

The weighted average cost of capital formula after the tax law changes of 2017

Eugenie Ardoin
University of Louisiana at Monroe

Arturo Rodriguez
University of Louisiana at Monroe

ABSTRACT

As a result of the Tax Cuts and Jobs Act of 2017, the way we traditionally calculate the weighted average cost of capital (WACC) has changed. This short paper presents a revised formula for WACC and a simplified example of the application.

Keywords: Weighted Average Cost of Capital, WACC, Corporate Finance, Cost of Debt, After-tax Cost of Debt



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INTRODUCTION

Traditional finance calculates the weighted average cost of capital as follows:

$WACC = W_e * R_e + W_d * R_d * (1 - t_c) + W_p * R_p$, where:

W_e = % of equity

R_e = cost of equity

W_d = % of debt

R_d = cost of debt

W_p = % of preferred

R_p = cost of preferred

t_c = corporate tax rate (now fixed at 21%)

Under the Tax Cuts and Jobs Act of 2017 a firm may only expense interest up to 30% of earnings before interest, taxes, depreciation and amortization (EBITDA) before taxes, with the remaining interest expensed after taxes. This will be allowed through 2021 resulting in the following change to the traditional formula:

If $\frac{(EBITDA)(0.3)}{Interest\ Exp} > 1$; then the traditional formula holds; however, if it is < 1 then the following formula holds:

$$WACC = w_e r_e + w_d \left\{ \left[\frac{(EBITDA)(.3)}{Interest\ Exp.} \right] [r_d(1 - t_c)] + 1 - \left[\frac{(EBITDA)(0.3)}{Interest\ Exp.} \right] [r_d] \right\} + w_p r_p$$

Factoring the above, the formula simplifies to:

$$WACC = w_e r_e + \left\{ w_d r_d \left[1 - \left(\frac{(EBITDA)(0.3)}{Interest\ Exp.} \right) (t_c) \right] \right\} + w_p r_p \quad (1)$$

After 2021 the formula will change again as the law will only allow firms to expense interest up to 30% of earnings before interest and taxes (EBIT) before taxes resulting in the following:

$$WACC = w_e r_e + w_d \left\{ \left[\frac{(EBIT)(.3)}{Interest\ Exp.} \right] [r_d(1 - t_c)] + 1 - \left[\frac{(EBIT)(0.3)}{Interest\ Exp.} \right] [r_d] \right\} + w_p r_p$$

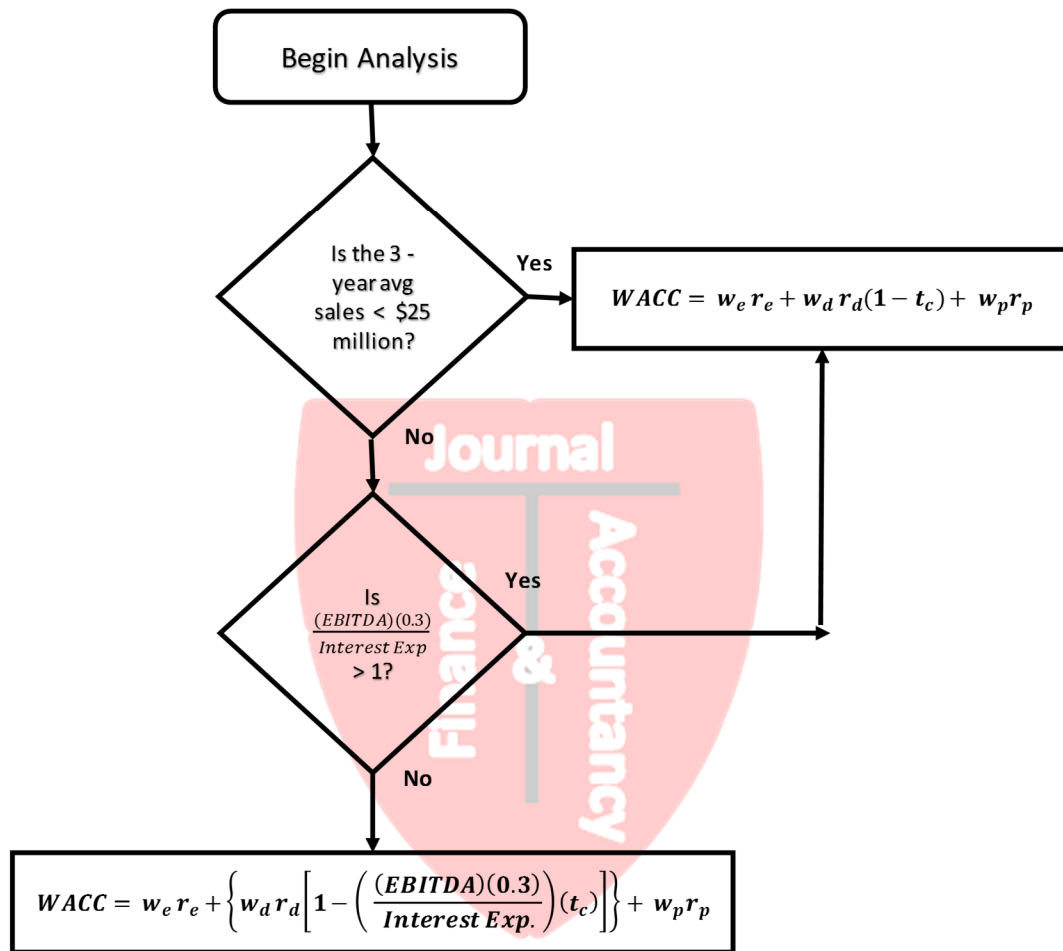
Conversely, factoring the above, the formula simplifies to:

$$WACC = w_e r_e + \left\{ w_d r_d \left[1 - \left(\frac{(EBIT)(0.3)}{Interest\ Exp.} \right) (t_c) \right] \right\} + w_p r_p \quad (2)$$

Overall, the changes to the formula will result in a higher cost of capital to firms, holding all else constant.

APPLICATION

In order to make the formula easier for students the following flow chart was developed as an aid:



The first step in the flow chart is to decide if the company's sales levels are within the range to allow full interest deduction. If the firm's average 3-year sales is less than 25 million then the firm can expense all the interest and the old formula is used to calculate the weighted average cost of capital. If the sales average is greater than 25 million, the next step is to determine if the interest expense exceeds the amount that would be allowed for deduction. If the firm's interest expense levels are lower than 30% of EBITDA then all the interest can be expensed and the old formula is used; however, if the interest expense is greater than 30% of EBITDA then only the amount up to 30% of EBITDA may be expensed before taxes and the new formula would be used to calculate WACC.

To illustrate, the following examples are used.

	Example 1	Example 2
Average 3 years sales	30,000,000	30,000,000
Interest Expense	1,000,000	2,000,000
EBITDA	5,000,000	5,000,000
EBITA * .30	1,500,000	1,500,000
EBITA*.3/Interest exp.	1.5	0.75

In each example, the average 3-years sales are greater than \$25 million. In example 1 the full amount of interest is less than the amount that would be allowed to be expensed, that is the ratio is greater than 1, so the old formula would be used. In the second example, the interest expense is greater than the amount that would be allowed, the ratio is less than 1, so the revised formula, equation 1, would be used to calculate WACC.

For simplicity and to illustrate the calculations each example is assumed to carry the same percentages of debt and equity with the same cost structure. Example 1 uses the original WACC equation which yields a WACC of 16.25%. Example 2 uses the modified equation (equation 1) which yields a WACC of 16.56%.

	Example 1	Example 2
Weight on Equity	0.5	0.5
Weight on Debt	0.5	0.5
Cost of equity	25%	25%
Cost of debt	10%	10%
Tax	25%	25%
WACC	16.25%	16.56%

The impact is an increase in the after-tax cost of debt as a result of the tax change on Example 2 which results in an increase in the overall WACC.

CONCLUSION

The purpose of the paper is to provide a simplified formula and method for calculating WACC under the new tax guidelines of 2017. The flow chart simplifies the analysis for students in an introductory finance course.

REFERENCES

Modigliani, F. and M.H. Miller, 1963, Corporate income taxes and the cost of capital: a correction, *The American Economic Review* 53, 433-443.

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