

Personal Taxes and the MM Capital Structure Model

Miller ("Debt and Taxes," *Journal of Finance*, May 1977) extended the original MM model to include personal taxation in the analysis. Personal taxes are relevant because stock and bond prices (and thus the value of the firm) are affected by the after-tax cash flows available to investors. The following paragraphs summarize the effect of personal taxes on the analysis in the MM models.

The value of a levered firm with corporate and personal taxes is:

$$V_L = V_U + \{1 - [(1 - T_C) * (1 - T_S) / (1 - T_B)]\} * B$$

where T_S is the personal tax rate on equity returns (capital gains and dividends) and T_B is the personal tax rate on bond returns (interest). Thus, the effect of financial leverage on the value of the firm depends on the corporate tax rate, T_C , the personal tax rate on equity returns, T_S , and the personal tax rate on interest, T_B .

In the following, we consider four cases regarding the relationships among the corporate tax rate, T_C , the personal tax rate on equity returns, T_S , and the personal tax rate on interest, T_B :

1. $T_S = T_B$

When personal tax rate on interest equals personal tax rate on equity returns, the result is the same as the MM propositions with corporate taxes, i.e. $V_L = V_U + T_C * B$.

The effect of personal taxation on capital structure is neutralized in this case. As such, it is only the corporate taxes influencing the capital structure decision, similar to the MM propositions with corporate taxes only.

2. $(1 - T_B) = (1 - T_C) * (1 - T_S)$

In this case, the tax benefits at the corporate level are exactly offset by higher personal tax rate on interest (relative to equity returns). The value of the firm is unaffected by the use of financial leverage, the same result as the MM propositions without corporate taxes, i.e., $V_L = V_U$.

Note that dividends face double taxation at both the corporate and personal levels, while interests are only taxed at the personal level since they are tax deductible by the corporation. However, effectively

T_S is lower than T_B because capital gains, which are subjected to a lower tax rate, are not taxed until they are realized. On the other hand, the return on bonds is mostly in the form of interest income that is taxed at the ordinary income tax rate in the current period.

In this case, the relative tax advantage of debt financing at the corporate level is offset by the relative tax disadvantage of interest income at the personal level such that the joint tax effect on capital structure is neutralized. As such, the MM proposition with no taxes follows.

3. $T_S < T_B$ and $(1 - T_B) > (1 - T_C) * (1 - T_S)$

In this case, the tax benefits at the corporate level are reduced because personal tax rate on interest is higher than personal tax rate on equity returns. Therefore, the value of a levered firm is higher than the value of an unlevered firm, but the increase in value is less than in case 1 (or MM propositions with corporate taxes only): $V_U < V_L < V_U + T_C * B$.

4. $(1 - T_B) < (1 - T_C) * (1 - T_S)$

In this case, personal tax rate on interest is much higher than corporate tax rate and personal tax rate on equity returns. The tax benefits at the corporate level are not sufficient to offset higher personal tax rate on interest, resulting in a lower firm value when financial leverage is used, i.e., $V_L < V_U$.

These results imply that firms will choose either 100% debt financing (cases 1 and 3) or 100% equity financing (case 4) or that capital structure is irrelevant to firm value (case 2).

Please reference Lecture Slides 34 - 38 for further information on this topic, in particular **Slide 38 for the formula calculating the joint tax benefits of debt financing on firm valuation!**