

Financial Management for Managers
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Lecture 55
Capital Structure –Part 2

Welcome all. So, in the process of learning about the capital structure and its various theories, now I will take you forward with the next important theory, which is a landmark in the history of studying the capital structure of the firms. That theory is called as the Capital Structure theory given by the Modigliani and Miller, Franco Modigliani and the Merton Miller they have given a very-very say after their classical say research, they have come out with a very classical theory of capital structure.

So, before as I told you in the previous class, also that before this say standard theory or the classical theory of the capital structure given to us by these two Nobel laureates in financial economics. Before that, whatever the approaches we had with us we have already discussed those approaches, net income approach, net operating income approach and traditional approach, they all had the different views and we were not able to accept which one is correct and which one to accept.

But after this work, which was a say first of all say presented to the people in 1958, for the first time, and later on, they revised it and then they changed their own say first proposition and the second proposition of the capital structure theory was given. So, now we are going to discuss that historical work that historical say a model of capital structure and say, we are going to conclude logically that how the capital structure of the firms has to be decided. Because earlier we concluded that the say capital structure has no meaning.

For example, if you talk about the net operating income approach, so net operating income approach says that the cost of debt and equity does not remain the same right. Say as the moment the debt moves into the firm, the cost of equity capital goes up. So, finally, if you talk about the overall capitalization rate or the cost of capital for the firm that remains the stable but the net income approach was contrary to this that was the reverse to this, and it said that yes, debt is cheaper than the equity.

And say, if we say infuse more amount of the debt in the firm or in the firms capital structure, then the say overall cost of capital tends to go down. So these are the two approaches, which

were scientifically tested by Modigliani and Miller, and when they gave their own say, standard approach of the capital structure, it also was divided into 2 parts, first one is the first proposition of that capital structure theory given by the two these novel laureates and the second one was given as a second proposition again by these two people.

So, if you talk about the first theory, the first theory is basically almost you can call it as the replica of the net operating income approach. in the net operating income approach also, as I just I told you that net operating income approach says that, overall cost of equity overall cost of capital remains same, because the moment you infuse the amount of debt in the firm, the cost of equity capital goes up.

Because the required rate of return is increased by the equity shareholders because of the increased amount of the debt in the firm, right So, that is a net operating income approach and Modigliani and Miller hypothesis or this approach also supported the net operating income approach. And for that they gave one argument which was called as very famous argument in support of their proposition was arbitrage argument right.

So, let us discuss what this approach is both the propositions I will discuss with you in detail, that is the first proposition of this theory and the second proposition of this Modigliani and Miller theory of the capital structure and then we will conclude that now, say is there any say reason or the meaning of the capital structure for the firms or say capital coming, maybe from the equity or debt has equal cost and it does not make any sense to increase the amount of debt or the amount of equity and to differentiate between the say overall cost of capital.

So, we will conclude it after say having the detailed discussion about this theory of the capital structure given by the, Modigliani and Miller, right.

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MODIGLIANI AND MILLER (MM) POSITION
(Franco Modigliani & Merton Miller)

The Modigliani-Miller work stands as the watershed between 'old finance' an essentially loose connection of beliefs based on accounting practices, Rules of thumb and anecdotes and modern financial economics with its rigorous mathematical theories and carefully documented empirical studies"- Robert Merton

Major Assumptions

- Perfect Capital Market ✓
- Rational Investors and Managers
- Homogenous Expectations
- Equivalent Risk Classes
- Absence of Taxation

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So, before we move into the theory, let us say read these very important lines, which are given to us by one, say another novel laureate in economics, that is, Robert Merton and Robert Merton has means created a clear cut demarcation, a line of demarcation between the say theories before the Modigliani-Miller theory and the theory given by the MM that is a Modigliani and Miller.

So he has very nicely, very beautiful he has said that what was before this theory and what is after this theory, and how this theory has totally changed the landscape of the capital structure discussion. So, let us see here what Robert Merton has to speak about the say Modigliani Miller theory of the capital structure. He says that Modigliani-Miller work stands as the watershed. It stands as the watershed between the old finance and essentially loose connection of the beliefs.

It is a loose connection of the beliefs because one approach says that the debt makes a difference in the overall costs of capital, second approach is that the moment that comes the cost of equity capital goes up. So capital structure has no meaning and traditional approach, say something else. So, you can call it as these this was nicely means a remarked as that lose connection of the beliefs based on accounting practices, rule of thumb and anecdotes.

Anecdotes means theories or sorry the stories or tales. And the modern of financial economics, the modern financial economics means it is a point of demarcation here. There is a point of demarcation here that Modigliani Miller work stands as the watershed between two between old finance and essentially loose connection of beliefs based on accounting

practices, rule of thumb and anecdotes and modern financial economics which is given by the these two people Modigliani and Miller.

Franco Modigliani and the Merton Miller with it is a rigorous mathematical theories and carefully documented empirical studies. So after very long and say detailed research on the capital structure of the different firms these two say financial experts have proposed this model. So, being a student of financial management you cannot afford to say not know anything about the MM theory of the capital structure, which is the most scientific and the say systematic theory of the capital structure which has come up after the long, very long and the detailed research conducted by these two financial experts.

So, we are going to learn about that what is this say MM theory of the capital structure and what difference does it make. So, this theory is based upon the 2 parts means first part is the first proposition of the MM theory. Second is the second proposition of the MM theory. In the first preposition that things are totally different. In the second proposition, the things are totally different.

So, in nutshell you can see in the first preposition Modigliani and Miller have supported the net operating income approach and in the second say preposition, they have finally supported the net income approach and they have agreed they have accepted it say after the empirical say analysis that yes that makes a difference that the amount of the debt if means the amount of the debt increases in the capital structure, overall cost of capital goes down and say, it increases the return to the equity shareholders right.

Whereas, in the first case, they have said that the costs of the debt and the equity is same, so it means, in the first case, they will say that overall cost of capital of the firm remain same. And the moment you increase the amount of debt in the firm, the cost of equity goes up. So, you are bringing the funds from a source which have the lesser cost of funds whereas, the other source is increasing its cost.

So, overall capitalization rate remains the same overall cost of capital remains same. This is the first proposition and the second one is that when that debt comes in the firm, the overall cost of capital goes down and this is a benefit to the equity shareholders. So, in this case, let us discuss the first preposition and to understand the first preposition very clearly, Modigliani and Miller have taken the say these 5 important assumptions right.

They have taken the 5 important assumptions, their first part of the theory is based upon the 5 major assumptions and these assumptions are first is the perfect capital market, it means, there is a complete say flow of information, symmetrical flow of information in the capital market, all the managers, all the investors know that what is going to happen in the market, what are the different stocks are available, how the market is going to respond, which stock is going to go up, which stock is going to come down.

So, perfect capital market situation is expected by them as the first assumption before proposing this model. Second is rational investors and managers, managers and investors have the equal amount of information because of the capital market and they whatever the decision with regard to the investment in the say, stocks of different companies of say maybe of the different nature or different durations they take that is means rationally, the decision is taken.

There is no amount of or element of irrational team amongst the investors and managers. Everybody is equally say, rational homogeneous expectations, the rate of return as well as the say costs of capital means is well understood by all in the same way by one and all. And then is a equivalent risk classes. Whatever the different stocks are available in the market, they carry the equivalent amount of the risk. T

he amount of the risk is not different, with a different kind of the say sources or may the avenues of investment and absence of taxation there are no taxes right. Absence of taxation, there are no taxes. So, if you look at these 5 assumptions, they look or they seem to be highly unrealistic, because capital market is never perfect. Second thing is investors and managers, all investors and managers cannot be rational, homogeneous expectations cannot be right.

And equivalent risk classes are not expected to be there in the market that all the stocks are carrying the equal amount of the risk and absence of taxation is again another unrealistic assumption. But they have taken they have developed this theory this model on the basis of these assumptions, and if you say consider these assumptions, means a carefully, then how the model has been proposed, how the model has been say given by or the first proposition of the capital structure by the Modigliani and Miller has given that is we are going to understand here.

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MM PROPOSITION I

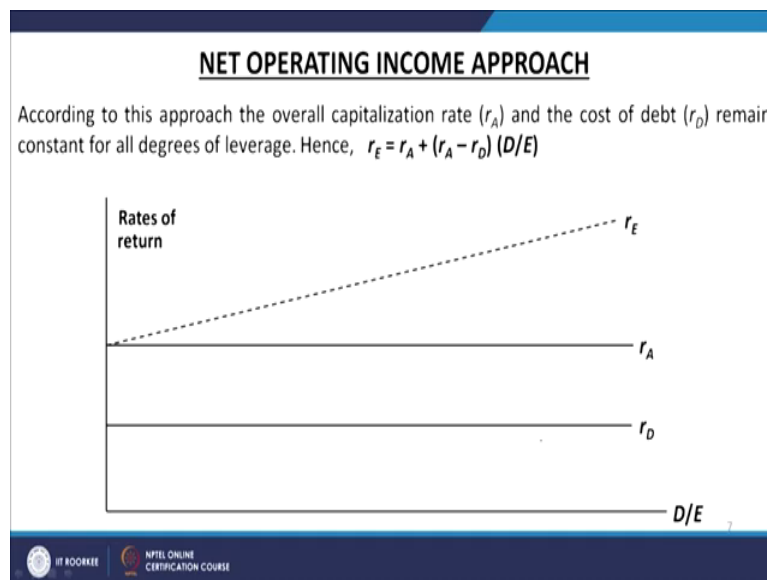
The value of a firm is equal to its expected operating income divided by the discount rate appropriate to its risk class. It is independent of its capital structure.

$$V = D + E = O/r$$

where, V = market value of the firm
D = market value of debt
E = market value of equity
O = expected operating income
r = discount rate applicable to the risk class to which the firm belongs

Identical to **NOIA** Arbitrage Argument

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So, MM proposition this is a fast proposition this is a proposition number one. This is the first part of the Modigliani-Miller theory of the capital structure. And what this first proposition says? The value of a firm is equal to its expected operating income, the value of its the value of a firm is equal to its expected operating income divided by the discount rate appropriate to its risk class.

Higher the amount of risk, higher the amount of discount and discount rate and lesser the amount of risk less of the amount of discount rate and it is independent of capital structure. You look at this it is independent of capital structure, the value of the firm is independent of the capital structure. This is a first proposition given by the Modigliani and say Miller is the first part of the theory.

They also supported the net operating income approach. And they said that debt has no meaning that you have say capital from the debt or you bring it from the equity. The value of the firm is cannot be affected by these sources of the funds it is independent of the capital structure. And finally, they gave the first part of the model was that is the V is the V is equal to D plus E is equal to O by r .

So, V is basically the market value of the firm, D is the market value of the debt, E is the market value of equity and O is expected operating income and r is the discount rate applicable to the risk class to which the firm belongs, right. So, it means basically it depends upon the operating income and that operating income to arrive at the present value of the operating income you have to discount it with the say some discount rate and that will depend upon the risk associated to the that particular firm or that particular stock of the firm.

So, finally, they have said they have concluded that independent of the capital structure it has no meaning, means the capital structure has no meaning for the firm and value of the firm does not depend upon that capital, you cannot means, change the value of the firm by having the funds from different sources, that one has the lesser costs and other has the higher cost. So, if you increase the amount of the funds, which is having the lesser cost, so naturally the cost of capital will go down.

So, the rate of return available to the equity shareholders will increase leading to the final say maximization of the value of the firm right. So, it is clearly written here that it is identical to something which is called NOIA that is Net Operating Income Approach, they have supported the say the net operating income hypothesis or the net operating income approach and in the net operating income approach also if you we go back, you will you will find here that what is the net operating income upload says net operating income approach says that see the cost of debt is same.



The cost of overall cost of capital is also same. So the, this approach says the moment you increase the amount of debt in the say total debt equity ratio of the firm, the cost of equity capital goes up. So, finally, the RA remains the same. Finally, the cost of overall cost of capitalization or overall capitalization rate of the firm remains the same because one is having the lesser cost of capital others cost of capital it is increased.

So, ultimately your cost of capital overall capitalization rate of the firm remains same. So, this is what it is said here. And for that purpose they have given the arbitrage argument also, they have given the arbitrage argument also.

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ARBITRAGE ARGUMENT

- In equilibrium, Identical assets must sell for the same price, irrespective of the fact how they are financed;
- No matter how you package a set of cash flows its value remains unchanged;
- *To see how arbitrage mechanism works, consider two firms U and L;*
- Firm U is unlevered firm financed by equity alone whereas, firm L is a levered firm financed by a mix of equity and debt; (*Firms*)
- Value of the levered firm is higher than unlevered firm even though both firms have same operating income and belong to the same risk.
- *Such a situation can not persist because equity investor would do well to sell their equity in firm L and invest in firm U with personal leverage (How?)*



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ARBITRAGE ARGUMENT

Particulars	<u>Firm U</u>	<u>Firm L</u>
Operating Income (EBIT)	✓ ₹1,50,000	✓ ₹1,50,000
Interest	₹ 0	₹ 60,000
Equity earnings	₹ 1,50,000	₹ 90,000
Cost of equity	0.15	0.16
Market value of equity	10,00,000	5,62,500
Cost of debt	-	0.12
Market value of debt	0	5,00,000
<u>Market value of firm</u>	✓ ₹ 10,00,000	✓ ₹ 10,62,500
Average cost of capital	0.15	0.1412



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And here what is the arbitrage argument and how they have tried to explain it, let us understand it in the say clear meaning or in the clear sense. What arbitrage argument says which is given by these two proponents of this capital structure theory, MM theory. First point of the arbitrage argument says in equilibrium identical assets must sell for the same price.

In equilibrium, when there is a equal amount of the supply of the funds from all the sources from different sources, identical assets must sell for the same price, irrespective of the fact

how they are financed. For example, you talk about any asset of the firm, whether it is financed from the debt or equity, it is not going to make any difference at that if it is financed by equity. So it is going to fetch the lesser price from the market, or if it is, say financed by the debt is going to fetch the higher price from the market, that is not going to say make the difference.

So it means capital structure means if you think about that, you can reduce the cost of capital overall cost of capital of the firm, so more funds should come from debt or lesser from the equity. That is not going to make the difference. No matter how you package a set of cash flows, its value remains unchanged this is a second argument they have given. And third is the most important argument to support their arbitrage argument is to see how arbitrage mechanism works.

Consider 2 firms U and L, they have we can understand this argument with the help of an hypothetical case, where we are going to take up now the case of the two firms. Firm U is the unlevered firm and financed by the equity alone whereas the firm L is the levered firm and it is finance by a mix of debt and equity right. So, let us create a situation where if you want to understand the arbitrage argument, where say these two people say these two financial experts say that debt and equity does not make a difference.

And for that they have extended the arbitrage argument. So what is arbitrage argument and how we can well understand it, let us means so consider 2 firms here. And these 2 firms, I have put the data of the two hypothetical firms here, we have put the firms, 2 firms here, one is the firm U and second is the firm L. U means the unlevered firm, which is the total capital structure of the firm is financed only through equity, no debt is there and is totally unlevered.

Levered means, when you talk about that leverage is the debt, if you bring any amount of the debt in that capital section of the firm that is called as the levered firm, and if it is free of the say debt in the capital structure then it is called as the unlevered firm. So, sorry if it is I will correct it that for example, the say what is the unlevered firm? Leverage means the debt the amount of debt, leverage means the amount of debt so, when you talk about the firm U, it is unlevered firm.

The amount of debt in this firm is 0. The capital structure of this firm is totally financed by the equity and no amount of the debt has been used here in the capital structure of this firm. And even you look at this say what is given to us here, operating income is EBIT that is

Earnings Before Interest and Taxes 150000 interest is 0, because no debt is there, entire amount has come from the equity and say you see here that is a market value of the equity here is a 10 lakhs, 1 million rupees, the total investment made in this firm is 1 million rupees 10 lakh rupees, entire amount has come from the equity, so no debt is there.

That is why this firm is say as a named as firm U, it is totally unlevered firm. Whereas this firm is named as firm L which is a levered firm. And in this firm if you look at the say total sources of the funds coming from, so, number one is the market value of equities this much and the market value of debt is this much right. And market value of the firm as a whole, if you talk about this is 1 million and this is 1.62 million.

So, it means these are the two firms and one is only if equity finance firm, second one is financed with the equity and debt both. So now, one is unlevered firm second is the levered firm. And now, let us means say with the help of this arbitrage argument, try to understand what is arbitrage argument and how Modigliani and Miller are going to say prove it that capital structure has no meaning and say whether you finance your say total funds the requirement to bring in with the help of debt or equity or maybe only equity or only debt, it has no meaning.

And finally, the overall save cost of capital to the firm is going to remain the same. So what is the arbitrage argument they have given with the help of this these two firms we are going to understand that. Now in this case, for example, operating income of the 2 firms, how much is operating income? 150000, how much is the operating income? 150000, same operating income of both the firms is 150, 150.

Whereas the market value of the firm which is unlimited from only finance with the help of equity is 1 million, whereas the market value of the firm is more than this firm by 62500 rupees whereas the operating income is same. So, the market value of the two firms is different, but the operating income is the same right. And if you talk about the equity earnings, the equity earnings are here 150000 because total what is the cost of equity here, market value of equities 1 million.]

Cost of equity is 15 percent. So, equity earnings are 150000 entire amount will go to the equity shareholders whereas in this case because debt and equity have come in the different proportions. So, only one part of the income will go to the equity because the one first will go

to the say the suppliers of debt or to the lenders. So, it means because the market value of the debt is 50000 and the cost of debt is 12 percent.

So, it means after settling the claims or servicing the debt component, which is 5 lakh into 12 percent, is 60000 rupees. So, out of 150000 rupees operating income 60000 will be going as the interest component here and only the equity earnings will be 90 percent. So, this is the whole case if you look at that unlevered firm and the levered firm operating income of both of firms is same the but the market value of the two firms is different.

Market value of the unlevered firm only financed by the equity is 1 million whereas the market value of this form is 1062500. So, in a way you can interpret it that the market value when the market value of the two firms is different, but the operating income is same. So, in this situation, what is going to happen and how the arbitrage argument is going to work right, how the arbitrage argument is going to work.

So in this case, what is going to happen that this situation cannot persist? As per the arbitrage argument, when the say market value of the two firms is different and the operating income is same, this situation cannot sustain in the market, this situation cannot say persist in the market, this situation is not permissible, this is going to change, how this situation is going to change? Because in this form normally what happens that say when you talk about the say the firm which is having the higher value.

The firm which is having the higher value there because we always assume that the scope for the further growth of the firm is not there in the market. So, what they investors do, sometime what the investors do that say who are the short term investors in the market they say that now, this is a maximum growth of the firm and this firm is not further going to grow in the market.

So, let us sell our stake whatever the earnings we had to do in this firm, let us sell our stake in this firm and say part of the stake we can invest into the firms which are say still have the scope to grow in the market. So, if you look at this, these two firms market value of this firm has already reached to 1062500, whereas the market value of this firm is lesser. So, this firm is having the lesser market value as compared to this firm. So, it means, there is a possibility that the unlimited firm may further grow up in the market.

So, if you buy the stock of the unlevered firm today and further it grows over a period of time. So, it will be the net gain to the equity shareholders. So, it may be possible because and

the market value of the two firms is different either the market value of all the firms has to be same, then the arbitrage argument is not going to work, but if the market value of the two firms this is different.

So, what is happening, the investors having the higher market value, the firms having the higher market value, they will sell the stocks of those firms to earn the say differential amount in the terms of the profit or that return on investment and then they can invest into the say the firms having a lesser market value and finally they expect that the firms which are having the lesser market value, they will also grow.

And normally it happens in the market also that you do not tend to buy the stocks of those companies whose market value is already very high. Because the growth rate is already has been attained and further possibility of the growth is not there. We try to buy the stocks of those companies whose stocks are at the at the lesser price. And we expect that they will also grow over a period of time and at least reach up to a level where the other firms in the industry are there in the market.

So if you buy at a lesser price and the stock grows over a period of time. So, at that time, when it grows up and you sell that stock in the market, you earn the better returns right. So, for example, same thing will happen in this case, because the firm which is having the higher value, the stock of this may be sold in the market by the investors and the firm having the lesser value, the stock of this firm will be purchased and over a period of time means, expected that the stock of the firm U will also grow in the market.

But what is the arbitrage argument? Now, what happens that when the people will start selling the stock of the firm L which is having the larger or the higher market value, the stock price of this firm will start falling and the stock price of the firm is start going up, because the demand for the stock of the firm U is now increasing. So the price of the stock of the firm whose demand is increasing the market start going up and the price of the stock of the firm whose stock is being sold in the market who supply is increasing in the market will fall down.

So, what will happen? Today the value of L is higher, so, people are selling L and buying U right. Tomorrow, what will happen that the price of U will go up. So, people will start selling U and start buying L. So, this process will continue unendingly and that is not possible because this is arbitrage, this process is called as the process of arbitrage and this process will continue.

So, we have to stop this process somewhere, if you want to stop this process somewhere. So, means we have to create a situation where the market value of all the firms is equal. So, ultimately the market value as per the first proposition of the MM model, the market value of all the firms remains the same, it remains unaffected otherwise arbitrage will start taking place will happen in the market and if arbitrage continues in the market, so it means they will be no stability in the overall, say capitalization process of the firms.

So, now how this process will work, how the arbitrage will work and how the things will say keep on moving in the markets, I will discuss with you means further taking this discussion on. So, how we can do it?

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10% ZT in Firm L

1. Rs. 56250/-
2. Borrow Rs. 5000 @ 12%



Rs. 106250 ✓

3. Rs. 10000 ✓

~~Rs. 6000~~

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ARBITRAGE ARGUMENT		
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Operating Income (EBIT)	✓ ₹1,50,000	✓ ₹1,50,000
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Market value of equity	10,00,000	5,62,500
Cost of debt	-	0.12 ✓
Market value of debt	0	5,00,000
<u>Market value of firm</u>	✓ ₹ 10,00,000	✓ ₹ 10,62,500
Average cost of capital	0.15	0.1412

For example, there is an investor who has a 10 percent stake in firm L right, he will sell his stake in the 10 percent stake in the firm L and what is the total value of that stake in the firm L say, what is the total equity value in the firm L? The equity value of the firm L is market value of the equity is this much right.

So, if any investor who is having a stake of 10 percent in this firm L if he sells his stake 10 percent stake which he has, if he sells entire stake in the market how much amount he will get? He will get the total amount is number 1, he will get the total amount of rupees, how much, 56250, right he will get this amount.

And now in the second case because now he wants to sell the stake in firm L and want to buy the stake in firm U to earn, say differential amount of the profit, so what he will do? He will borrow, he will borrow another amount of say I will call it as 50000 from the market, he will borrow rupees 50000 from the market how much that is equivalent to the 10 percent of this total debt in this firm say L and what is the cost of borrowing, 12 percent.

So he will borrow 50,000 at the rate of 12 percent. So, total amount which is available with him is how much? That is going to be 106250 this amount is going to be 106250. And out of this number three, he will buy the stake, how much? 10 percent stake and 10 percent stake of this firm is how much is the total, market value of the firm, it is 1 million rupees 10 lakh and he will buy 10 percent of this and he will shell out how much?

He will shell out that 1 lakh rupees here and still the difference how much amount is still available with him? 6250 still available with him right, so he has 10 percent stake in the firm

L which is sold in the market and he borrowed another 50000 at the same rate of interest which is the firm L is paying in the market.

So, what is doing? This 10 percent borrowing 50,000 is equal to the 10 percent of the total debt in the firm L, so what he is doing, he is replacing the corporate debt in firm L by this personal debt and by raising the total amount of how much, (100) 106250 rupees he is buying the 10 percent stake same amount of the stakes in the firm U and if he buys that, so he has to shell out only how much?

He has to shell out only 1 lakh rupees and remaining 6250 he can invest somewhere else in the market. So, if he does this kind of thing, what is going to happen, ultimately his overall income is not going to be say get affected his overall income is going to remain the same right. So, because earlier he has that total investment in the firm, say again 10 percent right. Now, he is also having that investment in the firm equal to the 10 percent of the equity but of the firm U.

But his income is going to remain the same. So, earlier he has almost invested how much? 106250 by investing the same amount because corporate debt belongs to him as well because he is the owner of the firm and tomorrow if there is a say problem, any kind of the financial problem, then out of his equity stake that debt will be paid back to the lenders. So, it means he is responsible for the corporate debt.

So, in a way you can say earlier he had invested 106250 in the firm where the 56250 was in equity and he has the share of the debt equivalent to 10 percent of 50000. So, total income of the total say investment, his investment in the firm was 106250. Now, by investing the same amount say investing the lesser amount by 6250 by investing just 1 lakh rupees, he can get the same amount of income in the firm or from the firm L.

So, ultimately he is still left with the surplus amount of the 6250. And this amount if he invest somewhere else, his income will be more than what he is getting from the, from his investment in the firm L. So how it will work, let us see it that how it is going to be this. So we will call it as that, say for example old income, this is the old income of the person, this is the new income.

This is the new income so where old income was when he was in firm L. And now he is in the firm U right, so in this case 10 percent of a firms equity income is equity income is how much, 10 percent of firms equity income in the old firm, if you talk about the old for it is

90000 rupees, which is an equity earning at 10 percent of it because ultimately he has the 10 percent stake.

So this income is going to be 9000 here. Whereas in this firm now, the new income is going to be how much, 150000 he has bought the stake of 10 percent. So his income is going to be how much? His income is going to be now 15000 rupees, right. In this case, less 12 percent interest, 12 percent interest on borrowings he is not going to pay any interest here, whereas he is going to pay the how much is borrowing in from the market? 50000 rupees.

So, how much interest is going to pay 6000 rupees, so, we are subtracting this. Finally, the total income in both the cases, total income here is 9000, total income here is 9000. So, it means, in this case in the new income is means 15000 plus means in this income 15000 less he has to pay the interest cost also because he has only invested from his pocket half of the investment, half he has borrowed from the market.

So, it means in this case his total income has gone up from the 9000 to 15000 and he has borrowed, he has replaced the corporate debt with a personal debt, so he is going to pay the interest cost of 6000 rupees. So, it means 9000 is going to be his residual income, whereas his income in the old investment was 9000. So, what is happening, the difference here is income level is going to remain the same, whereas the investment level is different.

The investment level here is 106250 which was old investment level, 56250 was the investment in equity and 5,000 stake he had in the debt of the firm, whereas the new investment is here only 1 lakh rupees. So, by investing lesser amount by 6250 he is ending up having the same amount of the income, so he has left over with the say some balance of the 6250 and this he can invest in the market.

So, his overall income will be, the new income plus the income for this investment and whatever the income for example, if he earns even 200 rupees, so, this income will become 9200 rupees, whereas this income is only 9000 rupees. So, it means, this arbitrage will continue, this arbitrage will continue to happen until and unless the market value of both the firms remain the same, because what we are seeing here.

If you look at the two firm situation operating income is same, but the market value of the two firms is different or other way around you can say the market value of the two firms is different, but the operating income is the same. So, what is happening that the firm which is having the higher market value, the people will start selling their stake in that firm and start

buying the stake of the firm whose market value is lesser in the expectation that the market value of this firm will also go up as a market value of this firm is already very high.

So, market value of this firm will also increase. So, they will earn the increased income over a period of time. So, in this process what will happen?

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ARBITRAGE ARGUMENT

- In equilibrium, Identical assets must sell for the same price, irrespective of the fact how they are financed;
- No matter how you package a set of cash flows its value remains unchanged;
- To see how arbitrage mechanism works, consider two firms U and L;
- Firm U is unlevered firm financed by equity alone whereas, firm L is a levered firm financed by a mix of equity and debt; (Firms)
- Value of the levered firm is higher than unlevered firm even though both firms have same operating income and belong to the same risk.
- Such a situation can not persist because equity investor would do well to sell their equity in firm L and invest in firm U with personal leverage (How?)

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In this process we look at now, say we were we were here that we started talking about the firms and now, we will say the value of the levered firm is higher than the unlevered firm even though both the firms have the same operating income and belong to the same risk class, this is what I was just talking to you value of the levered firm is higher than the unlevered firm.

Even though both firms have same operating income and belong to the same risk class. Same such a situation cannot persist because equity investor would do well to sell their equity in firm L, which I just explained it to you that they will sell the equity in the firm L because that is that having the more value so they will be able to fetch the higher price from the market by selling their stock in the market and invest in the firm U which is less valued firm.

So, in the anticipation of increasing the value of the firm U also they will sell it in the say highly valued firm and then they will invest into the lesser valued firm with the personal leverage which I told that they will borrow some amount and 50000 they will borrow from the say market. So, earlier their investment was 106250, 56250 was in equity and his responsibility towards the corporate debt was equivalent to 10 percent which is 50000.

So, in a way total investment becomes 106250. Whereas in the new investment now, he has got 56250 by selling the stake in the levered firm, 50000 he borrows from the market at the rate of the same rate of interest which the firm L is paying in the market. So, total amount of the funds now available with him is 106250, so he is now investing only 1 lakh setting aside 6250 whereas investing 106250 and investing 1 lakh in the unlevered firm, his net income is same that is 9000, what we have seen earlier.

And plus he has 6250 rupees plus surplus left with him if he invest that also in the market, he will get some additional income. So, what will happen? Arbitrage says people will keep on selling in the firms which are more valued and will keep on investing in the firm which are valued as less in the anticipation that the say valuation or the value of the lesser valued firm will also go up and the say their stock price will also increase.

So, the moment the value of the lesser valued firm increases, they will sell the stock and they will make the differential profit and again by the stock of the firm which is less valued. So, this process will continue and this all is happening because of the say in the levered firm we had the funds from the two sources and in the unlevered firm we had the funds from the one source.

So, if you accept the argument Modigliani-Miller said, if you accept the argument debt is cheaper, and it increases the cost of capital and increases the value of the firm as it has happened in this case. So, what will happen, the people will sell the stock in this firm, they will buy the stock in this firm.

Later on, they will sell the stock in this firm, they will buy the stock of this firm and this process will continue. So, people will keep on making profit just because of the arbitrage. Arbitrage means, selling the stock in the highly valued firm and buying the stock in that lesser valued firm. Then later on, after increasing the value of the lesser say a valued firm selling the stock in the more valued firm and again buying the stock of the lesser valued firm. So, this process will continue in the market and the market will never stabilize.

So it means if you bring the sources means the funds from the different sources, you cannot have that equal value for the say the firms having the same asset class and the same level of the risk, which is not expected to happen in the market, which is not acceptable argument. So, in this case finally, what they have said is in that say support of their arbitrage argument.

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ARBITRAGE.....

- Note that his risk exposure remains same because he has merely replaced Rs. 50,000 of his personal borrowings for his share of firm L's corporate borrowings or he has substituted homemade leverage for corporate leverage;
- When investors sell their equity in firm L and buy equity in firm U the market value of two firms tend to change;
- This process will continue until the market values of both the firms become equal because only then possibility of earning a higher income for a given level of investment and leverage by arbitrage is eliminated. As a result the CoC for both the firms becomes the same.

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Note that his risk exposure remains the same right, as we have seen both the firms are having the equal risk class L and U. Level of risk is same in both the firms because he has merely replaced 50000 of his personal borrowings for his share of firm Ls corporate borrowings or he has substituted homemade leverage. He has substituted homemade leverage for the corporate leverage for the corporate leverage.

Second, when investors sell their equity in firm L and buy the equity in the firm U which I just means, I was telling you, the market value of the two firms tend to change. The firm where people are selling the stock, the market value will come down and the people, the firm people are buying the stocks market value will go up.

So, this process will continue, this process will continue until the market value of both the firms become equal. Until the market value both the funds become equal because only then possibility of earning a higher income for a given level of investment and leverage by arbitrage is eliminated. Arbitrage otherwise is also not supported in the market. It is not a good thing that just for the artificial change in the price you keep on buying and selling the stocks in the market.

And if you say that capital structure makes a difference, then arbitrage will be supported. Whereas on the other side we are not in the position to support arbitrage, we do not consider the arbitrage as a good thing. So, it means then you want to condemn the arbitrage, but if you say that the capital structure makes the value of the firm (difference) different, so naturally

the arbitrage is going to be encouraged. And as a result, the cost of capital of both the firms become the same right.

So, it means what is happening, say for a given level of the investment and leverage by the arbitrage is eliminated. Until and unless the arbitrage is eliminated, so, people will keep on making the higher incomes simply means there is no increase in the overall value of the firm practically, but just by arbitrage people are making money in the market, which is not a good thing.

So, as a result, the cost of capital of both the firms becomes the same. So, it means, if you want to stop the arbitrage, what you have to do is, you have to make the cost of capital both the firms the same and if the cost of capital of both the firms is same. So, what will happen, final value of the firm will also become the same. And if the value of the firm becomes the same, arbitrage will not happen. And we want to condemn the arbitrage. We do not want to support the arbitrage.

So, because of that reason, you cannot say that the market value of the two firms will be different. If you say Modigliani Miller have said in their first proposition, if people say that debt is cheaper than the equity and if we have the more amount of debt, lesser amount of equity or the debt equity ratio of 1 is to 1 as compared to the debt equity ratio of the 0 is to 1, so it means the firm having the debt equity ratio 1 is to 1 as compared to the firm having a debt equity ratio of the 0 is to 1 will be having the lesser cost of capital, overall lesser cost of capital and the market value of the firm will increase. So, what will happen.

If there are 2 firms in the market, one is totally equity financed another is financed with the mix of the debt and equity. So, it means as per the say argument of the debt and equity having the different costs, the market value of the firm which is having the debt equity ratio of 1 is to 1 will be more, because their overall cost of capital will be less right.

So, when the market value of the firm will be more, people having the equity stake in the firm having the higher market value will start selling and start investing into the firms having the lesser market value in the anticipation that the market value of the firm having no debt at all in their capital structure will also go up and they will then sell the stock in the in the firm which is only equity financed over a say period of time then the value will go up.

They sell the stock or their stake in the firm U and will invest in the form L. So, it means what will happen.

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ARBITRAGE ARGUMENT		
Particulars	<u>Firm U</u>	<u>Firm L</u>
Operating Income (EBIT)	✓ ₹1,50,000	✓ ₹1,50,000
Interest	₹ 0	₹ 60,000
Equity earnings	₹ 1,50,000	₹ 90,000
Cost of equity	0.15	0.16
Market value of equity	10,00,000	5,62,500
Cost of debt	-	0.12 ✓
Market value of debt	0	5,00,000
<u>Market value of firm</u>	✓ ₹ 10,00,000	₹ 10,62,500
Average cost of capital	0.15	0.1412

In that situation that in these 2 firms what will happen? Arbitrage will continue happening because if you are selling in the firm L buying firm U, so the price of the stock will go down in the firm L. So, this overall say capitalization market value of the firm will go down, firm L will go down and the market value of the firm will go up. Later on, we will start selling in the firm U. So, market value of the firm will U will go down and the market value of the firm will go up.

So, this all is arbitrage and this is not supported, this cannot be means allowed to happen in the market for long. So, we have to create a situation ultimately where the cost of capital of both the firms is same, market value of both the firms is same. So, that arbitrage does not happen.

And if that is the situation expected to happen in the market that varies the difference in the cost of capital of the different sources of the funds. All the source of the funds are means at the at the same cost of the capital. And if the all the sources of the capital are coming with the same cost or they are having the equal amount of the cost, then how can you say the capital structure makes a difference?

Capital structure does not make a difference, capital structure has no meaning. So, this was the first argument. This was the first proposition of the Modigliani and Miller. But later on, when they came out with the second argument, when they considered some important, say changes in their assumptions and the major change in their assumptions which they affected was the taxes.

And they accepted that because of the taxes say, affecting the debt cost or the cost of the debt, overall costs of the debt goes down and the cost of equity automatically increases, the cost, the required rate of return automatically increases. So it means if you want to increase the market value of the firm for the equity shareholders, then certainly the capital structure makes a difference.

So in that case, more amount should come from the debt and lesser from the equity. So that debt being the tax deductible will increased means reduced overall cost of the capital for the firm and when the overall cost of the capital will go down, automatically the market value will increase and after say servicing the debt borrowed from the market, the ultimate value of the firm for the equity shareholders will be high.

So, what is the second proposition of the Modigliani and Miller and how they have means proved it that yes capital structure makes a difference and different sources of the funds have the different cost and they can impact the say value of the firm. I will discuss with you in the next class. Till then thank you very much.