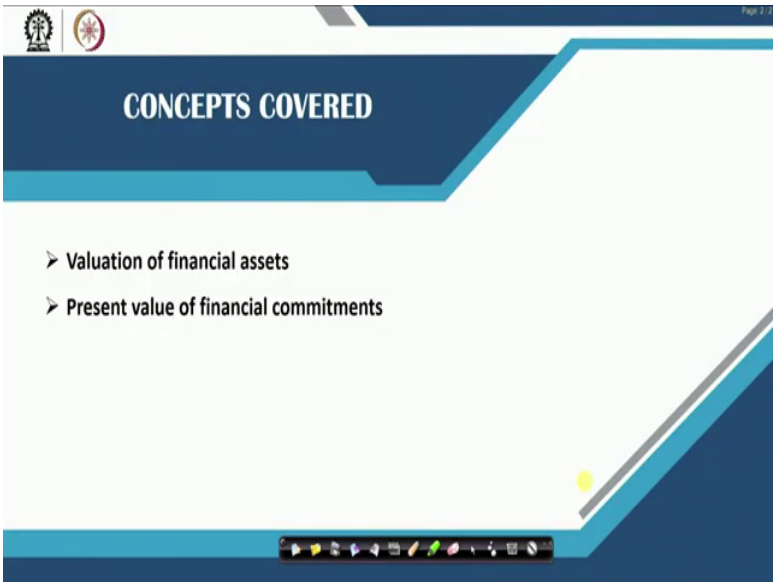
Behavioral and Personal Finance
Prof. Abhijeet Chandra
Vinod Gupta School of Management
Indian Institute of Technology, Kharagpur

Module – 01
Behavioral Economics and Finance
Lecture - 18
Valuation of Financial Assets

Hello there, welcome back to the course Behavioral and Personal Finance. In this course we have so far discussed the expected utility theory as a deviation from the standard utility theory. We have also seen how Kahneman and Tversky proposed an improvised version of expected utility theory, where the prospect theory shows how behavioral biases can influence people's decision-making processes. Recently we have discussed in previous sessions that these behavioral biases can translate into our financial decision-making processes and causes to incur financial losses as well.

This session focuses on understanding the valuation of financial decision processes in terms of valuation of securities and how different type of securities can be valued with some standard approaches which we will discuss today. The topics that we are going to cover are basically valuation of financial securities. The topics that we are going to discuss today include valuation of financial assets and present value method of calculating financial securities prices.

(Refer Slide Time: 01:49)



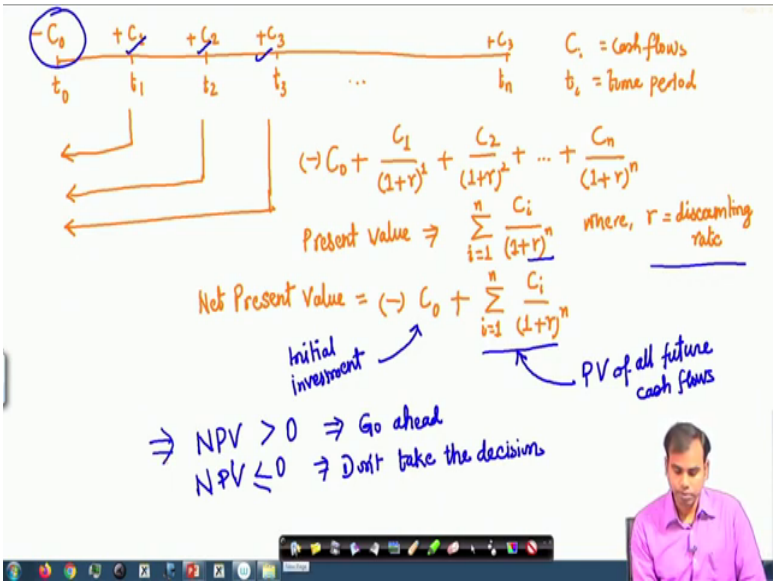
Essentially when we talk about valuation of financial securities, we imply that we are going to invest some amount of money in financial securities or financial assets. And as we progress in future, we are going to receive some return where which can be utilized as a criteria for deciding whether to invest at first place or not. So, what comes to our mind when we talk about financial assets? So, the financial assets that we are primarily focusing in this session include securities in stock market and financial market in general, and the assets where typically individual and retail investors tend to invest.

So, first we will discuss what are those financial assets and their attributes in terms of financial features, and how these features can be incorporated in a decision-making model, where we can understand the cash flow generated by these financial securities and the valuation of those cash flows in terms of present value. So, when we talk about financial securities essentially we mean that there will be some obligation or commitment in financial

market which can pay back an amount of money either in lump sum or as a periodical cash flow which can be considered as return on the investment.

So, let us understand what are those financial securities that we are going to focus in this session. So, first we will touch upon the types of financial securities that we are going to talk, and then we will understand their features, and subsequently we will incorporate those features into the decision-making model of financial evaluation. So, let us say we have an amount of money to invest, and we are going to invest that amount of money in some financial security which will pay back the return to us in future.

(Refer Slide Time: 04:31)



As we have already touched upon the typical characteristic of such a financial security would look something like this. It will be basically in a cash flow framework where we have some time line which begins with t 0, t 1, t 2, t 3 and so on to let us say t n. And every time at every

point of time if we invest some amount of money now, we are going to get some amount of money at every periodical time period. So, there will be cash flows which will be generated in future. So, C here represents the cash flows and t represents time period.

So, when we have such a cash flow associated with a financial security essentially when we have to make a decision whether to invest at first place or not, the first thing that we do is to understand what are the values in terms of present value of these cash flows which are incurring in future time. So, essentially it should be brought back to one single time line to understand whether the present value of these future cash flows are comparable with the initial investment that we are making.

So, the typical approaches we have C 0 which is basically a negative cash flow because you are paying the price right now and it is going out of your pocket, and then we have cash flows which are generated in future. So, we will take a simple approach as discounting method where we will use these cash flows to discount it to present value, and we will find what are the present value of these future cash flows. So, essentially the approach is when we have to find present value, essentially we are trying to see if the sum of all cash flows are with discounted value using a discount rate r, where the sum should be greater than the initial investment that we are making.

Here r is the discounting rate. So, discounting rate means this is a rate which can be used to discount the future cash flows to present time. So, present value is given as the sum total of all the present value of future cash flows. And when we try to calculate the net present value essentially which is the decision criteria here, essentially it is your initial investment which is a negative cash flow of c 0, and the sum total of all future cash flows present value. Here this is your initial investment, and this is your present value of all future cash flows.

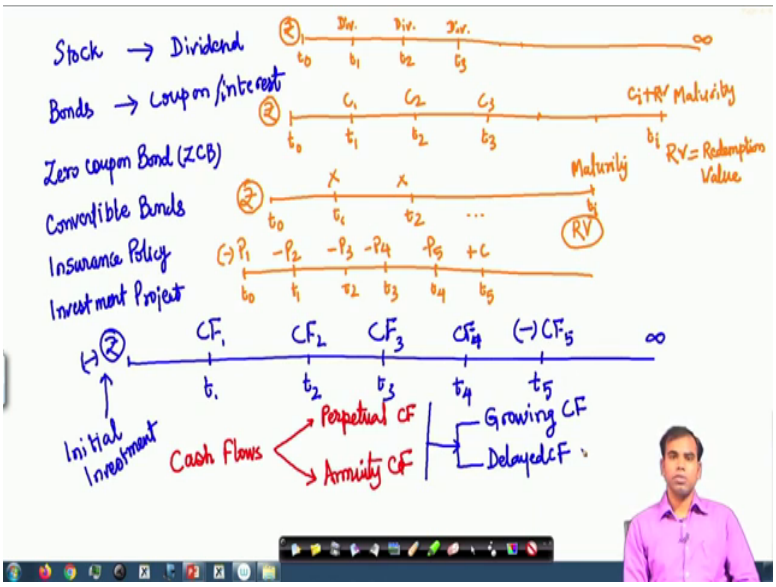
Now, if NPV which is basically net present value is going to be greater than 0, you can go ahead with the decision. And if it is zero or nonzero which is basically negative, then you should not typically pursue that decision. So, if NPV is lesser than 0, in some cases equal to also, then we should not take the decision.

Now, let me explain this approach with some practical examples. So, this typical approach of calculating NPV for future cash flows indicate that if we invest an amount of money today which is time 0 and the amount of money that we are investing is C 0, this is basically this value. If we invest an amount of money as C 0 and we expect that that amount of money will generate future cash flows in terms of C 1, C 2, C 3 and so on.

Then given that we have a discounting rate which is basically your cutoff criteria we can discount the future cash flows of C 1, C 2, C 3 and so on to present time to find the present value as given by this particular formula. And if we have the present value of all future cash flows, we can use this amount to be compared with C 0 to find the net present value. And if net present value is found and it is greater than 0, we can simply go ahead with the decision.

This approach can be utilized with slight modifications in different context. So, once we understand this generalized up of finding net present value of future cash flows we can contextualize this with different situations in financial market. So, what are those situations which are presented in financial market? Let us try to understand that those situations.

(Refer Slide Time: 12:13)



In financial markets typically investors find a different type of financial securities, for example, they might find stock which is basically share of a company. They might find bonds which is basically an instrument where you invest some money for long term and fixed return then you can find something called zero coupon bond. I will discuss the properties of these assets subsequently. And then you may find some let us say convertible bonds; you may have in the insurance policies; you may have investment project. Now, these financials opportunities or securities essentially present different type of scenarios.

So, in stocks when you invest some money, you are actually buying the share of a company in terms of the ownership, and you expect that whenever company makes a profit, you will be shared with that of some amount of money from that profit, and that is profit share given to

you typically is considered as the dividend. So, in stock market, if you invest in stock you get a dividend as a return. In bond, you get coupon or interest which is basically you return.

So, if it is bond of standard nature which is you invest some money today for 20 years, and every period you get a fixed amount of return from the investment you will get a fixed income. If this is a zero coupon bond, essentially zero coupon bond means you are not liable to get any amount of money in the holding period, but as their bond matures you get an amount of money as fixed by in the initial period.

Similarly, if it is a convertible bond, typically it means that you have an investment in the bond which will be paying you for certain amount of period a fixed rate of return and after that it becomes another securities typically a share. Similarly, if you have insurance policy you pay some money for certain number of periods, and after that period you are going to get some amount of money or some financial securities in terms of life insurance or health insurance. Similarly, if you have an investment project you invest some money today, and in future you are expected to get some amount of money in terms of return from that investment.

So, if we try to explain the unique features of these financial securities, we can show in terms of timeline. And the approach will be if you have a dividend, you typically invest some money today, and every period you are expecting some return. So, basically this period this investment period is infinite, and here you are getting dividend every year. Now, the dividend might be different in different years, and you have to pay a price today. So, what is your price today?

So, if you pay a price of some share today, you are expecting to get dividend in future and that dividend is not necessarily going to be fixed; it could be a vary from one year to another year. If you invest in bond, typically bonds pay you some fixed amount of return. So, you have to pay some money today that is t 0 and every period you are expecting to get some coupon. So, coupon will be in terms of interest payment to you. And then this will be maturity period which is typically defined in the beginning itself, where you not only get coupon, but also get redemption value.

So, suppose this is t i, for example, if you invest in bond which specifies that it will pay you a 7 percent of interest every year, and after 10 years when it gets matured you will get a fixed amount of money in terms of redemption value. So, this is a typical feature of bond, where they pay you interim interest as well as the redemption values. So, the RV basically indicates the redemption value.

If it is a zero coupon bond where you have to pay some amount of money today, and you are not going to get any amount of money in interim period. And at time of maturity, when the zero coupon bond matures, you get a lump sum value in terms of redemption period, redemption value. So, here there is no cash flow in interim period, but a single cash flow at the end of the maturity of this zero coupon bond.

Similarly, in insurance policy, for example, if you pay some amount of money for buying an insurance policy or the insurance policy has some features such as the endowment in nature. So, you have to pay some premium. So, premium basically is going out of your pocket from day 1, which is basically a premium here.

So, premium 1, then premium 2, again negative, premium 3, suppose you pay for 5 years premium, insurance premium for time period, and then from 5th year onwards you will start getting some insurance endowment back in terms of either cash back or in terms of the insurance coverage for your, your asset which you are purchased for. So, this is a typical feature of insurance policy.

Now, a similar characteristic can be generalized for an investment project, where you have as already explained, you have to invest some money today which is typically negative value, and then you expect some cash flows generated in future, and there will be a different time period for those cash flows. Now, it may so happen that in investment, if you make some initial investment today which is basically negative cash flow, you have to make certain further investment some later time period as well.

So, for example, if you have set up a business plant or production plant, you have to make some investment today to start the production or to set up the plant. And after five years probably, you have to make another investment to improve, improve the machinery or plant or maintenance of that plant for next 10 years. So, in that case probably the cash flow might look like in year 5, you have another negative cash flow which is basically a reinvest investment of some money to the project. This might also have some period. So, if we can say that it is going to be for infinite period, it could be defined as such, and this is what a typical flow of cash might look like with respect to different type of financial securities.

Now, if I can define or categorize these cash flows, I would say that there are two types of cash flows and these two types of cash flows could be considered as, so basically I am trying to define cash flows or categorized cash flows based on their properties. So, cash flows could either be a perpetual cash flow or it could be annuity cash flow. Perpetual cash flow means the cash flow which is going to incur for perpetuity, for example, in case of stocks.

So, when you invest in a share of a company you expect that the company will keep running for perpetuity, and you are going to get dividend for perpetual period. A nnuity is basically cash flow which is generated or incurred after every year. So, which is basically the annual nature of cash flows, for example, annual interest bearing bonds or maybe insurance policy, where you have to pay in annual insurance premium or it could be an investment project which is going to yield you an annual rate of return.

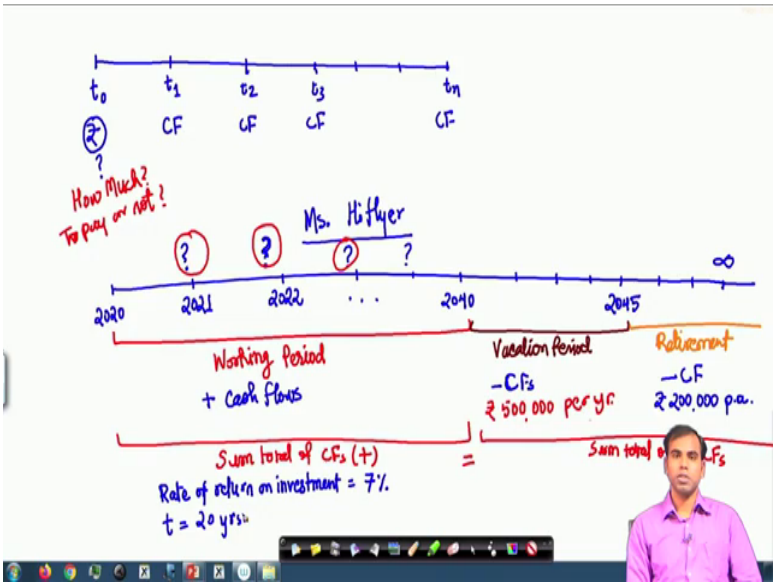
If we try to categorize it further probably both type of cash flows might look like growing, growing cash flows or delayed cash flows. For example, if you have a cash flow which grows every period, it is a typical growing cash flow let us say if you invest some amount of money in the stock of a company or share of a company, and every year company is increasing the dividend by certain proportion.

So, basically in year 1, you get x amount of dividend; and year 2, the dividend amount increases to x into some growth as decided by the company's management, so that is the typical growing cash flows and delayed cash flow indicate that you have hold onto the cash

flows for certain number of period. So, for example, if you are evaluating the insurance policy first seven years, you, first 5 years, you are getting to pay the insurance premium which is a 5 year cash flow; and after that your cash flow in terms of income is starting so which is basically indicating the delayed cash flows on the part of investment insurance policy.

If we try to explain this nature of cash flows with different type of examples, we can show a simple personal finance problem, and this can be understood with the help of a realistic financial situation or individual might be in.

(Refer Slide Time: 25:25)



So, if I highlight this here, suppose you have to pay some amount of money to invest in a particular project. So, I give the situation here. This is time 0. Keep in mind whenever you are trying to evaluate a financial situation or financial decision-making, you have to plot this

particular situation on a timeline because it should involve time value of money at different point of time.

So, this is a typical cash flow timeline. And the decision typically holds is you have to pay some amount of money now, and then you expect some cash flows in future. Most of the situations you can come across with in financial decision-making are of these this nature, where you have to decide how much to pay, or whether to pay or not, to pay or not.

So, for example, if you are buying a share, you need to decide how much to pay or whether to pay for that particular share or not, whether to invest or not. So, or you are buying an insurance policy you need to know how much is the right price for that insurance policy or insurance premium that you are going to expect that will of course, depend on how much endowment you want to create. So, you can consider either these two questions how much or whether to pay or not.

Now, if you assume or in a simplistic framework that an individual is in a college, so basically the person is about to complete his or her education, and the individual essentially is trying to include some financial knowledge to decide about his financial planning. So, a situation I am giving here is the person is going to enter the job market next year. And at the end of certain number of years, he would stop working and then he his retirement period will begin. So, I give you a situation here to think through that well discuss in next session, but before that I present the problem here which will try to incorporate situations which we have discussed from different financial securities.

So, the situation here is there is a person let us call it mister, let us call it Ms. Hiflyer. So, I am presenting the problem of Ms. Hiflyer here. So, Ms. Hiflyer is a very ambitious lady and she is entering the job market in 2020, January 1. And she is expecting that she is going to earn some money from that year onward. And since she is very ambitious, she believes that she will continue to live for eternity or she will continue to live very long which is very uncertain time in future.

So, the problem here is she is entering the job market in 2020, and she is expecting that for next 20 years, she will continue working. So, let us say she will continue working till 2040, and for next 5 years she will be vacationing. And after that she will settle down in some retirement home or some or let us say monastery. So, I tagged this period as working period, this period as vacation period. And finally, this period is a retirement period.

Now, she is going to expect certain amount of income during her working period and then she will be spending some money in vacation period and retirement period also. So, if we say there will be some positive cash flows here, which she can invest in some amount of money, and then there will be negative cash flows. Now, the problem here is if she earn some money and she has to decide whether she will be having enough for the vacation and the retirement after she ends up working, how much money should she save.

So, the situation here is what amount of money she should save every year, so that she will have sufficient amount of money during her vacation period and retirement period. So, if we put some hypothetical numbers here, let us say if we say that for vacation period she needs 5 lakh rupees every year. So, what it means that for every year vacation she will spend 5 lakh rupees. And for retirement although this is a very generous retirement scheme, but still she will need 2 lakh rupees per year for her retirement plan.

Now, if you believe that certain more information is needed, we will present that information. You have to tell how much amount of money she is going to invest every year, so that that sum total of this investment sum total of all cash flows should be equal to sum total of, so basically this is positive cash flows and this is negative cash flows. Additional information let us present some additional information here. The rate of return that a person can get in on investment, rate of return on investment here during this period is let us assume 7 percent.

Now, I stopped here by presenting this problem which I highlight again there is an ambitious lady Ms. Hiflyer who would like to earn for 20 years. So, time period is twenty years and she would spend her all savings which will be invested in different type of assets, for next 5 years on vacationing which will be requiring 5 lakh rupees per year as an expenses. And after 5

years she will settle down in a monastery somewhere or in a retirement home which will require her to spend about 2 lakh rupees per year of expenses.

So, your job is to advise Ms. Hiflyer how much money she should save every year from 2021 till 2040, so that the amount saved and invested should be sufficient to cover all her expenses during her 5 years of vacation period and in finite period of her retirement. This is a typical personal finance problem where a financial adviser is expected to advise her client on savings and investment approaches, and this is what is going to be the thrust of next module of the course. For now this is it.

Thank you very much.