Q1. Company ABC operates in the car industry. It has issued 5 million zero-coupon bonds; each bond has maturity of 5 years, face value of $1000, and it is priced at $900. It also has 5 million common stocks outstanding and each stock is worth $500; the risk free rate is 1% and the beta of the stock is 1.2, and the expected return on the market portfolio is 6%. The tax rate is 20%.



(A) What is the weighted average cost of capital for Company ABC (In computing the cost of equity, use the capital asset pricing model)?

900(1+YTM)^5 = 900(1+EAY)^5 =1000

Cost of debt = YTM = 0.0213



Current market value of debt = 900\*5M = $4500M

Cost of equity = 0.01 + 1.2\*(0.06-0.01) = 0.07



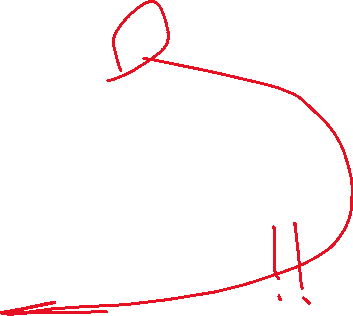
Current market value of equity = 5M\*500 = 2500M



WACC = 4500/7000\*0.0213\*(1-0.2) + 2500/7000\*0.07 = 0.036



(B) Company ABC is considering the project of staring a new car lineup. It needs an initial cash outlay of $140,000 to start the project, and it is expected to generate an after-tax cashflow of $145,000 one year later. If Company ABC wants to maintain the same capital structure for the project as in its overall firm capital structure (i.e. as in Part A), should it accept or reject the project? Reject



Because of the following reasons:  
- Company ABC’s capital structure for the project is same as the firm structure  
- It will maintain the same capital structure throughout the project  
- The project deals with the same type of business as the industry ABC operates in



we will use Company’s WACC of 0.036 as the project discount rate

-140,000 + 145,000/1.036 = -38.61 < 0

Company ABC should reject the project

(C) Company ABC also wants to get involved in a new project of battery production. Because it has never been involved in producing battery, it believes that this new project is slightly riskier than the average risk of the current business; as a result, it will use 2% plus the weighted average cost of the capital for the company as the discount rate for the new project. If the initial cash outlay is $2 million and the after-tax free cashflow from the new project is $2.1 million in Year 1, should Company ABC accept or reject this project? Reject



Discount for the project = WACC + 0.02 = 0.056



NPV = -2M+2.1M/(1.056) = -0.011M> 0

It should reject the project.

Q2. Willie Sutton Bank Vault Company has a debt-to-equity ratio (in market value terms) of 0.75, and it has a tax rate of 40 percent. Willie Sutton Bank Vault is eyeing the automated bank teller business, a field that involves electronics and is considerably different from its own line of business, so the company is looking for a benchmark or proxy company. The Peerless Machine Company, whose stock is publicly traded, produces only automated teller equipment. Peerless has a debt-to-equity ratio (in market value terms) of 0.25, a beta of 1.15, and an effective tax rate of 40%.



(A) If Willie Sutton Bank Vault Company wishes to enter the automated bank teller business, what is the adjusted beta of this new venture if it intends to employ the same capital structure in the new venture as it presently employs? 1.45



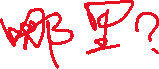
Because Willie Sutton Bank Vault Company wants to operate in a field that is different from its baseline operations, we need to use systematic risk of The Peerless Machine Company as a benchmark.

The unlevered beta of The Peerless Machine Company is = 1.15/(1+0.25\*(1-0.4)) = 1  
This represents the systematic risk of equity in the automatic teller machine business when there is no debt.



Now, Willie Sutton Bank Vault Company wants to be involved in this new business with a det-to-equity ratio of 0.75. Hence, we need to lever up the unlevered beta. i.e. systematic risk of equity when we include the debt financing.

Hence, the levered beta of Willie Sutton Bank Vault Company in this new business  
= unlevered beta from The Peerless Machine Company \* [1+0.75\*(1-0.4)]   
=1\* [1+0.75\*(1-0.4)]   
= 1.45



(B) If the risk-free rate currently is 7 percent and the expected return on the market portfolio is 17 percent, what is the cost of equity for this new project of Willie Sutton Bank Vault Company, if it uses a CAPM approach? 0.215



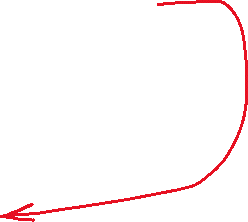
Cost of equity  
= Rf + beta\*(E[Rm]-Rf)

= 0.07+1.45\*(0.17-0.07)



= 0.215

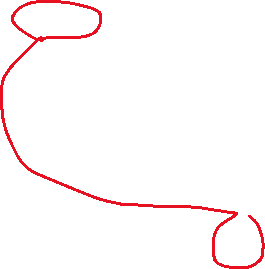
Q3. Company ABC is considering investing in a new snowplow truck costing $30,000 today. The truck is likely to provide after-tax incremental operating cash flows of $8,000 per year for the next six years. The unlevered cost of equity capital for the firm is 16 percent per year. The company intends to finance the project with 60 percent debt, bearing an interest rate of 12 percent per year. The loan will be repaid in equal annual principal payments at the end of each of the six years, i.e. $3,000 per year. Flotation costs (in present value terms) associated with raising $30,000 is $1,000, and the company is in a 30 percent tax bracket.



What is the adjusted present value (APV) of the project? $178

$18,000 is financed by debt and $12,000 is financed by equity.

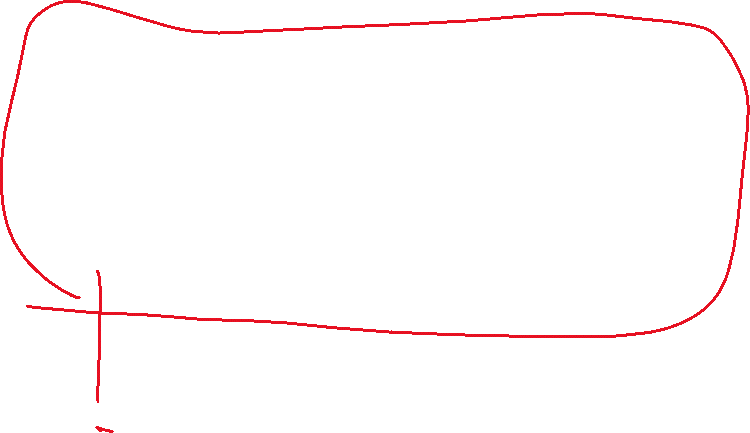
PV of CF from operations @cost of unlevered equity



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| CF | -30000 | 8000 | 8000 | 8000 | 8000 | 8000 | 8000 |
| PV @ 16% | -30000 | 6897 | 5945 | 5125 | 4418 | 3809 | 3284 |
| Sum of PV | -522 |  |  |  |  |  |  |

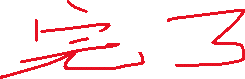
PV of tax shield benefits

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Debt Owed | 18000 | 15000 | 12000 | 9000 | 6000 | 3000 | 0 |
| Interest Expense @ 12% |  | 2160 | 1800 | 1440 | 1080 | 720 | 360 |
| Tax Benefits at Tax rate 30% |  | 648 | 540 | 432 | 324 | 216 | 108 |
| PV of Tax Benefits @ 12% | 0 | 579 | 430 | 307 | 206 | 123 | 55 |
| Sum of PV | 1700 |  |  |  |  |  |  |



APV = NPV from operations + PV of tax shield – Floating costs = -522 + 1700 – 1000 = 178 > 0

Yes, the project is acceptable. Note that the project is attractive enough to be accepted because of the tax shield benefits.



Q4. Which of the following is FALSE?

(A) We should not use the WACC (weighted average cost of capital) for a project as the appropriate discount rate for the project if the capital structure does not stay the same throughout the project.

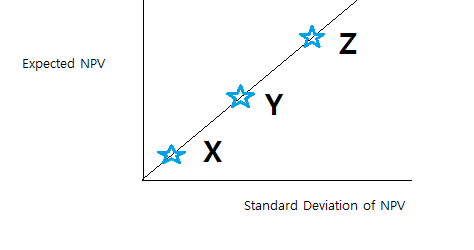
(B) The cost of equity for a firm should be higher than the cost of debt for the same company as debt holders have priority on claims on assets over equity holders.

(C) Payment of dividends will lead to reduction in corporate income tax

(D) If a project requires an initial cash outlay today and generates positive after-tax cashflows in all future years, a lower cost of capital will lead to a higher value of NPV for the project.

Q5. Alice, Ben, and Charles are financial managers of a company. All of them want to maximize expected NPV of real projects and minimize the standard deviation of NPV of the projects. Portfolio X, Portfolio Y, and Portfolio Z are available portfolios of real projects to the company.

Alice is the most risk-tolerant manager, Ben is the second most risk-tolerant manager, and Charles is the most risk-averse manager. Which of the following is the most likely preference of the projects for each manager?



(A) Alice prefers Portfolio X. Ben prefers Portfolio Y. Charles prefers Portfolio Z.

(B) Alice prefers Portfolio Y. Ben prefers Portfolio Z. Charles prefers Portfolio X.

(C) Alice prefers Portfolio Z. Ben prefers Portfolio X. Charles prefers Portfolio Y.

(D) Alice prefers Portfolio Z. Ben prefers Portfolio Y. Charles prefers Portfolio X.