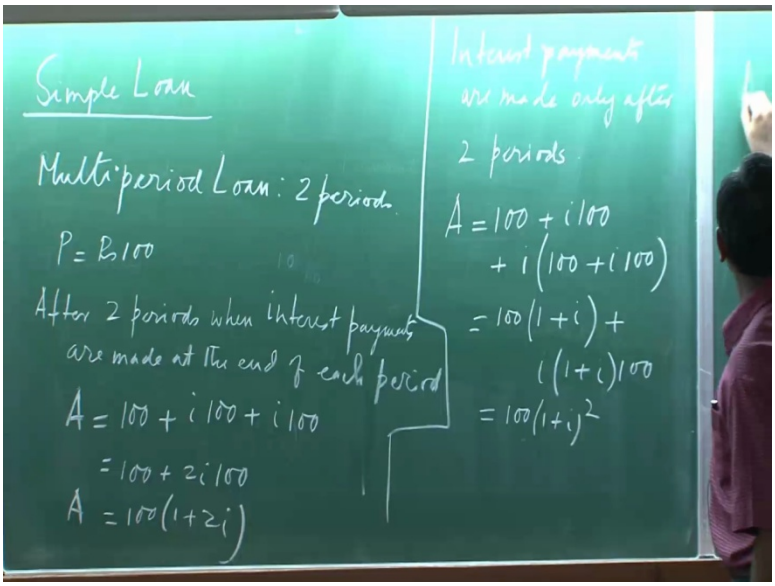

So, no interest payment will be made in between. I take the loan today. I make no interest payments and finally, return the amount to the bank say. So, the amount to be, first 100 I will get, the principle plus i times 100, the interest payment that I am supposed to make after one period. But, I do not make that interest payment. I make it after second period. So, after second period, what I have is, i times bracket the entire principle plus the interest that I have not paid.

So, I pay the interest on that. A compound interest is coming . So, i times 100. I have not made the interest payment, i times 100 if i is 0.1. So, interest compound interest is coming. In case of a compound interest, what will happen? Therefore, it will become 100 into 1 plus i and plus, if you take out, if you take that, it will be i into 1 plus i 100. This is what you have. Alright? 100 into 1 plus i and then, i into 1 plus i 100. So, what is this going to be? So, 100 plus. So, it will be, is it will be 100 into 1 plus i square?

This is what you have. Yeah. 1 plus i factor out 100 plus and 1 plus i gone out 100 plus i 100. So, 1 plus i and 1 plus i square. Two different results will follow depending upon the arrangement the bank has with the borrower. Either you make an interest payment after every period or you make an interest payment only at the end when you return the principle. This is the formula, which we usually see often used in books. This is the formula which is not used in the books. Except there will be a different chain. So, this 2 is a very (()) factor. For a n period loan, multi period can be n period. For an n period,

loan it will be 100 into 1 plus n i. Whereas here, it will be, A will be equal to 100 into 1 plus i to be power n. Two different things. Two very different formulations are coming out with n there.

Yes, you want to ask me something. No. So now, the question is, you can see from these formulas, these hundreds that stay outside depending upon the formulation you are using, the present discounted value, one case will be A over 1 plus 2 i 100 is equal to A over 1 plus 2 i. In another case, it will be this 100 is, say P, presented discounted value, 1 plus i square.

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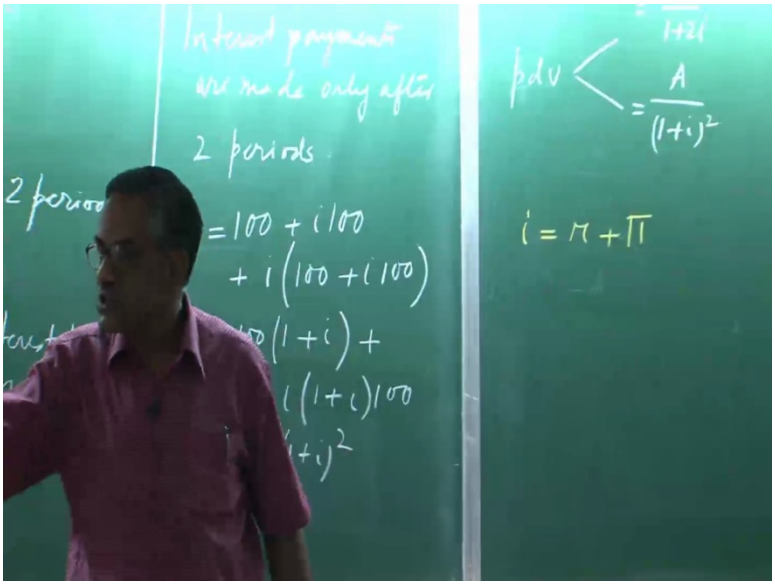

So, the p d v value, if I am correct, can be of two types. One is p d v is equal to A over 1 plus 2 i. In another case, it will be equal to A over 1 plus i square for a two period loan. So, I get a return after 5 years. If I can calculate the return, this 5 years will essentially take that power factor or whatever to the power 5 and I get the present discounted value. I am using a mechanistic thing may be, but this will help you to understand, how the future is discounted, if you are sitting today and trying to find out, how much is it worth and the factors and questions that usually come from students is that, which are very natural, which you have not asked so far.

So, one more thing is that, what will happen to that inflation thing, because 5 years later, the inflation reduces the money value. So, wont inflation also be a discount factor? Because, inflation is reducing that value and what I give them as the smart answer, like a

smart card may be, which is not that useful after all; smart answer what I give them is, this i is a nominal interest rate. So, it accounts for the inflation rate. You are discounting already with the inflation.

The Irving Fisher rule. What did Irving fisher say in the early 1920's? That nominal interest rate is equal to real interest rate plus inflation rate; that American economist said. That is where we learn, what is the relationship between real interest rate and nominal interest rate. So, what Irving fisher said is very simple; is that a nominal interest rate i is equal to the real interest rate r, which we use in ISLA model plus inflation rate pi, which is inflation rate. In a futuristic context, this i will become an expected i, because pi will be expected pi. What inflation do you expect. This is how you can calculate.

Now, this interest rate that we use in banks, when bank charge any interest rate or something is not real interest rate. It is always the i. Banks always charge you i. r, you have to deduct yourself. Sit with a calculator or use your mind to calculate r. r is never reported to the public. What is reported to the public like, when you go to the bank and take a loan or would you put money in a fix deposit, the interest rate that they give you is only the i. Or any interest rate, that will come up in future in our discussion will be i. Remember, no r is given. r you can deduct yourself. That is your job, as an economist what is the real rate. So today, fixed deposit rates are how much? 7- 8 percent. Inflation rate is how much? About 7 percent. So, real interest rate (())? Nearing 0. This is your job. Yes, real rate will change, nominal rate also changes, and bank changes interest rate.

Suppose you fix i. Yes, alright, you fix i. (( )) bank and If inflation rate increases, what happens to the real rate, if i is fixed? Nothing to be surprised. This is often happening in economics. Real rate negative (( )) I (( )) percent inflation percent (( )); that is another very fascinating area of economics. That is also very fascinating area of economics. What is the real rate, how is it moving in India. Macroeconomics and draft about Fantastic stuff.