



# Capital Structure: the effect of Personal Taxes ( $T_E$ , $T_i$ )

Gestão Financeira II  
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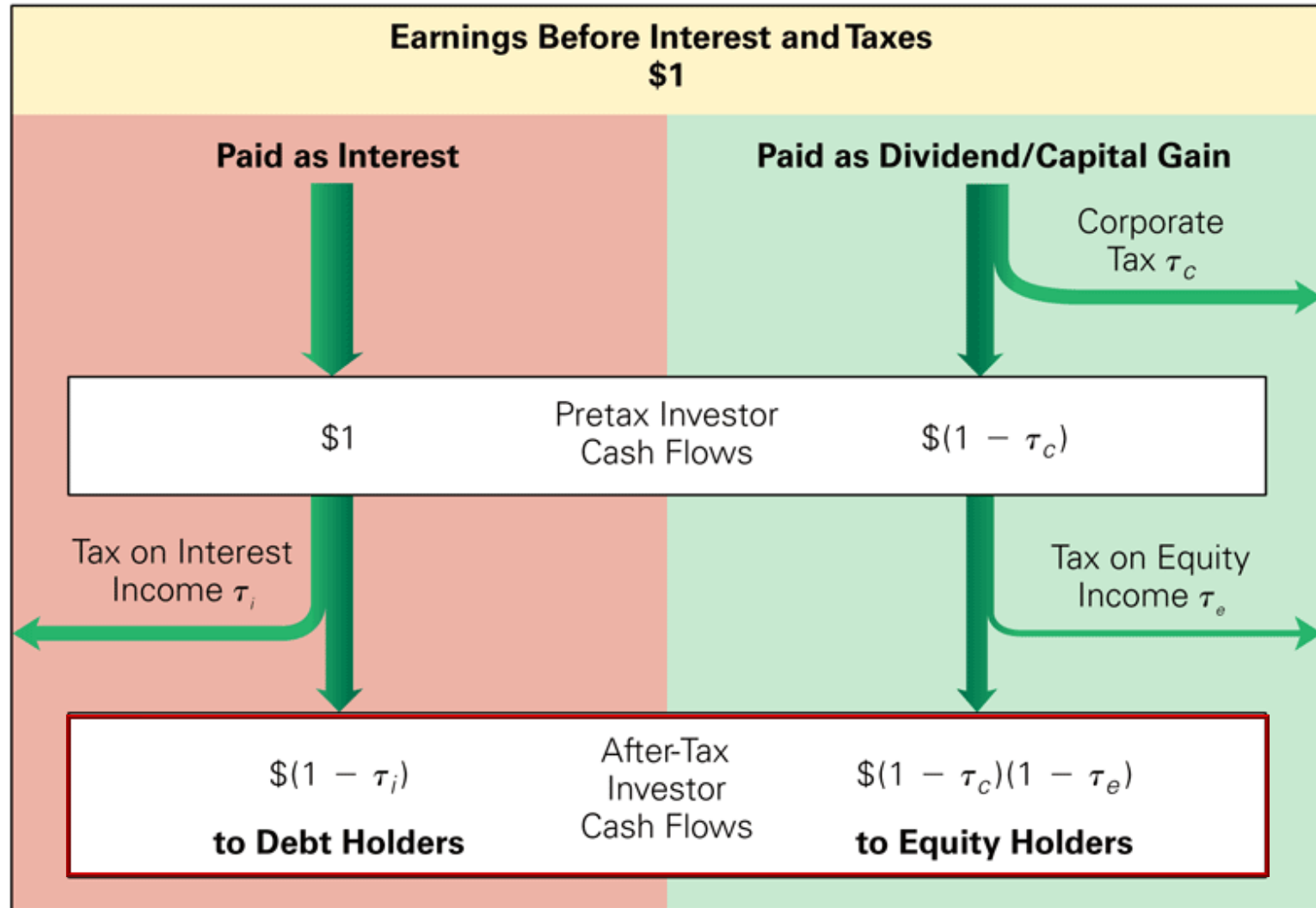
# Personal Taxes

- The **cash flows to investors** are typically **taxed twice**. Once **at the corporate level** and **then investors are taxed again** when they receive their interest or dividend payment or realize their capital gain.
- For individuals:
  - Interest payments received from debt are taxed as income.
  - Equity investors also must pay taxes on dividends and capital gains.
- Personal taxes reduce the cash flows to investors and can offset some of the corporate tax benefits of leverage.

# Tax Benefit of Using Debt: Interest Tax Shield

- The actual **interest tax shield** depends on both **corporate and personal taxes** that are paid.
- To determine the true tax benefit of leverage, the **combined effect** of both corporate and personal taxes needs to be evaluated.

# After-Tax Investor Cash Flows from a \$1 EBIT



# Including Personal Taxes in the Interest Tax Shield

- Therefore, in terms of after-tax cash flows, debt is more favorable than equity as long as:

$$\$1 \times (1 - \tau_i) > \$1 \times (1 - \tau_C)(1 - \tau_E)$$

- We could think of an **annual tax shield** from using debt, compared to equity, after corporate and personal taxes as:

$$\left[ (1 - \tau_i) - (1 - \tau_C)(1 - \tau_E) \right] \times \text{Interest}$$

# Including Personal Taxes in the Interest Tax Shield

- If we are to consider a perpetual level of Debt and a fixed annual interest payment, we would get the present value of the Interest Tax Shield as:

$$PV(\text{Interest Tax Shield}) = \frac{[(1 - \tau_i) - (1 - \tau_C)(1 - \tau_E)] \times r_D D}{r_D (1 - \tau_i)}$$

- Finally, the **Effective Tax Advantage of Debt** can be seen as:

$$\tau^* = 1 - \frac{(1 - \tau_C)(1 - \tau_E)}{(1 - \tau_i)}$$

# Interpreting the Effective Tax Advantage of Debt

$$\tau^* = 1 - \frac{(1 - \tau_C)(1 - \tau_E)}{(1 - \tau_i)}$$

- Intuitively:
  - If there are no personal taxes ( $T_i = T_E = 0$ ), or simply if the personal tax treatment is the same for equity and debt ( $T_i = T_E$ ), the advantage of debt is the same as when only  $T_C$  were considered:  $T^* = T_C$
  - If equity income is less heavily taxed than interest ( $T_E < T_i$ ) – as is usually the case – then the **tax benefit of using debt is reduced**. Could even be negative!

# Valuing the Interest Tax Shield with Permanent Debt

- To keep things simple we will consider only the case of Permanent Debt in the capital structure.
- Following **MM**'s analysis and incorporating this additional imperfection – personal taxes – we would adapt **proposition I** to state:

$$V^L = V^U + \tau^* D$$

- Note: If we were to use the WACC method the  $r_{WACC}$  rate would look the same, but  $r_E$  and  $r_D$  would be adjusted to compensate investors for their personal taxes.



# Effective Tax Advantage of Debt: Example

- Consider the tax rates (for the highest income tax brackets) in the US in different periods:

Year	Corporate Tax Rate <sup>†</sup>	Personal Tax Rates*			
		Interest Income	Average Rate on Equity Income	Dividends	Capital Gains
1971–1978	48%	70%	53%	70%	35%
1979–1981	46%	70%	49%	70%	28%
1982–1986	46%	50%	35%	50%	20%
1987	40%	39%	33%	39%	28%
1988–1990	34%	28%	28%	28%	28%
1991–1992	34%	31%	30%	31%	28%
1993–1996	35%	40%	34%	40%	28%
1997–2000	35%	40%	30%	40%	20%
2001–2002	35%	39%	30%	39%	20%
2003–2009	35%	35%	15%	15%	15%

- Compare the Effective Tax advantage of Debt in 1980 and 1990:

$$\tau_{1980}^* = 1 - \frac{(1 - 0.46)(1 - 0.53)}{1 - 0.7} = 0.082$$

$$\tau_{1990}^* = 1 - \frac{(1 - 0.34)(1 - 0.28)}{1 - 0.28} = 0.34$$

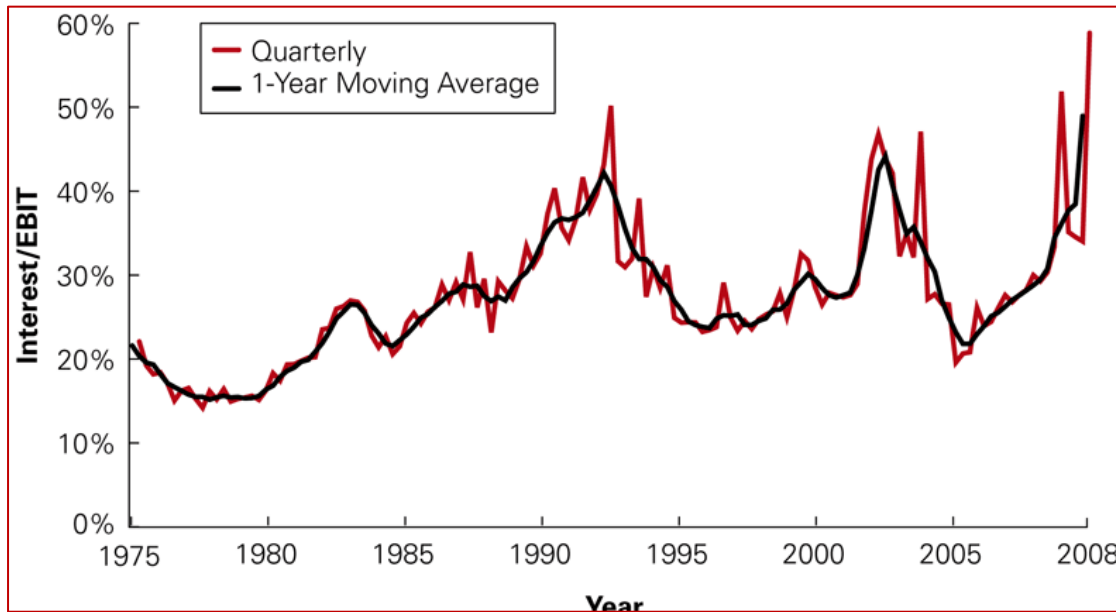
# Further Comments

- The effective personal tax rate on equity income,  $T_E$  (especially for capital gains) is **hard to determine**, because the rate is only applied when the investor sells the share.
- **Some investors are exempt from paying personal taxes** (e.g., some retirement savings accounts or pension funds.)
- All we've seen so far applies only to **firms that are paying corporate taxes**. If a firm's EBIT is already negative, paying interest will not make the firm pay less taxes... (it's *as if*  $T_c=0$ ).
  - In this case there is actually a tax disadvantage from excess interest payments:

$$\tau^* = 1 - \frac{(1-0)(1-\tau_E)}{(1-\tau_i)} = \frac{\tau_E - \tau_i}{1-\tau_i} < 0$$

# Capital Structure in Practice

- The optimal level of leverage from a tax saving perspective is the level such that interest equals EBIT. Of course, EBIT is not fully predictable. Still, US firms use lower leverage than what we could expect from a tax savings perspective



Interest Payments as  
a Percentage of EBIT  
for S&P 500 Firms,  
1975–2008  
Source: Compustat

# Capital Structure in Practice

- The, perhaps low, levels of leverage (from a tax perspective) are found in different parts of the world.

Country	$D/(E + D)$	Net of Cash		$\tau_c$	$\tau^*$
		$D/(E + D)$	Interest/EBIT		
United States	28%	23%	41%	34.0%	34.0%
Japan	29%	17%	41%	37.5%	31.5%
Germany	23%	15%	31%	50.0%	3.3%
France	41%	28%	38%	37.0%	7.8%
Italy	46%	36%	55%	36.0%	18.6%
United Kingdom	19%	11%	21%	35.0%	24.2%
Canada	35%	32%	65%	38.0%	28.9%

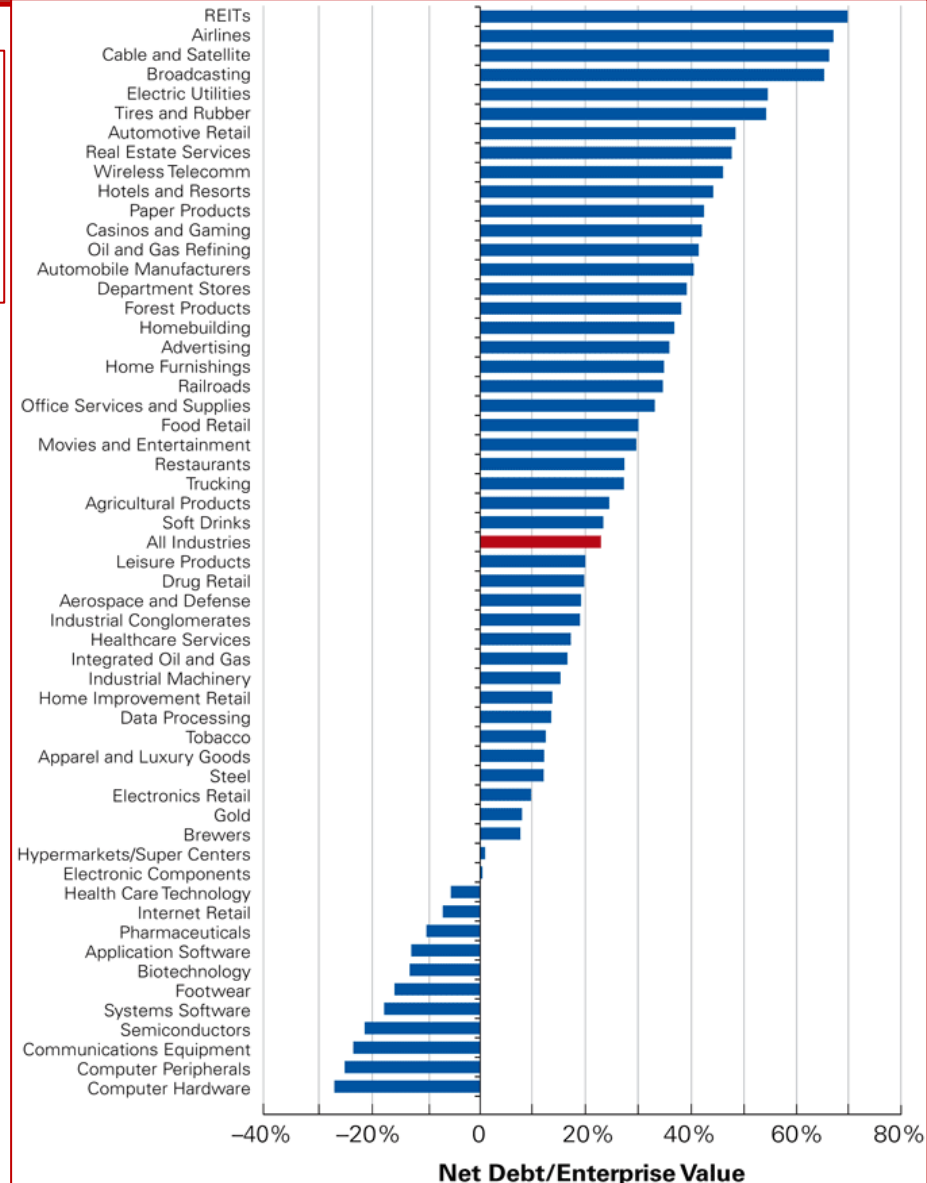
Source: R. Rajan and L. Zingales, "What Do We Know About Capital Structure? Some Evidence from International Data," *Journal of Finance* 50 (1995): 1421–1460. Data is for median firms and top marginal tax rates.

# Capital Structure in Practice

Debt-to-Value Ratio [ $D / (E + D)$ ]  
for Select Industries

Source: IQ Capital

- Capital Structures vary a lot in practice.
- Huge differences across industries.



# Capital Structure in Practice

- What to conclude?
  - That **Taxes overall tend to give an advantage to the use of Debt**;
  - But firms are cautious in using very high levels of debt. Why?
  - Because **there are more factors** – besides taxes – **that are important to determine the capital structure**. Which factors?
  - **For instance**, higher debt increases the probability of bankruptcy, and **bankruptcy can be costly**.