Miller and Modigliani (M&M) - Capital Structure Irrelevance

In the 1950's Miller and Modigliani (M&M) described the conditions under which a firm's capital structure is irrelevant.

Their key argument was **'home-made' leverage.** The idea is that a firm's shareholders can borrow themselves, therefore they can create their own tax-shields. This means that a firm's capital structure is irrelevant.

If a company has no leverage, but a shareholder wants leverage, he can borrow (sell debt) himself and use the borrowed cash to buy more of the company's stock. His interest payments will be tax deductible from the income he receives from the company in the form of dividends and capital gains, therefore he creates his own tax shields.

If a company is highly levered, but a shareholder wants no leverage, she can lend some of her own cash (buy debt) herself and invest the remainder in the company's stock. Her interest income will be taxed together with the income she receives from the company in the form of dividends and capital gains, and in this case she will not be receiving the full benefit of the tax shields, just as she would if the company had no leverage.

Other Applications of the 'Home-made' Principal

M&M's idea of 'home-made' leverage is a powerful concept that is applied to many other areas of finance.

Diversification

There is no point for a firm to diversify into lots of different businesses since an investor can do it themselves by buying lots of shares. In fact firms that diversify are believed to be at a disadvantage since they lose focus on their 'core competency', they suffer the 'conglomerate discount'.

Payout Policy

There is no point in a firm paying dividends if it has positive NPV projects available, it should invest in those projects, making a capital gain, and any shareholders who need dividends can pay themselves 'home-made' dividends by selling some stock.

Vice-versa for firms that pay high dividends, but a shareholder wants capital gains. The shareholder can simply invest the dividends in more stock, replicating a capital gain.

Why Capital Structure and Payout Policy is Relevant

M&M's theory of capital structure irrelevance only applies in a world without taxes and transaction costs.

But in the real world there are taxes and transaction costs. Therefore capital structure is relevant.

Similarly for payout policy. Real world tax rates on dividends (personal income) and capital gains are different, so investors will usually have a preference of one over the other. Therefore payout policy is also relevant.

Common Misperceptions

The theories of debt, tax shields and the WACC seem quite simple, but they are not! Take the following example.

Question: An all-equity financed firm is valued at V_U .

Management is thinking of increasing the proportion of debt in the firm's capital structure by selling debt (borrowing) and buying back shares (share repurchase). The assets of the firm will not be changed.

Management's argument for increasing the proportion of debt in the firm's capital structure is:

1. The firm's WACC is simply a weighted average of the cost of equity and the after-tax cost of debt.

$$WACC_{after-tax} = r_d \cdot (1 - t_c) \cdot \frac{D}{V} + r_e \cdot \frac{E}{V}$$

- 2. The cost of debt is always less than the cost of equity. $r_d < r_e$
- 3. Therefore by increasing the proportion of debt in the firm's capital structure, its WACC will be lower and so the levered value of the firm (V_L) will be higher.

Describe the **flaw** in their reasoning.

Consider the statements in a world with corporate taxes only, without transaction costs and without information asymmetries or any other market frictions. Also assume that the firm's shareholders can borrow at the same rate as the firm (r_d) .

Answer: Management's first two statements are correct, but the third is not.

The managers are correct when they assert that V_L increases when more debt is issued. But it's not because the cost of debt is *cheaper* than equity. Of course debt has a lower required return than equity, that's because it has less risk. The real reason why the value of the firm increases is because of the higher present value of interest tax shields.

The cost of debt is always less than the cost of equity. That's because debt-holders have less risk since they have first claim on the firm's assets if it goes bankrupt. But as the proportion of debt increases (higher leverage, so $\uparrow \frac{D}{V_L}$), the risk of equity increases and so does its required return ($\uparrow r_e$). This balances

out the higher weight in the cheaper cost of debt in such a way that the before-tax WACC doesn't change.

However, the after-tax WACC will decrease due to the higher interest tax shields from having more debt.

Another reason why the value of the firm's assets shouldn't change (except for the tax shield benefit) is that the before tax WACC is the required return on the firm's assets. Since the firm's assets are unchanged, the before-tax WACC should be unchanged because the risk of the firm's assets is still the same therefore the discount rate that applies to those assets (the before tax WACC) should be the same.

Finally, even though it is true that the levered value of the firm increases, there is not necessarily any increase in shareholder

wealth. This is because, according to M&M's theory of homemade leverage, if shareholders valued the higher benefits of tax shields above the costs of financial distress, they would have already borrowed themselves using their own holding company to create those interest tax-shields on their own account.

Therefore managers' efforts to adjust the level of leverage to maximise the levered value of the firm might be in vain.

Theory Examples: M&M

Question: An all-equity financed firm has constant expected net income (NI), full payout, and therefore no expected growth in NI or dividends.

The firm decides to issue debt to buy back equity $(\uparrow \frac{D}{v})$.

There are no transaction costs, no information asymmetry, and the cost of debt (r_D) remains constant. The firm's assets are unchanged.

What will happen to the firm's $WACC_{before tax}$, $WACC_{after tax}$, OFCF, FFCF, V_{ITS} , V_U , V_L , r_{EL} and shareholder wealth?

Assume that individuals and firms can borrow and lend at the same rates, there is corporate tax only, there are no transaction costs of arranging debt, no signaling effects and no costs of financial distress.

Answer part 1: *WACC*_{before tax} remains unchanged.

Since the firm's assets are unchanged, the $WACC_{before\ tax}$ must remain constant. That's because it's the discount rate appropriate to the level of risk of the firm's assets, and since the assets are unchanged then the risk of the assets must be unchanged so the required return ($WACC_{before\ tax}$) of those assets must also remain unchanged.

Answer part 2: *WACC*_{after tax} falls.

Since the after-tax WACC takes tax shields into account, it will fall to reflect the benefit of the larger amount of tax shields which occurs when the proportion of debt increases.

Answer part 3: *OFCF* remains the same since it ignores interest expense.

Answer part 4: *FFCF* will increase by the amount of the increase in yearly tax shields ($IntExp \times t_c$).

Answer part 5: V_{ITS} will increase by the present value of the increase in yearly interest tax shields ($IntExp \times t_c$).

If the discount rate of tax shields is the same as the cost of debt, the present value of this increase will be $D \times t_c$.

Answer part 6: V_U will be unchanged since it ignores the present value of tax shields.

Answer part 7: V_L will increase by the present value of tax shields (V_{ITS}).

Answer part 8: r_{EL} , the required return on levered equity will increase since there is proportionally more debt (higher leverage) and therefore the equity risk is higher so the required return on equity will rise. Note that:

$$r_{WACC\ before-tax} = r_D \cdot \frac{D}{V_L} + r_{EL} \cdot \frac{E_L}{V_L}$$

Answer part 9: Since the corporation is worth more, shareholder wealth will also increase.

However, Miller and Modigliani's theory can be applied in the real world with taxes. If shareholders would have benefited from the higher leverage, they could have levered up themselves using personal borrowing (home leverage) and bought more shares until their preferred risk-return trade off was reached and they were happy. So if the firm increases its corporate leverage, it may lead shareholders to reduce their own home-made personal leverage until they are back to their preferred overall level of leverage again.

However, in the US, corporate interest tax shields are generally better than personal tax shields since corporate interest tax shields save corporate and personal tax while personal interest tax shields just save personal tax. In Australia, the imputation system may make corporate interest tax shields worthless since corporate tax is refunded at the personal level when franked dividends are paid. This makes personal interest tax shields are more valuable compared with corporate interest tax shields. This is complicated by the fact that only domestic tax residents can use franking credits, foreigners can't. Yet foreigners own around 50% of Australian listed equity! It's a difficult but interesting topic.

Questions: Miller and Modigliani's theory of home made leverage

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