

Financial Calculations Of Salina Corporation, Carbon8 Corporation And FM Foods

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1. Salinas Corporation: Annual Interest Tax Shield

Salinas Corporation earns net income of \$15 million on annual net sales of \$90 million and currently has no long-term debt. It is considering issuing \$20 million of debt at an annual interest rate of 7 percent. The company's effective tax rate is 40 percent. The original calculation correctly identifies the interest tax shield as the tax saving created because interest expense is generally deductible in calculating taxable corporate income. The first step is to calculate the annual interest payment. Multiplying the \$20 million principal by 7 percent gives annual interest expense of \$1.4 million: $\$20,000,000 \times 0.07 = \$1,400,000$.

The annual interest tax shield equals deductible interest multiplied by the tax rate. Therefore, the expected annual tax shield is $\$1,400,000 \times 0.40 = \$560,000$. The original answer of \$0.56 million, or \$560,000, is correct. This result assumes that Salinas has sufficient taxable income to use the deduction, that the interest remains deductible under applicable tax rules, that the debt remains outstanding for the full year, and that the 40 percent marginal tax rate is appropriate for the incremental deduction. The question provides an effective tax rate, but finance analysis normally uses the marginal rate applicable to the next dollar of taxable income because that rate determines the actual saving from the interest deduction.

The tax shield reduces the after-tax cost of debt. Although Salinas pays creditors 7 percent before tax, the effective cost after the deduction is $7\% \times (1 - 0.40) = 4.2$ percent, subject to the assumptions above. The difference between the \$1.4 million cash interest payment and the \$840,000 after-tax cost is the \$560,000 shield. This does not mean that borrowing creates free value without risk. The corporation must make fixed interest and principal payments, and excessive debt can increase financial distress, restrict future flexibility, and change the risk borne by shareholders.

Salinas should therefore evaluate the tax shield as one benefit within a broader capital-structure decision. Management should compare operating cash flows with debt service, examine whether earnings are cyclical, consider loan covenants and refinancing risk, and determine whether the \$20 million will finance investments capable of earning an adequate return. If the company experiences a loss and cannot use the deduction immediately, the timing and value of the tax shield may differ. Under a simple perpetual-debt model, the present value of a permanent tax shield is sometimes estimated as the tax rate multiplied by debt, which would be \$8 million for \$20 million of permanent debt at 40 percent. The current problem asks only for the annual shield, so \$560,000 remains the required answer.

2. Carbon8 Corporation: Shares Required in a Seasoned Equity Offering

Carbon8 Corporation wants to receive \$120 million net of all fees from a seasoned equity offering. Its stock currently sells for \$28 per share. Underwriters require a fee of \$1.25 per share and expect the new shares to be offered at a 7.5 percent discount from the current market price. The company will also incur \$785,000 of fixed legal, administrative, and other costs. The task is to determine how many shares Carbon8 must sell so that the cash remaining after both variable and fixed issuance costs equals \$120 million.

The first step is to calculate the expected offer price after underpricing. A discount of 7.5 percent on a \$28 market price equals \$2.10 per share: $\$28 \times 0.075 = \2.10 . The issue price is therefore $\$28 - \$2.10 = \$25.90$ per share. This is the amount investors pay to purchase each new share. Underpricing is separate from the underwriter's fee. The company receives less than the market value because the shares are issued at \$25.90, and it then pays \$1.25 per share to the underwriters.

Net proceeds before fixed costs equal $\$25.90 - \$1.25 = \$24.65$ per share. Carbon8 must raise enough through these per-share proceeds to cover both the desired \$120 million and the \$785,000 fixed cost. The gross net-of-underwriting proceeds required are therefore $\$120,000,000 + \$785,000 = \$120,785,000$. Dividing this amount by \$24.65 gives approximately 4,900,000 shares. The calculation is $\$120,785,000 \div \$24.65 = 4,900,000$ exactly under the figures provided. Thus, the original answer is correct.

The logic can be verified by reconstructing the cash flow. Selling 4.9 million shares at \$25.90 generates \$126.91 million from investors. Underwriting fees equal $4.9 \text{ million} \times \$1.25 = \$6.125$ million, leaving \$120.785 million. After paying fixed costs of \$785,000, Carbon8 retains \$120 million. This verification is important because equity-offering problems contain several prices: the existing market price, the discounted issue price, and the net proceeds per share after variable fees. Using the wrong one in the denominator produces a material error.

The offering also creates dilution. Before the transaction, existing shareholders own all outstanding shares. New shares increase the denominator used in earnings per share and reduce each existing shareholder's percentage ownership unless that shareholder participates proportionately. Underpricing can transfer value to new investors because they purchase below the pre-offering market price, although the actual post-issue price may adjust when the market incorporates new capital, investment plans, and information. Management should therefore consider the expected use of proceeds, the effect on leverage, market conditions, and communication with existing investors.

3. FM Foods: Cost of Equity, After-Tax Debt Cost, and Weighted Average Cost of Capital

FM Foods is evaluating its cost of capital using information as of December 31, 2017. Long-term government bonds yield 4.4 percent, company long-term bonds yield 6.3 percent, the coupon rate on those bonds is 7 percent, the historical excess return on common stocks is 6.5 percent, the company's equity beta is 1.20, the stock price is \$40, 240 million shares are outstanding, the book value of equity is \$5.24 billion, interest-bearing debt has a book value of \$1.25 billion, and the tax rate is 35 percent. The original solution uses market-value weights and assumes that the debt's market value equals book value because no separate market value is provided.

The cost of equity is estimated using the [Capital Asset Pricing Model](#). CAPM states that the required return on equity equals the risk-free rate plus beta multiplied by the market risk premium. The government bond yield of 4.4 percent is used as the risk-free rate, the 6.5 percent historical excess stock return is used as the market risk premium, and beta is 1.20. The calculation is $4.4\% + (1.20 \times 6.5\%) = 4.4\% + 7.8\% = 12.2\%$ percent. The original text contains "1.2% $\times$ 6.5%," but beta is not expressed as a percentage in this multiplication. The correct notation is $1.20 \times 6.5\%$.

Beta measures the sensitivity of the company's equity return to broad market movements under the CAPM framework. A beta of 1.20 indicates that FM Foods' stock is assumed to carry 20 percent more systematic risk than the market portfolio, on average. The resulting 12.2 percent is an estimate, not a guaranteed return. Its accuracy depends on the risk-free maturity, beta estimate, market premium, and validity of CAPM assumptions. Because all provided figures are dated 2017, they should not be applied as a current required return without updating inputs.

Market Value of Equity

The market value of equity is calculated by multiplying shares outstanding by market price. FM Foods has 240 million shares at \$40 per share, producing market capitalization of \$9.6 billion: $240,000,000 \times \$40 = \$9,600,000,000$. The original calculation is correct. Market value is used instead of the \$5.24 billion book value because WACC represents the return required by investors on the current economic value of financing. Book equity records historical accounting amounts and does not necessarily represent what shareholders' claims are worth in the market.

The use of market values is especially important when market and book equity differ substantially, as they do here. Weighting equity at \$5.24 billion would understate its proportion in the capital structure and distort the estimated WACC. Market value reflects expectations about future cash flows, growth, and risk, although it can fluctuate and may contain temporary mispricing.

Market Value and Cost of Debt

The problem does not provide a quoted market price for FM Foods' bonds. The original solution assumes debt trades at par and uses the \$1.25 billion book value as market value. This is a reasonable simplifying assumption for the exercise, but it should be stated explicitly. The fact that the bonds' coupon rate is 7 percent while their yield to maturity is 6.3 percent suggests they may trade above par if other terms are standard, because the coupon exceeds the required yield. A precise market value would require maturity, coupon-payment frequency, face value, and market price or sufficient information to calculate it.

The pretax cost of debt is the current yield to maturity, 6.3 percent, rather than the historical 7 percent coupon rate. The coupon determines contractual cash payments relative to face value; yield to maturity estimates the return required by current debt investors. The after-tax cost of debt is $6.3\% \times (1 - 0.35) = 4.095$ percent. The tax adjustment reflects the assumed deductibility of interest.

Capital Structure Weights

Total market capital under the simplifying debt assumption equals \$9.6 billion of equity plus \$1.25 billion of debt, or \$10.85 billion. The equity weight is $\$9.6 \text{ billion} \div \$10.85 \text{ billion} = 0.8848$, or 88.48 percent. The debt weight is $\$1.25 \text{ billion} \div \$10.85 \text{ billion} = 0.1152$, or 11.52 percent. The original text accidentally labels the debt-weight numerator as market equity value in one line, but the numerical calculation correctly uses debt.

The weights sum to 100 percent, providing a basic check. Preferred stock is not included because none is reported. If other financing such as leases or preferred securities were material and relevant to the analysis, they might require separate treatment. The target capital structure could also differ from the current one; many corporate decisions use long-run target weights when management expects financing proportions to change.

Weighted Average Cost of Capital

The WACC combines the required equity return and after-tax debt return according to their market-value weights. The calculation is $(0.8848 \times 12.2\%) + (0.1152 \times 4.095\%)$. The equity component is approximately 10.7946 percent, and the debt component is approximately 0.4717 percent. Adding them produces approximately 11.2663 percent, which rounds to 11.27 percent. The original answer is therefore correct.

FM Foods could use this WACC as a discount rate for projects whose operating risk and financing characteristics resemble those of the existing company. It should not automatically use 11.27 percent for every investment. A project in a much riskier line of business requires a higher return, while a

lower-risk project may justify a lower rate. The WACC is also based on the 2017 inputs and would need revision when interest rates, share price, beta, tax law, or capital structure changes.

Interpretation of the Three Problems

The Salinas problem demonstrates the tax benefit of debt. The Carbon8 problem demonstrates flotation costs and underpricing in equity issuance. The FM Foods problem combines investor-required returns and financing weights into a company-wide hurdle rate. Together, they show that the nominal amount of capital raised is not the same as its economic cost. Debt produces interest and financial obligations but may generate a tax shield. Equity does not require fixed interest, but issuing it creates underwriting costs, dilution, and a relatively high required return. WACC integrates these sources for investment evaluation.

Financial managers should avoid choosing financing based on one advantage. The Salinas tax shield is valuable only if the company can support debt. Carbon8 should not reject equity merely because flotation costs exist if the capital finances a positive-net-present-value opportunity. FM Foods should use WACC as an estimate supported by assumptions rather than as an exact permanent number. Good financial analysis states those assumptions, verifies arithmetic, and tests how the result changes when inputs vary.

Conclusion

Salinas Corporation's annual interest expense on \$20 million of debt at 7 percent is \$1.4 million. At a 40 percent tax rate, the annual interest tax shield is \$560,000. Carbon8 must sell 4.9 million shares: the 7.5 percent discount reduces the issue price to \$25.90, the \$1.25 underwriting fee reduces net variable proceeds to \$24.65, and the company must cover \$120 million of desired funds plus \$785,000 of fixed costs. FM Foods' CAPM cost of equity is 12.2 percent, its after-tax debt cost is 4.095 percent, and its market-value weights are 88.48 percent equity and 11.52 percent debt. The resulting WACC is approximately 11.27 percent.

The original numerical answers were substantially correct, but several labels and assumptions required clarification. Beta is multiplied as 1.20 rather than 1.20 percent, the debt-weight numerator is debt value, yield to maturity rather than coupon rate represents the current debt cost, and the debt market value is assumed equal to book value only because complete bond pricing information is absent. These corrections make the calculations transparent and suitable for use in corporate-finance decision making. (Berk & DeMarzo, 2024; Brealey et al., 2020; Ross et al., 2022)

References

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