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**Problem Set: Cost of Capital and Decision Criteria**

**(Solutions Below)**

**Cost of Capital**

1. Calculate the cost of equity if stock in a firm has a beta of 1.15. The market risk premium is 8 percent, and T-bills are currently yielding 4 percent.
2. A bank has an issue of preferred stock with a $6 stated dividend that just sold for $92 per share. What is the bank's cost of preferred stock?
3. A firm is trying to determine its cost of debt. The firm has a debt issue outstanding with 12 years to maturity that is quoted at 105 percent of its face value of $1,000. The issue makes semiannual payments and has an coupon rate of 8 percent annually. What is the pretax cost of debt? If the tax rate is 35 percent, what is the after-tax cost of debt?
4. A firm has a target capital structure of 50 percent common stock, 5 percent preferred stock, and 45 percent debt. Its cost of equity is 16 percent, the cost of preferred stock is 7.5 percent, and the cost of debt is 9 percent. The relevant tax rate is 35 percent. What is its WACC?

**Decision Rules**

If r = 10%, determine whether or not to do the following projects (questions 5-9) using each of the five decision criteria:

* Payback Period (3 year)
* Discounted Payback Period (3 year)
* Net Present Value (NPV) Rule
* Internal Rate of Return (IRR)
* Modified Internal Rate of Return (MIRR) (rRI = 10%)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -1,000 | 500 | 200 | 200 | 500 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -10,000 | 3,500 | 3,200 | 3,200 | 2,500 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -300 | 250 | 150 | -200 | 150 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -15,000 | 5,000 | 3,000 | 4,000 | 5,000 |



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -10,000 | 1,600 | 3,600 | 1,700 | 4,500 |

1. Use the NPV rule to decide on the better project (r = 10%).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -10,000 | 3,600 | 3,100 | 2,500 | 4,700 |
| -20,000 | 8,300 | 4,900 | 5,200 | 7,200 |

**Solutions**

NOTE: I include the formulae solutions but you only need to know how to do this on a financial calculator.

**Cost of Capital**

1. Calculate the cost of equity if stock in a firm has a beta of 1.15. The market risk premium is 8 percent, and T-bills are currently yielding 4 percent.

Using the CAPM, we find:

RE = .04 + 1.15(.08) = .1320 or 13.20%

1. A bank has an issue of preferred stock with a $6 stated dividend that just sold for $92 per share. What is the bank's cost of preferred stock?

The cost of preferred stock is the dividend payment divided by the price, so:

RP = $6/$92 = .0652 or 6.52%

1. A firm is trying to determine its cost of debt. The firm has a debt issue outstanding with 12 years to maturity that is quoted at 105 percent of face value. The issue makes semiannual payments and has an coupon rate of 8 percent annually. What is the pretax cost of debt? If the tax rate is 35 percent, what is the after-tax cost of debt?

P/Y = 2; N = 24; I/Y = 7.37%;

PV = 1,050; PMT = -40; FV = -1,000

PMT = (1,000 x 0.08)/2 = 40

N = 12 x 2 = 24

And the after-tax cost of debt is:

rD = 0.0737(1 – 0.35) = 0.0479 or 4.79%

1. A firm has a target capital structure of 50 percent common stock, 5 percent preferred stock, and 45 percent debt. Its cost of equity is 16 percent, the cost of preferred stock is 7.5 percent, and the cost of debt is 9 percent. The relevant tax rate is 35 percent. What is its WACC?

Using the equation to calculate the WACC, we find:

WACC = 0.50(0.16) + 0.05(0.075) + 0.45(0.09)(1 – 0.35)

= 0.1101 or 11.01%

**Decision Rules**

If r = 10%, determine whether or not to do the following projects (questions 5-9) using each of the five decision criteria:

1. Payback Period (3 year)
2. Discounted Payback Period (3 year)
3. Net Present Value (NPV) Rule
4. Internal Rate of Return (IRR)
5. Modified Internal Rate of Return (MIRR) (rRI = 10%)

NOTE: Where applicable, You may also use the financial calculator functions to sole these problems.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -1,000 | 500 | 200 | 200 | 500 |

a. Payback Period (3 year)



b. Discounted Payback Period (3 year)



c. Net Present Value (NPV) Rule



d. Internal Rate of Return (IRR)



e. Modified Internal Rate of Return (MIRR)



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -10,000 | 3,500 | 3,200 | 3,200 | 2,500 |

a. Payback Period (3 year)



b. Discounted Payback Period (3 year)



c. Net Present Value (NPV) Rule



d. Internal Rate of Return (IRR)



e. Modified Internal Rate of Return (MIRR)



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -300 | 250 | 150 | -200 | 150 |

a. Payback Period (3 year)



b. Discounted Payback Period (3 year)



c. Net Present Value (NPV) Rule



d. Internal Rate of Return (IRR)



e. Modified Internal Rate of Return (MIRR)



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -15,000 | 5,000 | 3,000 | 4,000 | 5,000 |

a. Payback Period (3 year)



b. Discounted Payback Period (3 year)



c. Net Present Value (NPV) Rule



d. Internal Rate of Return (IRR)



e. Modified Internal Rate of Return (MIRR)





|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -10,000 | 1,600 | 3,600 | 1,700 | 4,500 |

a. Payback Period (3 year)



b. Discounted Payback Period (3 year)



c. Net Present Value (NPV) Rule



d. Internal Rate of Return (IRR)



e. Modified Internal Rate of Return (MIRR)



1. Use the NPV rule to decide on the better project (r = 10%).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| -10,000 | 3,600 | 3,100 | 2,500 | 4,700 |
| -20,000 | 8,300 | 4,900 | 5,200 | 7,200 |

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