

"A man is  
great by  
deeds, not by  
birth"

-Chanakya

Welcome to IIMK



**INDIAN INSTITUTE OF MANAGEMENT KOZHIKODE**



## Case Study

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**In the world of MM**

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## In the world of MM

*CF 101 course, Capital Structure class in progress: ..it sounds good in theory but does it work in practice? Feeling uncomfortable with the question raised by one of the students (who is also awake in the class), the Instructor began narrating a colorful analogy given by Modigliani and Miller (MM):*

Under perfect market conditions, a dairy farmer cannot in general earn more for the milk he produces by skimming some of the butter fat and selling it separately, even though butter fat per unit of weight sells for more than whole milk. The advantage from skimming the milk rather than selling whole milk would be purely illusory; for what would be gained from selling the high priced butterfat would be lost in selling the low-priced residue of thinned milk

Instructor did not find any sense of enthusiasm or appreciation in the faces of the students. He proceeded with the assumption that the idea will be clear once he demonstrates the idea of arbitrage with the help of some numbers. He went on with his lecture - *Consider two companies Debtly (D1) and Debtfree (D2) both operating in the same industry and earn \$1mn a year. Assume market expects that both companies have the same earning power, which is sustainable over time. The two companies are financed differently – D1 is financed with both debt (\$4 mn) and equity (\$6 mn) while D2 is completely financed with \$10 mn of equity only. Consequently the entire earnings of \$1 mn accrue to the stockholders in the case of D2 while D1 has to pay an interest of \$0.2 mn and the rest belongs to \$0.8 mn goes to the share holders. The two companies are valued at the same level of \$10 mn by the market. What happens if they are valued differently for instance, if D1's equity is valued at \$7 mn while debt is valued at \$4 mn? The combined value of debt and equity of D1 at \$11 mn makes it more valuable than D2 although both have the same earning power and riskiness.*

*Such inconsistent valuations leads to arbitrage opportunities. Suppose you own 1% equity (\$70,000) of D1, you are entitled for a 1% share of the profits, which will be \$8,000 per year. But you can earn a higher share of profits by investing in D2 for the same amount of your investment in D1. The recipe is simple – sell your equity stake in D1 borrow the remaining amount of money required to buy 1% equity stake in D2. Accordingly, sell your 1% equity in D1, which will release \$70,000 and for buying 1% equity in D2 you need \$100,000 so take a personal loan of \$30,000 at 5% a year. With this investment you hold 1% stake in D2 and you will receive 1% of profits in D2 amounting to \$10,000. After paying interest on the personal loan you are left with \$8,500. That is \$500 more than what you were earning on 1% equity in D1.*

The Instructor looked at the students thinking the numerical example clarified the idea of arbitrage, which is an important contribution of Modigliani and Miller. As the class was silent the Instructor presumed the concepts were understood and gave the following assignment question for discussion in the next class:

*Practice Question:* You are currently an investor in Future Plantations that earns an EBIT of \$25,000 each year. The firm's total assets are currently worth \$200,000. 30% of the firm's assets are currently funded by debt at a cost of 8%. There are totally 2500 shares outstanding of which you own 25 shares. In the recent board meeting, the executives have come up with the decision to push the firm's leverage to 45% by replacing suitable amount of equity with debt. Suppose there are no taxes, the firm as well as you can lend/borrow at 8%, prove that increasing leverage is a value neutral proposition for you.

The Instructor asked the students to submit the analysis for the above question before the next class. Instructor also added that this question would be discussed in the next class. The following was the only submission the Instructor received.

We worked out the problem assuming a WACC of 10%. In the new policy, leverage goes up by 15%, therefore in the homemade leverage case, need to borrow additional 15%

Step 1 – decide amount to borrow (15% of the current investment), and with the total invest in current firm

Step 2 – estimate total earnings which is EPS of current \* number of shares invested minus interest payment

Step 3 – estimate Earnings for investing 10 shares in the new firm

There are two ways here, one is assume stock price is  $200000/1000 = 200$  and start the problem in which case the original investment is 2000 in firm with 30% debt, so in step 1, total investment is  $2000+300 = 2300$ ; 11.5 shares, Step 2 is  $11.5*8.080 - .08*300 = 68.92$ ; Step 3 new number of shares  $2500-150$  (30000 shares repurchased as it is the 15% increment in debt and assuming price doesn't change, it amounts to 150 shares repurchased) = 2350. Estimating new earnings for 25 shares in this firm i.e. 45% leverage amounts to same as step 2 result (there may be slight changes in answer because of rounding off errors but within an acceptable range the answer matches)

Assignment Questions:

1. Identify the mistakes in the answer submitted by the student.
2. Show the correct proof that the increase in leverage is irrelevant for the investor.

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