
Chapter 14: Taxes and financing choices

The *Modigliani-Miller theorem* holds that if the capital structure decision has no effect on the total cash flows that an organization can hand out to its debt and shareholders, the decision also will have no effect on the total value of the organization's debt and equity. This only holds when there are no transaction costs.

The total cash flows that are produced by an organization can be stated as a pie chart and the various claims on those cash flows are slices of the pie. The first pie can be stated as the case in which all of the cash flows accumulate to debt and shareholders. This is the assumption of the MM theorem. The second pie has a piece removed because of the tax payments. How the pie is sliced does not affect its total size. Organization wants to try to minimize the amount of tax that they have to pay. So, when more of the pie is allocated to the debt holders, less is allocated to the government. This entails that with holding debt, less of the pie goes to taxes, because interest payments are tax deductible. The third pie includes an additional piece that reflects the possibility that part of the pie is wasted, because of inefficiency, lost opportunities, or avoidable costs.

For example, two organizations exist for one year, produce identical pretax cash flows (X) at the end of that year, and then liquidate. They are financed in a different way; company A is unleveraged, which means that it holds no debt, and company B is leveraged. The cash flow X from company A is handed out only among the shareholders. The current value is the same as the value of its equity. Company B has a debt obligation in one year of $(1 + r_D)D$ dollars. If debt is riskless, and \bar{r}_D is the same as the riskless rate, company B's debt holders will receive $(1 + r_D)D$ at the end of the year and its shareholders will receive the remaining $X - (1 + r_D)D$ dollars. The current value is the current value of its outstanding debt D plus its equity E . This current value must equal $D+E$. The equity of company A is perfectly tracked in the future by company B's debt plus equity, so these two must equal. If these values are unequal, an arbitrage opportunity exists.

The MM theorem

Suppose:

- An organization's total cash flows to its debt and shareholders are not influenced by how it is financed
- There are no transaction costs
- No arbitrage opportunity exist.

Then the total market value of the organization, which is equal to the sum of the market values of the items on the right-hand side of the balance sheet (debt and equity), is not influenced by how it is financed.

The MM theorem supposes that if an organization is not able to meet its debt obligations and goes in bankruptcy, the ownership and control of the organization's assets move costless from the shareholders to the debt holders. If a new debt issue is not subordinated to the old debt, the new debt can generate a transfer of wealth from the existing debt holders to the shareholders. If the debt is subordinated, shareholders will continue to be indifferent to a capital structure change that does not affect the assets of the organization.

Also, under the previous mentioned assumptions of the MM theorem:

If an organization's existing debt holders have a senior claim in the event of bankruptcy, both the organization's stock price per share and the value of its existing senior debt claims are not influenced by changes in the organization's capital structure.

If an organization's existing debt holders do not have a senior claim in the event of bankruptcy, a new debt issue can lower the value of existing debt. Under the assumptions, though, the loss to the old debt holders would be offset by a gain to the shareholders, leaving the total value of the organization unaltered by this type of capital structure change.

Suppose that the pre-tax cash flows of the organization are not influenced by a change in an organization's capital structure, and that there are no transaction costs or opportunities for arbitrage.

With corporate taxes at the rate T_c , but no personal taxes, the value of a levered organization with static risk-free perpetual debt is the value of an otherwise equivalent unlevered organization plus the product of the corporate tax rate and the market value of the organization's debt; that is:

$$V_L = V_U + T_c D$$

Where V_L = the current value of a leveraged company

V_U = the current value of an unlevered company

$T_c D$ = the tax gain to leverage

Suppose that the pre-tax cash flows of the organization are not influenced by a change in an organization's capital structure, and that there are no transaction costs or opportunities for arbitrage. With corporate taxes but no personal taxes, an organization's optimal capital structure will include enough debt to totally remove the organization's tax liabilities.

Since the total cash flows to the equity and debt holders of organizations are larger when cash flows are paid out in the form of debt interest payments instead of retained or paid as dividends, tax-exempt shareholders will favour organizations to have high leverage.

However, shareholders who pay personal taxes favour to receive income in the form of capital gains because capital gains can always be deferred and, in many countries, are taxed at lower rates than interest or dividend income. In general, debt is less risky than equity and thus requires a lower expected rate of return.

With personal taxes, it is necessary to account for the fact that the returns to equity, which often come in the form of capital gains, are usually taxed less heavily than the return to debt. To compensate taxable shareholders for its relative tax disadvantage, the pre-tax return on debt should exceed the pre-tax zero-beta return on equity.

This pre-tax return difference leads tax-exempt shareholders to favour debt to equity.

Suppose that the pre-tax cash flows of the organization are not influenced by a change in an organization's capital structure, and that there are no transaction costs or opportunities for arbitrage. If shareholders all have personal tax rates on debt and equity income of T_D and T_E and if the corporate tax rate is T_c , then the value of a levered organization goes higher than the value of an otherwise equivalent unlevered organization by $T_g D$; that is $V_L = V_U + T_g D$

$$\text{Where } T_g = 1 - \left[\frac{(1 - T_c)(1 - T_E)}{1 - T_D} \right]$$

If T_g in this formula is positive, organizations will want to issue enough debt to remove their tax liability; if T_g is negative, organizations will want to issue no debt in their capital structures.

Organizations will be indifferent when: $(1 - T_D) = (1 - T_c)(1 - T_E)$

The zero-beta organization's after-tax cost of capital will be the same for debt and equity when:

$$r_D(1 - T_c) = \bar{r}_E$$

The left-hand side of the formula is the organization's after tax cost of debt; the right-hand side its after-tax cost of equity.

Suppose there is a tax gain from leverage, but the taxable earnings of organizations are low in relation to their present values.

- With riskless future cash flows, organizations will want to employ debt financing up to the point where they eliminate their whole corporate tax liabilities, but they will not want to borrow beyond that point
- With uncertainty, organizations will choose the debt ratio that weighs the benefits associated with the debt tax shield when it can be used against the higher cost of debt in cases where the debt tax shield cannot be used.
- Organizations with more non debt tax shields are probably using less debt financing.

The marginal tax rate is the extra tax paid per additional dollar of profit. This is frequently a smaller amount than the statutory tax rate. For large corporations, the tax gain associated with leverage is quite large, and for small corporations, the tax gain associated with leverage is expected to be quite small.

The claims of a favoured stockholder are always junior to the claims of the organization's debt holders in the event of bankruptcy, but such claims are senior to the claims of the organization's common stockholders. One of the most important differences between favoured stock and bonds is that the dividends of favoured stock are not tax deductible, while the coupon payments of a bond are.

Because of this, some analysts conclude that subordinated bonds provide cheaper financing than favoured stock. If a corporation owns the favoured stock of another corporation, only 30 percent of the dividend received by the original corporation is taxable. Consequently, the required yield on an organization's favoured stock is often less than the yield on its bonds.

Tax-exempt shareholders, who experience an leverage-raise in the organization whose shares they own, can undo it by selling some of their stock and buying the corporation's bonds.

The taxable and tax-exempt shareholders will not agree about the correct capital structure policy for a corporation. Corporations can raise the after-tax cash flow to their high-tax-bracket shareholders, as well as their low tax bracket shareholders, by increasing leverage, with shareholders undoing or, offsetting, this raise, if they so desire, by selling shares and increasing their tax-exempt bond holdings.

The tax gain raises as the interest rate on corporate debt raises. The most notable reason for change interest rates is a change in the expected rate of inflation.

Fisher (1930) identified a one-to-one relation between interest rates and expected inflation: if inflation is expected to be one percentage point higher, the nominal interest rate also raises by approximately one percentage point. This holds that a raise in inflation raises the tax gain associated with leverage for organizations that will be able to use the interest tax deductions. This is only true when an organization can take advantage of all of its tax shields.

A positive cross-sectional relation between EBIT and debt ratios has not been observed. A negative relation is observed and this probably arises because organizations only rarely issue new equity, which entails:

- Non-debt tax shields and the use of debt financing are positively correlated because organizations tend to finance most major capital expenditures with debt
- organizations that have low or negative EBIT, tend to accumulate debt to meet their expenses

Corporations that lost the most non-debt tax shields under the 1986 Tax Reform Act, raised their debt levels more than organizations that were less affected by the new tax law.

Operating lease is an agreement to acquire the services of an asset for a period that usually represents only a small part of the asset's useful life. In a financial lease, or capital lease, the lease agreement extends over most of the asset's useful life. In general, an organization in a low tax bracket has an inducement to lease equipment from organizations in higher tax brackets. For low tax bracket shareholders, it is often cheaper to lease an asset than to buy it.

In the *Miller equilibrium*, organizations are indifferent between financing their new investments by issuing debt or issuing security, so the after-tax cost of debt equals the cost of equity financing.

If the pre-tax costs of debt and equity are equal, debt is cheaper on an after-corporate tax basis. Organizations have an inducement to raise their debt levels and will do so by issuing debt to repurchase their own shares.

The Miller equilibrium supposes that the supply curve for debt is flat. Since Miller supposes that there are no costs associated with debt financing, organizations will use debt financing exclusively if the cost of debt is less than the cost of equity and they will use equity financing exclusively otherwise.

The Miller equilibrium: If the following assumptions hold:

- the interest deduction for debt always reduces taxes at the margin; that is, organizations experience positive earnings after paying interest
- $(1 - T_D)$ is less than $(1 - T_c)(1 - T_E)$ for some shareholders; that is, shareholders who favour equity to debt.
- There are no costs such as bankruptcy costs associated with increasing debt levels

Then in equilibrium, $T_g = 0$, that is, $(1 - T_D) = (1 - T_c)(1 - T_E)$ and $r_D(1 - T_c) = \bar{r}_E$.

This entails that organizations should be indifferent about leverage when both corporate taxes and personal taxes are taken into account.

However, competition entails that the relative advantages associated with issuing debt and equity securities vanish, making organizations ultimately indifferent about which to issue. Again, consumer tastes – in this case, shareholder tastes for receiving ordinary income instead of capital gains – determine the mix of debt and equity in the economy as a whole.

