Foundations of Accounting & Finance

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Lecture – 57

Valuation and Capital Structure

Valuation with WACC

The Weighted Average Cost of Capital (WACC) serves as the discount rate for the firm's cash flows or for projects that mirror the firm's characteristics. Whether it is the firm's cash flows, a project replicating the firm, or another firm for which the current firm acts as a proxy, the same WACC is applied for discounting.

WACC essentially becomes the benchmark discounting rate for projects with similar risk profiles or risk characteristics. This uniform approach ensures consistency in valuation and reflects the firm's overall cost of capital, incorporating both debt and equity components weighted by their respective proportions in the capital structure.

Example:

Suppose a firm has both a current and a target debt–equity ratio of 0.6, a cost of debt of 5.15 percent, and a cost of equity of 10 percent. The corporate tax rate is 34 percent. Suppose the firm is considering taking on a warehouse renovation costing $60 million that is expected to yield after tax cost savings of $12 million a year for six years.

Solution

Now, the question is whether the firm should proceed with this renovation project, considering the significant cost of capital. Should they invest in this renovation project, which requires a $60 million expenditure? This decision hinges on whether the firm should borrow the funds, raise them through a combination of debt and equity, or not undertake the project at all, given that the anticipated annual return is $12 million.

Calculation of WACC

Given a debt-equity ratio of 0.6, a cost of debt of 5.15 percent, a cost of equity of 10 percent, and a corporate tax rate of 34 percent, we need to determine the Weighted Average Cost of Capital (WACC).

First, we calculate the weights of debt and equity:

- Debt-equity ratio: 0.6
- Weight of debt = Debt-equity ratio / (Debt-equity ratio + 1) = 0.6 / (0.6 + 1) = 0.375
- Weight of equity = 1 - Weight of debt = 1 - 0.375 = 0.625

Next, we calculate the after-tax cost of debt:

- Cost of debt: 5.15 percent
- After-tax cost of debt = Cost of debt * (1 - Tax rate) = 5.15% * (1 - 0.34) = 3.39 percent

Now, we can calculate the WACC:

- WACC = (Weight of debt * After-tax cost of debt) + (Weight of equity * Cost of equity) = (0.375 * 3.39%) + (0.625 * 10%) = 1.27125% + 6.25% = 7.52125%

Therefore, the Weighted Average Cost of Capital (WACC) for the firm is approximately 7.52 percent.

	debt Equity ratio	0.6		
	Cost of debt	5.15%		
	Cost of equity	10%		
	Tax rate	34%		
		Weight	Cost of Ca	WACC
Debt	0.375	0.375	3.40%	0.013
Equity	0.625	0.625	10.00%	0.063
	1.000			**7.52%**

Discounting cash flows at WACC

Let us analyse the cash flows and discount them accordingly. Initially, there is a negative cash flow of $60 million, signifying the investment in the renovation project. Over the next six years, there will be positive cash flows of $12 million annually.

To find the present value of these cash flows, we discount each year's cash flow using the Weighted Average Cost of Capital (WACC), which in this case is 7.52 percent.

For example, the present value of the $12 million cash flow at the end of the first year is calculated as follows:

PV Year 1 = $12 million / (1+7.52%)^ 1

We repeat this process for each year, adjusting the power term (year) accordingly. Once we have calculated the present value of all the cash flows, we sum them up.

Next, we calculate the Net Present Value (NPV) of the project by subtracting the initial investment from the present value of the cash flows. If the NPV is positive, it indicates that the project is viable given the cost of capital. However, if the NPV is negative, as in this case, the project is not economically justified at the current cost of capital. In this example, the NPV is negative 3.7163

We can explore scenarios where we adjust the cost of capital to see if it makes the project viable. For instance, reducing the cost of capital to 5.72 percent may make the project viable, while further reduction to 4.72 percent would likely increase its viability.

In conclusion, the cost of capital plays a crucial role in determining the feasibility of the project. After analysing the cash flows and discounting them at the WACC, we can assess whether the investment is economically viable.

Year	0	1	2	3	4	5	6
Cash flow	-60	12	12	12	12	12	12
PVIF		0.930	0.865	0.804	0.748	0.696	0.647
PV	-60	11.160	10.379	9.653	8.977	8.349	7.765
NPV	**-3.7163**						

Example (Part 1)

- Consider the Good Food Corporation, a public company is a leading food retailer. It operates about 10,000 restaurants in 100 countries.
- Good Food serves a value-based menu - hamburgers and French fries.
- The company has $4 billion in market valued debt and $2 billion in market valued common stock. Its tax rate is 20 percent. Good Food has estimated its cost of debt as 5 percent and its cost of equity as 10 percent. Calculate WACC

Calculation of WACC

To calculate the Weighted Average Cost of Capital (WACC) for the Good Food Corporation, we first need to determine the weights of debt and equity in the total capital structure.

Given that the market value of debt is $4 billion and the market value of common stock is $2 billion, the weight of debt is 4/6 = 0.67 and the weight of equity is 2/6 = 0.33

Next, we calculate the after-tax cost of debt. The cost of debt is given as 5 percent, and the corporate tax rate is 20 percent. Therefore, the after-tax cost of debt is $5\% \times (1-0.2)=4\%$.

The cost of equity is stated as 10 percent. Since there are no tax shields associated with equity, the after-tax cost of equity remains the same as the cost of equity, which is 10%.

Now, we can compute the WACC using the formula:

$WACC$=Weight of Debt × After-tax Cost of Debt + Weight of Equity × Cost of Equity

Substituting the values, we get:

$WACC$ = (46×4%)+(26×10%)=6%

Therefore, the Weighted Average Cost of Capital (WACC) for the Good Food Corporation is 6 percent.

Calculation of WACC				
	MV	Weight	Cost of Capital	WACC
Debt	4	0.666667	4.00%	0.027
Equity	2	0.333333	10.00%	0.033
	6			**6.00%**

Example (Part 2)

- Good Food is seeking to grow by acquisition. Potential candidate
- Happy Meals is currently a private firm with no publicly tradable common stock but has the same product mix. It operates about 4,000 restaurants mostly in North America and Europe. Happy Meals has $1,318.8 million of debt outstanding with its market value the same as the book value.
- It has 12.5 million shares outstanding. Since Happy Meals is a private firm, we have no stock market price to rely on for our valuation. Happy Meals expects its EBIT to grow 10 percent a year for the next five years. Increases in net working capital and capital spending are both expected to be 24 percent of EBIT. Depreciation will be 8 percent of EBIT. The perpetual growth rate in cash flow after five years is estimated to be 2 percent

Estimation of Net Cash Flows

Now, let us move on to estimating the net cash flows for the acquisition of Happy Meals. Firstly, we need to determine the EBIT for Happy Meals, which is currently $150 million and is expected to grow at 10 percent annually. Therefore, the EBIT for the next year would be 110 percent of the current EBIT, which is $165 million.

Next, we calculate the taxes based on the tax rate of 20 percent, as determined in the previous example. So, the taxes would be 20 percent of the EBIT.

After-tax earnings (EAT) can be calculated by subtracting the taxes from the EBIT.

To calculate the net cash flows, we add back the depreciation since it's a non-cash expense. Depreciation is 8 percent of the EBIT.

We need to account for capital expenditures (CAPEX) and increases in working capital, which are both expected to be 24 percent of EBIT each. Therefore, CAPEX and the increase in working capital are both calculated as 24 percent of the EBIT.

Finally, the net cash flow is obtained by subtracting CAPEX and the increase in working capital from the sum of after-tax earnings and depreciation.

So, as indicated in the following table, the net cash flow for the acquisition of Happy Meals is the sum of after-tax earnings and depreciation, minus CAPEX and the increase in working capital.

Year	1	2	3	4	5
EBIT	150	165	182	200	220
Less: Taxes	30	33	36	40	44
EAT	120	132	145	160	176
Add: depreciation	12	13	15	16	18
Less: CAPEX	36	40	44	48	53
Increase in NWC	36	40	44	48	53
Net Cash flow	**60.0**	**66.0**	**72.6**	**79.9**	**87.8**

Valuation of the firm

Now, let us move on to valuing the firm. We have determined the net cash flows, which we will consider as perpetual cash flows since they are expected to continue indefinitely. Therefore, we calculate the terminal value of these cash flows using the perpetuity with growth formula. Considering a growth rate of 2 percent and the WACC as the discount rate, we find the terminal value of the enterprise.

Next, we find the present value of all these cash flows. Each cash flow is discounted using the WACC as the discount rate. The terminal value, calculated for year 5, is also discounted for 5 years. This provides us with the present value of all the cash flows.

By summing up the present values of all the cash flows, we obtain the total value of the firm, which amounts to $1.979.11 million.

Now, let us determine the value of the debt, which is $1,318.8 million. Subtracting the value of debt from the total firm value gives us the value of equity, which amounts to $660.31 million.

In conclusion, the WACC is utilized for discounting and valuing the firm, enabling us to estimate the total firm value and the value of equity.

Net cash flow	60.0	66.0	72.6	79.9	87.8
PVIF	0.943	0.890	0.840	0.792	0.747
PV	56.60	58.74	60.96	63.26	65.64
Terminal Value					1673.913
Total	56.60	58.74	60.96	63.26	1739.56
Total Value of Firm	1979.11				
Total value of debt	1318.8	Million			
Total value of Equity	660.31	Million			
Equity value per share	52.82504				

Summary of DCF Model of valuation

$$\mathrm{PV}_0 = \frac{CF_1}{1 + R_{\mathrm{WACC}}} + \frac{CF_2}{(1 + R_{\mathrm{WACC}})^2} + \frac{CF_3}{(1 + R_{\mathrm{WACC}})^3} + \cdots + \frac{CF_T + TV_T}{(1 + R_{\mathrm{WACC}})^T}$$

$$TV_T = \frac{CF_{T+1}}{R_{\mathrm{WACC}} - g_{CF}} = \frac{CF_T(1 + g_{CF})}{R_{\mathrm{WACC}} - g_{CF}}$$

Cash flow = net cash flows and is equal to earnings before interest and taxes (EBIT), minus taxes, minus capital spending, minus increases in net working capital plus depreciation.

Optimum capital structure

The combination of debt and equity in a firm's capital structure is crucial, and finding the optimal mix is a key financial decision. This optimal capital structure is the balance between debt and equity that minimizes the firm's cost of capital and maximizes its value.

Why is this mix important? Let us take an example:

Example

Let's examine the scenario with two companies, A and B, with different capital structures - one relying more on equity and the other on debt.

Company A:

- Equity: $100
- Debt: 0

- Profit before interest and tax (PBT): $10
- Interest expense: 0
- Profit after tax (PAT): $5 (assuming a 50% tax rate)
- **Return for equity holders: $5 for $100 investment = 5%**

Company B:

- Equity: $60
- Debt: $40 at 10% interest
- Profit before interest and tax (PBT): $10
- Interest expense: $4
- Profit after tax (PAT): $3 (assuming a 50% tax rate)
- **Return for equity holders: $3 for $60 investment = 5%**

Now, let us consider the impact of increasing the capital structure. Company A decides to raise an additional $20 through equity, while Company B opts for debt.

For Company A:

- Interest expense remains at 0
- Profit before interest and tax (PBT) remains at 10
- PAT remains at 5
- **Return for equity holders: $5 for $120 investment = 4.17%**

For Company B:

- Interest expense increases to $6
- Profit before interest and tax (PBT): $4
- PAT drops to $2 (assuming a 50% tax rate)
- **Return for equity holders: $2 for $60 investment = 3.33%**

This comparison illustrates that as debt increases in the capital structure, the risk to equity holders also increases. With higher debt levels, equity holders face the possibility of reduced returns, especially if the company's performance does not improve to offset the increased financial

obligations. Thus, the expected return for equity holders tends to rise as debt becomes a larger part of the capital structure.

Twist in the example

Let us add a twist to the example by considering a COVID year where the profit before interest and tax (PBIT) for both companies A and B is reduced to $6.

For Company A:

- PAT reduced to $3
- **Return for equity holders: $3 for $100 investment = 3%**

For Company B:

- PAT drops to $1
- **Return for equity holders: $1 for $60 investment = 1.67%**

This illustrates that in a challenging economic environment such as COVID year, where PBIT decreases, the returns for equity holders decrease as well. Additionally, the interest on debt remains constant, further impacting the returns for equity holders.

With debt in the capital structure, the risk for equity holders increases, leading to a higher cost of equity. Eliminating debt entirely and relying solely on equity may not be a viable solution either, as debt is generally cheaper than equity due to its lower risk and assured return.

In summary, debt is typically cheaper than equity because it offers lower risk and assured returns, while equity entails higher risk and uncertain returns, resulting in a higher cost of equity.

The core problem

The core problem lies in the fact that while the cost of equity increases with debt in the capital structure, debt is inherently cheaper than equity. Therefore, the challenge is to strike the right balance between debt and equity to achieve the lowest overall cost of capital, known as the weighted average cost of capital (WACC). Finding this optimal combination of debt and equity is the key challenge.

Choosing the right mix of debt and equity involves various considerations, and there exist models like the Modigliani-Miller theorem among others to guide this decision-making process. However, delving into the details of these models is beyond the scope of this discussion.

Financial managers must carefully assess factors such as agency costs, bankruptcy costs, and other associated risks when determining the ideal debt-to-equity ratio for their firms. While aiming for

a debt-to-equity ratio of nearly 100% may seem advantageous, it is crucial to consider the potential consequences and costs associated with excessive debt.

Costs of Financial Distress

The costs associated with financial distress are significant and can have a substantial impact on both debt and equity holders. When a company is unable to meet its debt obligations and declares insolvency, it incurs various costs, including the cost of bankruptcy. This cost is already factored into the cost of debt, as lenders anticipate the possibility of default.

As debt levels increase, so does the risk of financial distress, leading to higher costs of debt and equity. This phenomenon occurs because high debt levels amplify the potential consequences of default, resulting in greater risk for both creditors and shareholders.

Despite the tax benefits associated with debt and its obligatory payment structure, the risks of default, financial distress, and bankruptcy are inherent. These risks can lead to a loss of ownership control for shareholders and result in significant costs associated with distress. Consequently, the overall cost of capital increases as debt levels rise, affecting the company's financial health and stability.

Description of Financial Distress Costs

- Direct Costs - Legal and administrative costs
- Indirect Costs - Impaired ability to conduct business (e.g., lost sales)
- Agency Costs
- *Selfish Strategy 1: Incentive to Take Large Risks*
    - Firms near bankruptcy often take great chances because they believe that they are playing with someone else’s money
- *Selfish Strategy 2: Incentive toward Underinvestment*
    - Stockholders of a firm with a significant probability of bankruptcy often find that new investment helps the bondholders at the stockholders’ expense.
- *Selfish Strategy 3: Milking the Property*
    - Pay out extra dividends or other distributions in times of financial distress, leaving less in the firm for the bondholders

Can Costs of Debt Be Reduced?

Reducing the costs of debt is possible through various mechanisms such as positive covenants and strategies aimed at mitigating financial distress. Positive covenants, which are clauses in loan agreements that require certain actions by the borrower, can help lower the cost of debt. Stockholders may agree to pay higher interest rates to lenders as insurance against their own potentially selfish strategies, as seen in previous examples. These agreements can be included as part of the loan documentation.

However, it is essential to acknowledge that breaking covenants can lead to default and further financial distress. Managing financial distress and its associated costs is a complex subject that requires careful consideration. Mitigating risks and addressing the costs of financial distress involve comprehensive strategies that are beyond the scope of this discussion.

Agency Cost of Equity

The agency cost of equity arises from the divergence of interests between the shareholders, who are the owners of the company, and the managers, who make operational decisions. As a shareholder, I aim for the long-term success and sustainability of the company, while the manager may prioritize short-term gains that benefit them personally. This misalignment of interests is referred to as the agency problem.

For instance, the manager may focus on short-term profits to maximize their performance-linked incentives, even if it compromises the company's long-term goals. To mitigate this, incentive schemes for managers, including CEOs, should align with the shareholders' interests, emphasizing long-term performance rather than short-term gains.

Moreover, agency costs can extend beyond the owner-manager relationship to scenarios involving minority and majority stakeholders. In such cases, the majority stakeholder, who controls the firm, may make decisions that primarily benefit them, disregarding the interests of minority stakeholders.

As these agency problems persist, they contribute to the overall cost associated with equity. However, efforts to minimize agency problems, such as aligning incentives and ensuring fair treatment of minority stakeholders, can help reduce the agency cost of equity. Similarly, addressing agency issues can also lead to a decrease in the cost of debt by minimizing the risk of financial distress or bankruptcy.

Summary

In summary, achieving the optimum balance between debt and equity is a crucial challenge for financial managers and CFOs. The goal is to maintain a combination that minimizes the overall cost of capital for the company. While increasing debt can lead to higher costs of both debt and

equity, debt is generally cheaper than equity. Therefore, the CFO and their team work to find the optimal mix that keeps the overall cost of capital at its lowest.