

Capital budgeting after the Tax Cuts and Jobs Act: a classroom exercise

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ABSTRACT

After providing background material to assist with classroom preparation, this paper develops a series of capital budgeting exercises on Zemo's, a fictitious restaurant chain, to help students gain insight into the impact of taxation on capital budgeting. In particular, the exercises assist students in learning about the impact of the Tax Cuts and Jobs Act (TCJA) on calculating weighted average cost of capital and on determining cash flows, under the bonus depreciation provisions in Internal Revenue Code Section 168(k)(1). A final component of the exercise acquaints students with Internal Revenue Code Sections 1250 and 1245. These provisions determine the tax treatment of the disposition of fixed assets; neither are traditionally emphasized during capital budgeting instruction. Solutions to all exercises are provided.

Keywords: capital budgeting, taxation, Tax Cuts and Jobs Act, weighted average cost of capital, accounting and finance education

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INTRODUCTION

The passage of the Tax Cuts and Jobs Act (TCJA) in December 2017 marked the most significant change in US tax law since the enactment of the Tax Reform Act (TRA) of 1986. Both acts shared a core philosophy of using taxes to stimulate the US economy. They also tended to implement this philosophy in a similar fashion (Auerbach & Slemrod, 1997; IRS, 2019, 2020c). More specifically, they reduced the number of Americans and US businesses subject to federal income taxes (Graetz, 2011; Stallworth & Berger, 2018). Additionally, they typically reduced tax rates, with the TCJA taking the reduction in tax rates an unprecedented step further by establishing a new 21% flat rate structure for corporations (Auerbach & Slemrod, 1997; IRS, 2019, 2020c). Both laws also incentivized capital investment by accelerating the deductibility of fixed assets relative to methods used under financial accounting (Koowattanatianchia, Charles, & Eddie, 2019; York & Muresianu, 2018).

At the same time, both laws broadened the tax bases of many individuals and business entities that continued to be subject to taxation (IRS, 2019, 2020c; Nellen & Porter, 2016). For example, both acts reduced the deductibility of interest expense, which had been a staple of the US tax code. More specifically, the TRA limited the deductibility of most of individuals' interest expense besides mortgage interest, while business interest expense remained deductible (Auerbach & Slemrod, 1997). Recently, the TCJA not only increased limitations on the deductibility of home mortgage interest, but also limited the deductibility of business interest for almost all business entities (Simms, Smith, & Moreschi, 2018).¹

The TCJA and the TRA share another commonality in terms of the challenge of incorporating the breadth and complexity of these acts into business pedagogy. This challenge is, perhaps, most clear for the field of taxation pedagogy. However, this article focuses on a more nuanced challenge: When an area of study is not taxation, but is impacted by taxation, how much can educators simplify the discussion of taxation without sacrificing accuracy? This article offers a possible solution when the area of study is capital budgeting. In the past when adapting to the TRA, textbook examples of capital budgeting have tended to incorporate only baseline information on the taxation (e.g., the depreciation and the disposal of fixed assets) with little additional explanation. This appeared to be a reasonable approach for allowing instructors to focus their instruction.

However, this prior strategy may no longer be practical because two components of capital budgeting have become more complex under the TCJA. First, the formula for weighted average cost of capital (WACC) can no longer be built on the assumption that business interest expense is fully tax deductible. Second, options for immediately expensing fixed assets have increased relevance under the new law. Accordingly, this paper offers a teaching exercise that explores both of these components, while also adding a third component typically not taught in the finance classroom: It incorporates more technical provisions related to taxation of the disposition of fixed assets. Hence, the upshot of this paper is to offer instructors and students an updated approach to capital budgeting that is robust and accurate under the tax law.

¹An exception is included for small businesses under IRC section 163(j), where a small business is defined as a business that averages \$25 million or less in gross receipts in the previous three tax years.

The remainder of this paper is developed as follows. The next section provides background information necessary for instructors to prepare for the classroom exercise. This background includes a discussion of the impact of the TCJA on the calculation of WACC, cost recovery methods under the tax law, and the taxation of gains or losses on the disposition of fixed assets. The following section presents a classroom exercise on Zemo's, a fictitious restaurant chain, to help students gain insight into the impact of taxation on capital budgeting. The paper concludes with a teaching note that provides suggested solutions to the exercise.

BACKGROUND

The Impact of TCJA on WACC

Instructors commonly develop WACC for capital budgeting based on Nantell and Carson's (1975) two capital component of the weighted average cost of capital (WACC)²

$$WACC = W_d(1-t)(r_d) + W_e(r_e) \quad (1)$$

W_d is the proportion of debt to total capital; t is the tax rate; r_d is investors' required return on debt, usually expressed as the composite yield to maturity of all debt instruments; W_e is the proportion of equity to total capital; and r_e is the required return for equity investors.

This formula is problematic under the TCJA in that the term $(1-t)$ assumes that business interest expense is fully tax deductible. However, IRC section 163(j) now limits the deduction for business interest expense to no more than the sum of business interest income, 30% of adjusted taxable income, and floor plan financing.³ Many businesses have limited interest income relative to interest expense and no floor plan financing, so that adjusted taxable income is generally the key limiting factor for determining deductible interest expense.

Under the new law, adjusted taxable income cannot be less than zero. It is generally taxable income before net operating losses, business interest income, and business interest expense. Until 2022, adjusted taxable income also excludes tax depreciation, amortization and depletion. For example, if a business had adjusted taxable income of \$90 billion, interest expense of \$30 billion and no interest income or floor plan interest, its deductible interest expense is limited to \$90 billion times 30% or \$27 billion dollars. The remaining \$3 billion in interest expense (\$30 billion - \$27 billion) carries forward to the next tax year until it is used.

To account for only a portion of the interest, q , being deductible under the TCJA, (2) expands the component cost of debt from (1) with the value of q ranging from 0 to 1:

$$q(1-t)(r_d) + (1-q)(r_d) \quad (2)$$

While q captures the portion of interest that is deductible, q itself must be calculated. To do this, variable z is defined to calculate the proportion of interest that is deductible:

$$z = \max\left(\frac{\text{Adjusted Taxable Income}}{\text{Net Interest Expense}}, 0\right) \quad (3)$$

Here z either takes the value of the ratio of adjusted taxable income to net interest expense or it takes the value of 0 to eliminate the possibility of negative values for z . Equation

²Preferred stock can be added to this equation when it is present in the business's capital structure.

³Floor plan financing occurs when a business borrows to purchase its inventory, using the inventory as collateral. The loan is repaid when the item is sold from inventory. As an example, auto dealerships may borrow to purchase new vehicles from the manufacturer.

(4) represents the TCJA's requirement that no more than 30% of adjusted taxable income may be deducted as a business interest expense net of interest income:

$$\text{Net Deductible Interest Expense} \leq (0.30 \times \text{Adjusted Taxable Income}) \quad (4)$$

Solving (4) for the ratio of adjusted taxable income to net deductible interest expense reveals that as long as adjusted taxable income is at least 3.33 times the net interest expense, net interest expense is fully deductible. Said differently, for values of z that range from 0 to 3.33, there will only be a partial deduction of interest expense equal to the ratio of z divided by 3.33. If z is greater than 3.33, then adjusted taxable income exceeds interest expense by more than 30%, and the interest is fully deductible. This is captured by defining q as in equation (5):

$$q = \min\left(\frac{z}{3.33}, 1\right) \quad (5)$$

A business can only deduct 100% of its interest expense so that q must be the minimum of $z/3.33$ or 1. Substituting equation (2) into equation (1) generates equation (6).

$$\text{WACC} = W_d[(q)(1-t)(r_d) + (1-q)r_d] + W_e(r_e) \quad (6)$$

where q is defined in (5) and z is defined in (3).

It may be helpful for some students to view the new WACC equation as a piecewise function:

$$\text{WACC} = \begin{cases} W_d \left[\frac{z}{3.33} (1-t)r_d + \left(1 - \frac{z}{3.33}\right) r_d \right] + W_e(r_e) & \text{if } 0 \leq z \leq 3.33 \\ W_d(1-t)r_d + W_e(r_e) & \text{if } 3.33 < z \end{cases} \quad (7)$$

where z is defined as (3).

Cost Recovery Methods for Fixed Assets

Historically, businesses have had to weigh various options for cost recovery of depreciable assets. Their options have included expensing assets immediately, if the assets qualify for such treatment, or depreciating them under the tax law. Options for expensing assets immediately have been expanded considerably under the TCJA. In theory, immediate expensing would seem to be the most beneficial due to the benefits of immediate tax savings. However, businesses might continue to depreciate new assets for taxes for other business reasons.⁴

Taxpayer's specific options for the cost recovery of new business property fall in this order:

1. They can elect to expense the property immediately under Section 179.
2. They can elect out of expensing property under the bonus depreciation rules. (Otherwise, they must expense all eligible property immediately.)
3. Or, they can depreciate the property under the modified accelerated cost recovery system.

Section 179

As long as a business places less than a threshold amount of qualified property into service during the tax year, the business can elect to deduct up to the 179 limit immediately.

⁴Examples might include tax strategies that attempt to minimize book-tax differences and conflicts with other tax provisions—such as farmers being exempt from the new interest expense limitations under 163(j) if they elect to use straight-line depreciation under the alternative recovery system.

Qualified property generally includes tangible personal property and improvements to real property such as new roofs, heating, ventilation, and air conditioning systems. For 2020, the 179 limitation is \$1,040,000 and the threshold is \$2,590,000. These amounts are indexed to inflation and change annually. If the 179-property placed in service during the year exceeds the limitation plus the threshold, then the 179 expense is disallowed for the year. For example, if a business places \$4 million in qualified property into service, Section 179 is disallowed because \$4 million exceeds \$3,630,000, which is the sum of the 179 limitation and the 179 threshold.

Bonus depreciation

Under the new tax law, 100% of qualified property acquired from September 27, 2019 to December 31, 2022, can be expensed immediately under IRC Section 168(k)(1). Qualified property must have a depreciable life of 20 years or less for tax purposes. Thus, most real property, currently including qualified improvements, is excluded from this election. After 2022, the limitation on bonus depreciation is reduced by 20% per year, so that the limitation is 80% in 2023 and reduced to 0% in 2027. Immediately prior to the new tax law, bonus depreciation was 50%, but has ranged from 30% to 100% since its inception in 2001. Taxpayers must elect out of the bonus depreciation rules; otherwise, they are required to use them.

The modified accelerated cost recovery system

Tax depreciation is determined under the modified accelerated cost recovery system, better known as MACRS. Salvage value under MACRS is always zero. Revenue Procedure 87-56 determines the asset's recovery period under MACRS—with the recovery period being akin to the estimated useful life under financial accounting. Additional rules for MACRS depend on whether the depreciable asset is real property or personal property (i.e., non-real property). Personal property is depreciated using a double-declining balance method unless an election is made to use the 150%-declining balance method or a straight-line method. Instead of considering the exact date that property is placed in service (or removed from service), personal property is usually depreciated for half the year when it is placed in service and half the year when removed from service. This practice is called “the mid-year convention.” If, however, a business places more than 40% of new depreciable, personal property into service during the fourth quarter, it must use the mid-quarter convention. The mid-quarter convention assumes that property is placed into service (or disposed of) halfway through the quarter in which it is placed into service (or disposed of).

Common recovery periods under MACRS are 5 years for computer equipment and machinery, and 7 years for office furniture and fixtures. An example of the calculation of MACRS depreciation for 5 year property under the double-declining balance and half-year convention is provided in Table 1 (Appendix). Note that due to the half-year convention, the asset is depreciated for 6 years, rather than 5 years. The depreciation rate is determined as twice the straight-line rate until the straight-line rate is higher. The IRS provides tables with depreciation rates for all recovery periods, methods, and conventions under MACRS, so that taxpayers do not have to compute these rates.

Under MACRS, real property is depreciated under the straight-line method using a mid-month convention. The mid-month convention assumes that property is placed into service and removed from service—halfway through the month—rather than taking actual dates into

account. Residential rental property is depreciated over 27.5 years, and nonresidential property is currently depreciated over 39 years.

Taxation of Gains or Losses on the Disposition of Fixed Assets

IRC Section 1231 governs taxes on the sale of businesses property that has been held more than a year if the property is (1) non-depreciable real property (e.g., land) or (2) depreciable. Both categories of property are often called “1231 property.” Gains on 1231 property are taxed as long-term capital gains, and losses are taxed as ordinary income. This bifurcated treatment is generally favorable, especially because the deductibility of capital losses is sharply limited for both corporations and individuals.

The tax consequences of gains on 1231 property depends further on whether the disposition is ultimately taxable to a C-corporation or to an individual—as may be the case for business income generated by a partnership, and as is the generally case for income generated by an S-corporation or sole proprietorship. The long-term capital gains tax rate currently is and historically has been same as the ordinary tax rate for corporations—so that a gain on 1231 property offers no tax benefits for a corporation. For individuals, long-term capital gains rates are lower (i. e., 0%, 15%, or 20%) than are tax rates on ordinary income. The benefits of lower taxes on Section 1231 property for individuals is quite relevant: Based on the most recent IRS data fewer than 5% of businesses are taxed as C-corporations (IRS, 2020b).

Additional tax rules not do apply to the disposition of non-depreciable 1231 property, such as land. However, the taxation of gains on depreciable 1231 property is further adjusted under Sections 1250 and 1245. Because corporation do not receive a reduced tax rate for capital gains, Section 1250 and 1245 only meaningfully impact dispositions of business property that are ultimately taxed to individuals. The portion of the gain subject to additional tax rules is the same under both sections and is calculated as the lesser of the gain on the property or accumulated tax depreciation.

Under Section 1245 (which covers non-real property), the lesser of the gain on the property or accumulated tax depreciation is reclassified as ordinary income. For example, assume a gain on 1245 property (such as business equipment) is ultimately taxed to an individual; the gain is \$200,000 and accumulated tax depreciation is \$150,000. In this case, \$150,000 is taxed as ordinary income; only \$50,000 of the gain is eligible for more favorable long-term capital gain treatment.

Section 1250 property covers depreciable, real 1231 property (such as a building). Rather than being eligible for long-term capital gains rates, the lesser of the gain on 1250 property or accumulated tax depreciation is taxed at 25%. Hence, if the asset described previously were a building, \$150,000 of the gain would be taxed at 25% rather than at more favorable capital gains rates.

CLASSROOM EXERCISE

The following capital budgeting exercise is appropriate for illustrating the impact of the tax law to undergraduate or graduate corporate finance classes, where undergraduates may perceive the exercise as offering a greater challenge.

Fact Pattern

Zemo's is a calendar-year end corporation. It operates fast-casual restaurants that serve create-your-own pizzas 363 days a year. Zemo's plans to open a new restaurant that will begin operating on January 1, 2020. Its site survey team is planning to purchase an existing building fee simple. No other Zemo's stores are within the store's projected radius of customers, though it is estimated that the new building would rent for \$2,500 per month, if not used for another purpose. Zemo's has committed to operating at this new location for five years, at which point, it will reassess its decision. Thus, it could rent out this space at \$2,500 per month if it did not operate a restaurant.

Startup costs for the new restaurant paid on January 1, 2020 are as follows:

- The cost of the building and building improvements is \$900,000. For tax purposes, this property is depreciated over 39 years using the straight-line method and the mid-month convention.
- Kitchen equipment, which includes a dough machine, gas-fired brick oven and all refrigeration equipment, cost \$75,000. Shipping and installation costs for the kitchen equipment will be \$5,000. Additionally, tables, chairs, and booths will be purchased for \$8,000, with an additional \$2,000 required for shipping and installation. All items in this bullet have a cost recovery period of five years under the tax law (IRS, 2020a). The mid-year convention will be used.
- The cost of two point-of-sale (POS) terminals, including installation, will be \$1,000 each and will have a five-year cost recovery period. The mid-year convention will be used.
- Food stuff and paper goods needed to open the store total to \$20,000. Zemo's will pay \$10,000 in cash and record \$10,000 on account (i.e., record \$10,000 of the transaction as accounts payable).

Estimated revenue and expenses for the new restaurant are as follows:

- The new restaurant will serve an average of 265 customers per day, with each customer typically spending \$10.95 before tips and sales tax. Revenue is expected to grow by 3% per year after the first full year of the new store's operation.
- Zemo's spends about 27.5% of its gross revenue on labor costs, and 34.75% of its gross revenue on purchases of food, beverages, and packaging supplies⁵ (Chipotle 10Q, Q1 FY2020).
- Occupancy and other operating costs currently average about 7% of gross revenue.

Information on Zemo's taxes and financial structure is as follow is:

- Zemo's applicable federal income tax rate is 21%.
- It has 1 million shares of common stock outstanding, with a current market price of \$20 per share.
- The organization just paid a dividend of 75 cents per share. This dividend is expected to grow by 6% a year forever.

⁵All costs (labor, food and beverage, and occupancy, are approximately equal to those as found in Chipotle's, Fiscal Year 2020 Q1 10Q. Zemo's Pizza is a fast-fired make-your-own pizza restaurant that is modeled after Chipotle.

- It has also issued 60,000, 8% annual coupon bonds, with 5 years remaining until maturity. These bonds sell for \$950 each and have a face value of \$1,000. The interest expense that the corporation pays on these bonds is its only interest expense.
- The organization does not currently issue preferred stock.
- Zemo's typically reports \$6 million in adjusted taxable income each year. It expects to have adjustable taxable income at this level for the foreseeable future. (Zemo's has no interest income.)

Assignment

Evaluate whether Zemo's should open a new restaurant under each of the four scenarios provided by (1) calculating WACC, (2) modeling the estimated cash flows for the new restaurant and (3) determining the present value (NPV) of these cash flows for four scenarios described below.

Scenario 1.

- Zemo's depreciates all fixed assets rather than expensing any eligible assets.
- Zemo's is a small business under IRC section 163(j) and, thus, is exempt from the TCJA's limitations on the deductibility of interest expense.
- Assume that Zemo's anticipates that, if the project ends after the five-year trial period, all equipment will be transferred to existing restaurants.

Scenario 2.

- All of the assumptions provided in Scenario 1 continue to hold, except Zemo's average gross receipts over the last three years have been \$50 million. Thus, it is not a small business under IRC section 163(j) and must comply with the TCJA's limitations on the deductibility of interest expense.

Scenario 3.

- Zemo's decides to expense eligible fixed assets immediately in 2020 rather than depreciating them.
- Zemo's will place \$3,630,000 of fixed assets in service in 2020 at its other stores. These assets are eligible to be expensed under IRC section 179.
- Zemo's average gross receipts over the last three years have been \$50 million. Thus, it is subject to the limitation on the deductibility of interest expense under 163(j).
- Assume that Zemo's anticipates that, if the project ends after the five-year trial period, all equipment will be transferred to existing restaurants.

Scenario 4.

- Instead of being organized as a C-corporation, Zemo's is organized as an S-corporation, which is 100% owned by Mrs. Talia. Thus, all of Zemo's income is taxed on Mrs. Talia's tax return at her personal tax rates. Her long-term capital gains tax rate is 20% and the effective federal tax rate on

her income from Zemo's is 29.6%, due Mrs. Talia's eligibility for the qualified business deduction.⁶

- On December 31, 2024, Mrs. Talia sells the building and improvements purchased in 2020 on the new store for \$1,500,000 and the other in fixed assets purchased in 2020 for \$100,000.
- Zemo's continues to be subject to the limitation on the deductibility of interest expense under 163(j), and it depreciates its fixed assets.



⁶The qualified business deduction allows Mrs. Talia to reduce her taxable income by 20% of her business income under IRC section 199A.

TEACHING NOTE**Solution for Scenario 1**

Zemo's depreciates all fixed assets rather than expensing any eligible assets. Zemo's is a small business under IRC section 163(j) and, thus, is exempt from the TCJA's limitations on the deductibility of interest expense. Because Zemo's plans to re-use the equipment in other, existing restaurants, there are no cash flows associated with the disposition of the equipment in year 5.

1. Calculate WACC. Given that Zemo's interest expense deduction is not limited, it can use the traditional WACC formula, $WACC = W_d(1-t)(r_d) + W_e(r_e)$.

Step 1. Determine W_d and W_e . The market value of equity is 1,000,000 shares x \$20 = \$20,000,000, while the market value of debt is 60,000 bonds x \$950 = \$57,000,000. Therefore, $W_e = (\$20,000,000) / (\$20,000,000 + \$57,000,000) = 26.0\%$ and $W_d = \$57,000,000 / \$77,000,000 = 74.0\%$.

Step 2. Calculate r_e , the required return on equity using the Gordon growth model so that $r_e = D_0(1+g)/P_0 + g$, where D_0 is the current dividend, P_0 is the current stock price, and g is the dividend growth rate. Thus, $r_e = (\$0.75 * 1.06) / \$20 + 0.06 = 9.98\%$.

Step 3. Compute r_d , the required rate of return on debt by solving for the yield to maturity (YTM) in the bond pricing formula, where bond price is equal to the present value of coupon payments plus the face value of the bond and the discount rate is the YTM. Here,

$$\$950 = \$80 \left[\frac{1 - \frac{1}{(1+r_d)^5}}{r_d} \right] + \frac{\$1,000}{(1+r_d)^5} \text{ so that } r_d \text{ is } 9.30\%.$$

Step 4. Thus, the WACC for scenario 1 $WACC = (0.74 * (1-.21) * 0.093) + (0.26 * 0.0998) = 0.0803$ or 8.03%.

2. Determine the estimated cash flows for the project. See the Excel solution in Table 2 (Appendix).
3. Compute the NPV for Scenario 1. See the Excel solution in Table 2 (Appendix). The NPV is \$23,820. Thus, Zemo's should open the new store because the NPV is positive.

Solution for Scenario 2

Zemo's continues to depreciate all fixed assets rather than expensing any eligible assets. However, Zemo's average gross receipts over the last three years have been \$50 million. Thus, it is not a small business under IRC section 163(j) and must comply with TCJA's limitations on the deductibility of interest expense. Again, because Zemo's plans to re-use the equipment in other, existing restaurants, there are no cash flows associated with the disposition of the equipment in year 5.

1. Calculate WACC.

Step 1. Retain applicable solutions from Scenario 1 (i.e., $W_e = 26\%$, $W_d = 74\%$, $r_e = 9.98\%$ and $r_d = 9.30\%$).

Step 2. WACC is now calculated using either (6) or (7) because IRC Section 163(j) limits the deductibility of interest expense. Both approaches are demonstrated here. First calculate z , where $z = \max\left(\frac{\text{Adjusted Taxable Income}}{\text{Net Interest Expense}}, 0\right)$. Forecasted adjusted taxable income is \$6,000,000, while interest expense is calculated as the face value of the bond times the annual coupon rate times the number of bonds ($= \$1,000 \times 0.08 \times 60,000 = \$4,800,000$). Thus, $z = \max\left[\left(\frac{\$6,000,000}{\$4,800,000}\right), 0\right] = 1.25$.

Next, solve for q , where $q = \min\left(\frac{z}{3.33}, 1\right)$. Thus, q is 0.375, the minimum of $1.25/3.33$ or 1.

Equation 6, states that $WACC = W_d[(q)(1-t)(r_d) + (1-q)r_d] + W_e(r_e)$. Hence, $WACC = 0.74[(0.375)(1-0.21)(0.093) + (1-0.375)0.093] + 0.26(0.0998) = 8.93\%$.

However, (7) may be more tractable for learning. It states

$$WACC = \begin{cases} W_d \left[\frac{z}{3.33} (1-t)r_d + \left(1 - \frac{z}{3.33}\right) r_d \right] + W_e(r_e) & \text{if } 0 \leq z \leq 3.33 \\ W_d(1-t)r_d + W_e(r_e) & \text{if } 3.33 < z \end{cases}$$

Thus, WACC is estimated as $WACC = 0.74 \left[\frac{1.25}{3.33} (1-0.21)0.093 + \left(1 - \frac{1.25}{3.33}\right) 0.093 \right] + 0.26(0.0998) = 8.93\%$ because z , which is 1.25, is less than 3.33.

- Determine the estimated cash flows for the project. The cashflows are the same as in Scenario 1. See the Excel solution in Table 2 (Appendix).
- Compute the NPV for Scenario 2. See the Excel solution for $WACC = 8.93\%$ in Table 2 (Appendix). The NPV is -\$730. Because the NPV is negative, the new restaurant should not be opened.

Note that the WACC in Scenario 2 increased 11.21% compared to Scenario 1. The NPV decreased 103%, and the decision to open the restaurant changed. Thus, Scenario 2 illustrates a possible economic impact of TCJA.

Solution for Scenario 3

Zemo's decides to expense eligible fixed assets immediately in 2020 rather than depreciating them. Zemo's will place \$3,630,000 of fixed assets in service at its other stores during 2020 that are eligible to be expensed under IRC section 179. Zemo's average gross receipts over the last three years have been \$50 million. Thus, it is subject to the limitation on the deductibility of interest expense under 163(j). Again, because Zemo's plans to re-use the equipment in other, existing restaurants, there are no cash flows associated with the disposition of the equipment in year 5.

1. Calculate WACC. The WACC is unchanged from Scenario 2 and is 8.93%
2. Determine the estimated cash flows for the project. See the Excel solution in Table 3 (Appendix). Under this scenario, the 5-year assets are expensed immediately under IRC Section 168(k)(1). Zemo's has placed too many assets in service to be eligible for expensing these assets under IRC Section 179.
3. Compute the NPV for Scenario 3. See the Excel solution for WACC = 8.93% in Table 3 (Appendix). The NPV is \$2,250. The NPV is positive; Zemo's should open the new restaurant.

Note that under this scenario, the impact of bonus depreciation under the new tax law caused this project to change from being rejected under Scenario 2 to being accepted under Scenario 3.

Solution for Scenario 4

Instead of being organized as a C-corporation, Zemo's is organized as an S-corporation, which is 100% owned by Mrs. Talia. Thus, all of Zemo's income is taxed on Mrs. Talia's tax return at her personal tax rates. Her long-term capital gains tax rate is 20% and the effective federal tax rate on her income from Zemo's is 29.6%, due to Mrs. Talia's eligibility for the qualified business deduction. On December 31, 2024, Mrs. Talia sells the building and improvements associated with the new store, which Zemo's purchased in 2020, for \$1,500,000. Likewise, she sells the other fixed assets purchased in 2020 for \$100,000. Zemo's continues to be subject to the limitation on the deductibility of interest expense under 163(j), and it depreciates its fixed assets.

1. Calculate WACC. The WACC is similar to that calculated in Scenario 2, except that Zemo's effective tax rate is 29.6%. Equation 6 states that $WACC = W_d[(q)(1 - t)(r_d) + (1 - q)r_d] + W_e(r_e)$. Hence, $0.74[(0.375)(1 - 0.296)(0.093) + (1 - 0.375)0.093] + 0.26(0.0998) = 8.71\%$.
2. Determine the estimated cash flows for the project. See the Excel solution in Table 4 (Appendix). The difference between Scenario 4 and the other Scenario 2 is that the fixed assets purchased for the new restaurant are sold at a gain on December 31, 2024 and the gain is taxable to an individual taxpayer, Mrs. Talia.
3. Compute the NPV for Scenario 4. See the Excel solution for WACC = 8.71% in Table 4 (Appendix). The NPV increases to \$418,530, mainly due to the gain on the sale of assets.

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APPENDIX

Table 1: Depreciation of 5-year property with a basis of \$100,000 using double-declining balance method and the half-year convention

Year	Depreciation rate	Tax depreciation expense
1	$(1/5) \cdot (2) \cdot 1/2 = .2$	$100,000 \cdot .2 = 20,000$
2	$((1-.2)/5) \cdot 2 = .32$	$100,000 \cdot .32 = 32,000$
3	$((1-.2-.32)/5) \cdot 2 = .192$	$100,000 \cdot .192 = 19,200$
4	$(1-.2-.32-.192)/2.5 = .1152^{\#}$	$100,000 \cdot .1152 = 11,520$
5	$.1152^{\#}$	$100,000 \cdot .1152 = 11,520$
6	$1-.2-.32-.192-.1152-.1152 = .0576^{\#\#}$	$100,000 \cdot .0576 = 5,760$

[#]The depreciation rate switches to straight-line over the remaining recovery period because the straight-line rate is now higher than the double-declining balance rate.

^{##}The remaining depreciation for the last half year (under the half-year convention) is taken in year 6.



Table 2: Cash flows and NPV for Scenario's 1 and 2 (in thousands)

	Time Period					
	0	2020	2021	2022	2023	2024
Building and improvements (39-year property)	\$ (900)					
Kitchen equipment, furniture and installation costs (5-year property)	-90					
Point-of-sale terminals (5-year property)	-2					
Change in NOWC	-10					
Revenues (Note 1)		\$ 1,053.3	\$ 1,085.1	\$ 1,117.8	\$ 1,151.5	\$ 1,186.1
Labor costs, 27.5% of revenue		289.7	298.4	307.4	316.7	326.2
Food, beverage, and packaging costs, 34.75% of revenue		366.0	377.1	388.4	400.1	412.2
Occupancy and other operating costs, 7% of revenue		73.7	76.0	78.2	80.6	83.0
Opportunity cost of rent (\$2,500*12)/1,000)		30.0	30.0	30.0	30.0	30.0
Depreciation on building and improvements (Note 2)		22.1	23.1	23.1	23.1	23.1
Depreciation on five year property (Note 3)		18.4	29.4	17.7	10.6	10.6
Operating income		253.4	251.1	273.1	290.4	301.0
Taxes at 21%		53.2	52.7	57.3	61.0	63.2
Net operating income after taxes		200.2	198.4	215.7	229.4	237.8
Depreciation		40.5	52.5	40.7	33.7	33.7
After tax operating cash flows		240.7	250.9	256.5	263.1	271.5
After tax gain or loss on sale of property & equipment						-
Release of net working capital						10
After tax cash flows	\$ (1,002)	\$ 240.7	\$ 250.9	\$ 256.5	\$ 263.1	\$ 281.5
NPV at 8.03% (in thousands), full deductibility	\$23.82					
NPV at 8.93% (in thousands), partial deductibility	(\$0.73)					

Note 1. Revenue is calculated as \$10.95 per meal times 265 customers per day times 363 days per year. Revenue increases by 3% each year starting in 2021.

Note 2. Depreciation on buildings and improvements is calculated as $\$900/39 = \23.1 for each year, except that in 2020 Zemo's must use the mid-month convention. Hence, in 2020, depreciation expense is calculated as $\$23.1 * 11.5/12 = \22.1 .

Note 3. The annual depreciation for 5-year property is determined by multiplying the cost basis by the depreciation rates provided in Table 1. For example, depreciation for year 1 is $(\$90 + \$2) * .20 = \$18.4$.

Table 3: Cash flows and NPV for Scenario 3 (in thousands)

	Time Period					
	0	2020	2021	2022	2023	2024
Building and improvements (39-year property)	-900					
Kitchen equipment, furniture and installation costs (5-year property)	-90					
Point-of-sale terminals (5-year property)	-2					
Change in NOWC	-10					
Revenues (Note 1, Table 2)		1,053.3	1,085.1	1,117.8	1,151.5	1,186.1
Labor costs, 27.5% of revenue		289.7	298.4	307.4	316.7	326.2
Food, beverage, and packaging costs, 34.75% of revenue		366.0	377.1	388.4	400.1	412.2
Occupancy and other operating costs, 7% of revenue		73.7	76.0	78.2	80.6	83.0
Opportunity cost of rent (\$2,500*12)/1,000		30.0	30.0	30.0	30.0	30.0
Depreciation on building and improvements (Note 2, Table 2)		22.1	23.1	23.1	23.1	23.1
Expensing of 5-year property under 168(k)(1)		92.0				
Operating income		179.8	280.5	290.7	301.0	311.6
Taxes at 21%		37.8	58.9	61.1	63.2	65.4
Net operating income after taxes		142.0	221.6	229.7	237.8	246.2
Depreciation and 168(k)(1) expensing		114.1	23.1	23.1	23.1	23.1
After tax operating cash flows		256.1	244.7	252.7	260.9	269.3
After tax gain or loss on sale of property & equipment						-
Release of net working capital						10
After tax cash flows	-1002	256.1	244.7	252.7	260.9	279.3
NPV at 8.93% (in thousands), partial deductibility	\$2.25					

Table 4: Cash flows and NPV for Scenario 4 (in thousands)

	Time Period					
	0	2020	2021	2022	2023	2024
Building and improvements (39-year property)	-900					
Kitchen equipment, furniture and installation costs (5-year property)	-90					
Point-of-sale terminals (5-year property)	-2					
Change in NOWC	-10					
Revenues (Note 1, Table 2)		1,053.3	1,085.1	1,117.8	1,151.5	1,186.1
Labor costs, 27.5% of revenue		289.7	298.4	307.4	316.7	326.2
Food, beverage, and packaging costs, 34.75% of revenue		366.0	377.1	388.4	400.1	412.2
Occupancy and other operating costs, 7% of revenue		73.7	76.0	78.2	80.6	83.0
Opportunity cost of rent (\$2,500*12)/1,000		30.0	30.0	30.0	30.0	30.0
Depreciation on building and improvements (Note 1, Table 4)		22.1	23.1	23.1	23.1	22.1
Depreciation of 5-year property (Note 1, Table 4)		18.4	29.4	17.7	10.6	5.3
Operating income		253.4	251.1	273.1	290.4	307.3
Taxes at 21%		53.2	52.7	57.3	61.0	64.5
Net operating income after taxes		200.2	198.4	215.7	229.4	242.8
Depreciation		40.5	52.5	40.7	33.7	27.4
After tax operating cash flows		240.7	250.9	256.5	263.1	270.2
After tax gain or loss on sale of 1250 property (Note 2, Table 4)						565.1
After tax gain or loss on sale of 1245 property (Note 3, Table 4)						63.7
Release of net working capital						10
After tax cash flows	-1002	240.7	250.9	256.5	263.1	909.0
NPV at 29.6 % (in thousands), partial deductibility	\$418.53					

Note 1. Fixed assets are sold on December 31, 2024. Hence, the five-year property is depreciated for only half the year in 2024 under the half-year convention. The 39-year property is depreciated for 11.5 months under the mid-month convention, which allows only half a month of depreciation in December.

Note 2. The building and improvements are classified as 1250 property. This property is sold for \$1,500,000. The adjusted basis in the property is the original cost of \$900,000 less the accumulated depreciation on this property of \$113,460 or \$786,540. Hence, the gain on the sale is $\$1,500,000 - \$786,540 = \$713,460$. The lesser of the gain or the accumulated depreciation is taxed at 25%. The remaining portion of the gain is taxed at Mrs. Talia's 20% long-term capital gains rate. Hence, the after-tax gain on the sale is $\$713,460 - \$113,460 \cdot .25 - (\$713,460 - \$113,460) \cdot .20 = \$565,095$.

Note 3. The kitchen equipment, furniture, installation costs, and point-of-sale terminals are 1245 property. This property is sold for \$100,000. The adjusted basis of the property is \$10,600, which is the \$92,000 initial purchase price less the accumulated depreciation in 2024 on the property of \$81,400. Thus, the gain on the sale is $\$100,000 - \$10,600 = \$89,400$. The lesser of the gain or the accumulated depreciation is taxed at 29.60% and the remaining portion of the gain is taxed at 20%. Hence, the after-tax gain on the sale is $\$89,400 - \$81,400 \cdot .2960 - (\$89,400 - \$81,400) \cdot .20 = \$63,706$.