

## Cost of Capital and its Components: An Application

Halil D. Kaya

Associate Professor of Finance, Department of Accounting and Finance, College of Business and Technology, Northeastern State University, Broken Arrow, OK 74014;  
Email: kaya@nsuok.edu

**DOI Link:** <http://dx.doi.org/10.6007/IJARBSS/v6-i5/2134>

**Published Date:** 16 May 2016

### Abstract

This case deals with the estimation of cost of capital and its components. Students will learn how to estimate the cost of debt, the cost of preferred stock, and the cost of common stock. They will learn how to compute the weight of each cost of capital component and then they will estimate the overall cost of capital. Finally, they will discuss why certain types of capital are more expensive than others. This is a hands-on experience for students who want to learn more about corporate financing costs.

**Keywords:** Capital Structure, Cost Of Capital, Cost Of Debt, Cost Of Preferred Stock, Cost Of Common Stock, Project Valuation

*JEL classifications:* G30, G31, G32

### Introduction

Ted Moore has just started working at the company under the firm's Assistant Treasurer. He has been given the task of evaluating the company's cost of capital. He thought initially that this would be an easy initial task for him. He would just collect some information on the firm's financing activities and then gather everything to come up with a final number, which would be the overall cost of capital for the firm.

He visits one of his colleagues in order to clarify some issues that come to his mind. "Jana" he said, "I am tasked with estimating our company's cost of capital. I am excited because this seems like a critical thing for our company. Could you help me a little bit?"

Jana is a more experienced person in the firm. She says "Sure, I can help you. What do you want to learn?"

Ted sighs "Jana, I am not 100% sure about what I need to do. Is this cost of capital the same thing as what we see in books as discount rate? I am kind of confused. Also, I am not sure why we need this number".

Jana responds “Yes, this is in fact the same thing as discount rate. You know, in a finance textbook, in every chapter it mentions discount rate, required return, interest rate, cost of capital, or opportunity cost of capital, etc. They all mean the same thing. So, that confuses a lot of people”.

Jana adds “If you remember project valuation, this cost of capital is related to that. Do you remember Net Present Value?”

Ted responds “Sure, I remember NPV. We were using NPV to evaluate projects. If NPV is positive, we were saying that the project is a good project, so we should invest in that project”.

Jana adds “Yes, if you remember, in order to compute the NPV, we were using the discount rate to discount the expected future cash flows. So, NPV depends on the discount rate. Remember, when we changed the discount rate, for the same project, we were finding a different NPV.

Ted adds “And also IRR. The internal rate of return. If I remember correctly, if IRR is greater than the required return, we would invest in the project”.

Jana says “Yes, so as you see, in both methods, we include the discount rate. With NPV, we include the discount rate in the calculation. In the end, we compare the NPV to zero. With IRR, we compute the IRR and then compare it to the discount rate. So, in both methods, we use the discount rate”.

Ted is excited “Now, I understand. The discount rate which is also the cost of capital for the firms relates to these capital budgeting techniques. We use the cost of capital in project valuation!”

Jana responds “Yes, cost of capital is very important because the company’s investment decisions depend on its cost of finding money. In order to create value, or make money, the company needs to earn more than the cost of capital. If the company can find money at a high cost, let’s say, then it would be harder for the company to accept most projects because the IRRs would fall below the cost of capital”.

Jana adds “So, let’s say we have a small firm that can find money at a high cost, for example the bank charges too much interest because it sees the firm as a risky firm, then that small firm would reject most projects, while a larger firm with a lower cost of capital would not reject most of those same projects. So, keeping the cost of capital low is very important for companies”.

Ted thanks Jana and goes back into his office. He remembers that the overall cost of capital is called the “weighted-average cost of capital”. “Let’s find some information on this weighted-average cost of capital. Maybe I can search the web and find some information on the formula”.

### The Weighted-Average Cost Of Capital And Its Components

Ted finds out that the weighted-average cost of capital can be calculated by using the following formula:

$$WACC = (w_e * r_e) + (w_p * r_p) + (w_d * r_d * (1-T))$$

where  $w_e$  is the weight of common stock,  $r_e$  is the cost of common stock,  $w_p$  is the weight of preferred stock,  $r_p$  is the cost of preferred stock,  $w_d$  is the weight of debt,  $r_d$  is the cost of debt, and  $T$  is the marginal tax rate of the firm.

He knows that he can estimate the cost of common stock by using one or both of the below formulas:

1) The dividend growth model formula:

$$r_e = (D_1/P_0) + g$$

where  $r_e$  is the cost of equity,  $D_1$  is next year's dividend,  $P_0$  is the current stock price, and  $g$  is the constant growth rate in dividends

2) The SML or CAPM ("Capital asset pricing model") formula:

$$r_e = r_f + \beta * (R_m - r_f)$$

where  $r_f$  is the risk-free rate,  $\beta$  is the systematic risk of the stock, and  $R_m$  is the expected market return.

He also knows that he can estimate the cost of preferred stock by using the below formula:

$$r_p = D/P$$

where  $D$  is the annual dividend payment and  $P$  is the current price of preferred stock of the firm.

Ted knows that cost of debt is the weighted-average costs of bonds outstanding and existing bank loans. He thinks "For bonds, the cost is the yield to maturity; and for bank loan, I can just use the APR of the loan".

### Current Capital Structure Of The Company

Currently, the company has four sources of capital. It has preferred and common shares outstanding. The company has also borrowed money through the sale of bonds to the public. In addition to that, it borrowed \$100 million from a large bank. The information related to the firm's finances are shown below:

Preferred stock:

Dividends= \$2, Current price of preferred stock=\$25, 10 million shares outstanding

Bonds:

The firm had issued 20-year semiannual coupon bonds three years ago. Par value is \$10,000, Price=\$9,000, Coupon rate (annual) = 6%, 60,000 bonds issued

Bank loan:

The firm borrowed \$100 million from a syndicate of banks. The APR is 8%.

Equity (common stock):

Expected dividend next year=\$1, Current price of common stock=\$20,

Expected growth=8%/year, 50 million shares outstanding

Ted has done additional research and finds that the company's beta is estimated to be 2. He has also collected some general market data like the expected return on the stock market for the next year (the general consensus is a 10% expected return from the stock market for the following year), and the 1-month t-bill yield (which is 1%).

### The Analysis

Now, Ted wants to start analyzing the firm's cost of capital.

1. He wonders how much the preferred shares cost to the company annually. How can he calculate this number? What is the cost of preferred shares for this firm?
2. Now, he thinks, is the time to calculate the cost of debt. He is thinking "should I look at bonds, bank loan, or both?" How can he calculate the cost of debt for his company? What should he find as the cost of debt?
3. For the common stock, he knows that he can use the dividend discount model and the CAPM formula. Since the data is available for both, maybe he can use both methods to come up with a number and then take the average and use it as his best estimate for cost of equity. What do you think? If instead of using only one method (DDM or CAPM), he uses both methods at the same time, does this give him a more accurate estimate for cost of equity? If he uses both methods and take the average, what would he find as cost of equity for his firm?
4. After finding the cost of preferred stock, the cost of debt, and the cost of common stock, can he now use the WACC formula to estimate the firm's overall cost of capital? Or does he need to work on the numbers some more before starting to use the WACC formula?
5. He realizes that he needs to find the weights of preferred shares, common shares and debt for his firm before using the WACC formula. How can he find the weights? What % weights would he find for preferred shares, common shares, and debt?
6. "Now", he thinks, "is the time to bring together all of these numbers using the WACC formula". He enters all of the weights and the costs into the formula and finds the WACC. What is the WACC for this firm?
7. What is the significance of WACC for a firm? Why would a firm try to reduce it?
8. Order the cost of preferred stock, cost of common stock, and cost of debt from the smallest to the largest. Why do you think we have this order (why one of them costs more than the others)?
9. For any firm, can cost of debt be larger than cost of preferred stock?
10. Generally, which one is higher? Please rank them.  
After-tax cost of debt, cost of preferred stock, cost of common stock
11. Why do you think the ranking is like this?
12. Please rank the following:  
After-tax cost of debt, cost of common stock, WACC (no preferred stock)

### **Biography**

**Dr. Halil Kaya** is an Associate Professor of Finance at Northeastern State University. Dr Kaya teaches in the MBA and Master of Accounting and Financial Analysis programs. He also teaches a variety of undergraduate level finance classes including international finance. His research interests include corporate finance, corporate governance, and entrepreneurial finance. He has more than fifty refereed journal articles and close to forty presentations at academic conferences. He has served as the Program Chair and the President of Kentucky Economic Association. He is also a member of the Southwestern Finance Association, Beta Gamma Sigma Honor Society, and National Scholars Honor Society.

### **References**

Weighted-average cost of capital (WACC)

<http://www.investinganswers.com/financial-dictionary/financial-statement-analysis/weighted-average-cost-capital-wacc-2905>

Weighted average cost of capital - WACC

<http://www.investopedia.com/terms/w/wacc.asp>

Cost of equity

<http://www.investopedia.com/terms/c/costofequity.asp>

Capital Asset Pricing Model - CAPM

<http://www.investopedia.com/terms/c/capm.asp>

Cost of Debt

[http://www.investopedia.com/terms/c/costofdebt.asp?utm\\_term=cost+of+debt&utm\\_content=sem-](http://www.investopedia.com/terms/c/costofdebt.asp?utm_term=cost+of+debt&utm_content=sem-)

[unp&utm\\_medium=organic&utm\\_source=&utm\\_campaign=&ad=&an=&am=&o=40186&askid=&l=dir&qsrc=999&qo=investopediaSiteSearch](http://www.investopedia.com/terms/c/costofdebt.asp?utm_term=cost+of+debt&utm_content=sem-unp&utm_medium=organic&utm_source=&utm_campaign=&ad=&an=&am=&o=40186&askid=&l=dir&qsrc=999&qo=investopediaSiteSearch)

### **Cost of Capital and Its Components: An Application Teaching Notes**

---

#### **Case Overview**

This case deals with the estimation of the cost of capital for a company. Students will learn how to estimate the components of cost of capital including cost of debt, cost of preferred stock and cost of common stock. In the end, they will compute the overall cost of capital for the company. They will also learn about the risk-return relationship for each investor group (i.e. creditors, preferred shareholders, and common shareholders) and learn why certain costs are higher than others. This manual serves as a guide to the instructor in teaching the case.

#### **Synopsis and Objectives**

##### **Synopsis**

1. The students need to:
  - a. Estimate the components of cost of capital including cost of debt, cost of preferred stock, and cost of common stock.

- b. Compute the weight of each type of capital using the information provided within the case
  - c. Estimate the overall cost of capital for the firm
  - d. Learn about the risk-return relationship for each investor group (i.e. creditors, preferred shareholders, and common shareholders) and learn why certain costs are higher than others.
2. The case has provided:
    - a. Firm-specific information regarding the firm's capital structure within the text.

### Objectives

The case can be used to perform analysis which allows:

1. Estimation of the firm's cost of debt, cost of preferred stock, and cost of common stock
2. Computation of the weight of each type of capital using the information provided within the case
3. Estimation of the overall cost of capital for the firm

### Suggested Questions Students Need To Answer After Reading the Case

1. Ted wonders how much the preferred shares cost to the company annually. How can he calculate this number? What is the cost of preferred shares for this firm?
2. Now, he thinks, is the time to calculate the cost of debt. He is thinking "should I look at bonds, bank loan, or both?" How can he calculate the cost of debt for his company? What should he find as the cost of debt?
3. For the common stock, he knows that he can use the dividend discount model and the CAPM formula. Since the data is available for both, maybe he can use both methods to come up with a number and then take the average and use it as his best estimate for cost of equity. What do you think? If instead of using only one method (DDM or CAPM), he uses both methods at the same time, does this give him a more accurate estimate for cost of equity? If he uses both methods and take the average, what would he find as cost of equity for his firm?
4. After finding the cost of preferred stock, the cost of debt, and the cost of common stock, can he now use the WACC formula to estimate the firm's overall cost of capital? Or does he need to work on the numbers some more before starting to use the WACC formula?
5. He realizes that he needs to find the weights of preferred shares, common shares and debt for his firm before using the WACC formula. How can he find the weights? What % weights would he find for preferred shares, common shares, and debt?
6. "Now", he thinks, "is the time to bring together all of these numbers using the WACC formula". He enters all of the weights and the costs into the formula and finds the WACC. What is the WACC for this firm?

7. What is the significance of WACC for a firm? Why would a firm try to reduce it?
8. Order the cost of preferred stock, cost of common stock, and cost of debt from the smallest to the largest. Why do you think we have this order (why one of them costs more than the others)?
9. For any firm, can cost of debt be larger than cost of preferred stock?
10. Generally, which one is higher? Please rank them.  
After-tax cost of debt, cost of preferred stock, cost of common stock
11. Why do you think the ranking is like this?
12. Please rank the following:  
After-tax cost of debt, cost of common stock, WACC (no preferred stock)

### Teaching Plan

In order to estimate each component of cost of capital as well as the overall cost of capital, students need to use the information given in the case. They need to carefully look at the at the text for any additional information that may be needed.

1. *Ted wonders how much the preferred shares cost to the company annually. How can he calculate this number? What is the cost of preferred shares for this firm?*

He should divide the dividend by the share price:

$$R_p = 2/25 = 8\%$$

2. *Now, he thinks, is the time to calculate the cost of debt. He is thinking "should I look at bonds, bank loan, or both?" How can he calculate the cost of debt for his company? What should he find as the cost of debt?*

He should find both and then calculate the weighted-average cost of debt.

34 N, 10000 FV, -9000 PV, 300 PMT, CPT I/Y=3.51%

YTM=(3.51)(2)=7.02%=cost of bonds

The MV of bonds=(9,000)(60,000)=\$540 million

Bank loan=\$100 million, APR=8%

$$\text{Cost of debt} = R_d = (540/640)(7.02\%) + (100/640)(8) = 7.17\%$$

3. *For the common stock, he knows that he can use the dividend discount model and the CAPM formula. Since the data is available for both, maybe he can use both methods to come up with a number and then take the average and use it as his best estimate for cost of equity. What do you think? If instead of using only one method (DDM or CAPM), he uses both methods at the same time, does this give him a more accurate estimate for cost of equity? If he uses both methods and take the average, what would he find as cost of equity for his firm?*

He needs to use both methods and then take the average of the two to have the best estimate for cost of common stock:

Using DDM:  $r_e = (1/20) + 0.08 = 13\%$

Using CAPM:  $r_e = 1 + (2)(10 - 1) = 19\%$

Average  $r_e = (13 + 19) / 2 = 16\%$  (best estimate)

4. *After finding the cost of preferred stock, the cost of debt, and the cost of common stock, can he now use the WACC formula to estimate the firm's overall cost of capital? Or does he need to work on the numbers some more before starting to use the WACC formula?*

He needs to find the weights of preferred shares, common shares, and debt first.

5. *He realizes that he needs to find the weights of preferred shares, common shares and debt for his firm before using the WACC formula. How can he find the weights? What % weights would he find for preferred shares, common shares, and debt?*

Weight of preferred =  $250 / 1890 = 0.132275$

Weight of debt =  $640 / 1890 = 0.338624$

Weight of common =  $1000 / 1890 = 0.529101$

6. *"Now", he thinks, "is the time to bring together all of these numbers using the WACC formula". He enters all of the weights and the costs into the formula and finds the WACC. What is the WACC for this firm?*

$WACC = (250 / 1890)(8) + (640 / 1890)(7.17)(1 - 0.35) + (1000 / 1890)(16) = 11.10\%$

7. *What is the significance of WACC for a firm? Why would a firm try to reduce it?*

WACC affects NPV and IRR. If a firm can lower it, its NPV (the value added) and IRR (% return) would go up.

8. *Order the cost of preferred stock, cost of common stock, and cost of debt from the smallest to the largest. Why do you think we have this order (why one of them costs more than the others)?*

In this case: cost of debt < cost of preferred < cost of common. This ranking is due to the risks. Common stock is the riskiest so cost of common stock (i.e. the required return by the common shareholders) is the largest. Debt is the least risky one for an investor, therefore the cost of debt (after the tax effects) is the lowest for the firm.

9. *For any firm, can cost of debt be larger than cost of preferred stock?*

Yes  $r_d$  can be larger than  $r_p$ . But after-tax  $r_d$  should be smaller than  $r_p$  (because the risk of a debt investment is smaller than the risk of a preferred stock investment, so investors would charge less after-tax)

10. Generally, which one is higher? Please rank them.

*After-tax cost of debt, cost of preferred stock, cost of common stock*

After-tax  $r_d < r_p < r_e$

11. Why do you think the ranking is like this?

Risk-return relationship. When risk is higher, investors require a higher return, therefore the cost to the firm is higher.

12. Please rank the following:

*After-tax cost of debt, cost of common stock, WACC (no preferred stock)*

After-tax  $r_d < WACC < r_e$

(WACC is just a weighted average of the two)