**Three Project Analyses of Johnson & Johnson (JNJ) in Terms of Excel Programs**

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References

\*Please note these project numbers are based upon the book: Lee et al, 2022. *Corporate Finance and Strategy: An Active Learning Approach*.

# Abstract\*

The main purposes of this paper are to show students how to collect data and use Excel programs to do three projects for Johnson & Johnson. In other words, this paper shows how we teach students in class to do their three projects required in our course. First, we show students how they can download data from annual financial statements and Yahoo finance. Secondly, we explain four Excel programs which discuss in the textbook. In addition, we also show students how to download these four Excel programs from website[[1]](#footnote-1). Project one, entitled Financial Analysis: XYZ Company versus Johnson and Johnson, shows how to calculate 27 financial ratios and sustainable growth rate using Excel, estimate sustainable growth rate, and compute DOL, DFL, and DCL with Excel program. Project three, entitled Portfolio Analysis, CML, SML, and the Cost of Capital: Johnson & Johnson vs. XYZ Company, presents how to estimate optimal portfolio weights and calculate statistical outputs of estimation of Beta coefficients and perform measures. Lastly, Project six, entitled Alternative Policy Analysis and Share Price Forecasting: XYZ as a Case Study, shows the Procedure of Using Excel to Implement the FinPlan Program, and to forecast company’s EPS, PPS, DPS, and other accounting ledger items. In addition, we also show students how to perform sensitivity analysis in terms of payout ratio, leverage ratio, and growth rate.

\*Please note these project numbers are based upon the book: Lee et al, 2022. *Corporate Finance and Strategy: An Active Learning Approach*.

# 1. Project One: Financial Analysis: XYZ Company versus Johnson and Johnson

The main purpose of this project is to perform portfolio analysis and estimate capital market line, security market line, and cost of capital by using the data of Johnson & Johnson, IBM, and S&P 500 index. In Section B, we perform a portfolio analysis of Johnson & Johnson, IBM, and market rate of return. In Section C, we estimate beta coefficient in terms of monthly rate of return of Johnson & Johnson, IBM, and market rate of return. In addition, we estimate cost of capital for both Johnson & Johnson and IBM in terms of three different methods. In Section D, we estimate Sharpe, Treynor, and Jensen performance measures, then we compare the historical performance of Johnson & Johnson, IBM, and S&P 500 index. Finally, in Section E, we summarize the results of this paper and make some concluding remarks.

This project essentially based upon chapter 2 of the textbook by Lee et al. 2022. We present the Word file version of the Excel information for Appendix 2A in calculating 27 financial ratios and sustainable growth rate. Appendix 2B: Two possible methods to estimate sustainable growth rate, and Appendix 2C: How to compute DOL, DFL, and DCL with Excel. We strongly recommend that the instructor uses the PowerPoints and these Excel programs to teach this chapter.

## Preprocess and Preparation

In our class examples, we use JNJ as the example company to show how we can analysis this company by using the project approach. Each student in this class need to choose his/her own company for the project. Before selecting companies, we provide criteria for students to choose their company.

Here are criteria for students to choose your company:

1. Company has at least five years monthly stock price data.
2. Company has paid cash dividends for last five years.
3. Company should choose either manufacturing, transportation, or utility companies. Financial company is not appropriate for this course.
4. The company needs to show both basic and diluted EPS information in the earnings statement.

Other than JNJ company that we use as an example, we also suggest some companies for students. These companies are Coca-Cola, IBM, Apple, Ford, Microsoft, and etc.

After students select their company, we show how students can get company’s financial statements information from the annual report. There are many ways to get financial statements for a company, and we choose to use company’s annual report for the projects because annual report tells more details about a company. For JNJ as our example, we use the key word “JNJ annual report” in Google Search and click on the JNJ official website[[2]](#footnote-2). Most of the companies present their annual report under “corporate report”, and we can easily find JNJ’s 2021 annual report[[3]](#footnote-3) in this website. Normally, company’s annual report is available after March of the next year, depending on the company’s fiscal year end. For JNJ, their 2021 fiscal year is ended on January 2, 2022, and JNJ provides the 2021 annual report on March 2022. A company annual report is normally more than 100 pages, and the financial statements are typically in the middle of the report. In the JNJ 2021 annual report, we can find the consolidated balance sheets on page 41, consolidated statements of earnings on page 42, consolidated statements of comprehensive income on page 43, consolidated statements of equity on page 44, and consolidated statements of cash flows on page 45.

## Financial Data Collection

Under consolidated balance sheets, we are able to find cash and cash equivalents ($14,487), marketable securities ($17,121), account receivables ($15,283), inventory ($10,387), current asset ($60,979), fixed asset ($18,962), total asset ($182,018), current liability ($45,226), long term debt ($29,985), total liability ($107,995), and total equity ($74,023) for the year 2021. The fixed asset line item is referred to property, plant and equipment (PP&E). There is total 11 inputs in the balance sheet financial statement, and the figure 1 shows those details.

#### Figure 1: JNJ’s Balance Sheets

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Under consolidated statements of earnings, we can find sales ($93,775), cost of goods sold ($29,855), interest expense ($183), taxes expense ($1,898), net income ($20,878), and total common share outstanding ($2,632.1) for the year 2021. Cost of goods sold is the same as cost of products sold, and taxes expense is also known as provision for taxes on income. For total common share outstanding, we use basic average shares outstanding. There is total 6 inputs in the earnings statement, and the figure 2 shows those details.

#### Figure 2: JNJ’s earnings statement

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Under consolidated statements of equity, we can find dividend payout is $11,032 for the year 2021, and $10,481 for the year 2020. Figure 3 presents the information.

#### Figure 3: JNJ’s Equity Statement

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Under consolidated statements of cash flows, we can find depreciation and amortization of property and intangibles is $7,390 for the year 2021, and $7,231 for the year 2020. For this line item, some companies might separate show the number of depreciation and the number of amortizations, and students can add these two numbers together. Figure 4 shows the information.

#### Figure 4: JNJ’s cash flow statement

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Summing up all the above information, we have 11 financial inputs from the balance sheet, 6 inputs from the earnings statement, 1 input from equity statement, and 1 input from cash flow statement.

The last financial input is price of the last trading day. This input means we need to collect the close price for the company at the last trading day of the year. For the year 2021, the last trading day is Friday on December 31. Some companies may provide the price of the last trading day in their annual report, but we also show students how they can collect the information from Yahoo finance[[4]](#footnote-4). On the Yahoo finance website, we can look for a company’s financial information.

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After clicking on Johnson & Johnson company under NYQ for US market, we can select “historical data” to see previous stock price for JNJ.

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Following figure 5 under the historical data page, we can change the “time period” from December 24, 2021, to January 01, 2022. Normally we select several days during the end of the year because the last trading day might be several days prior to December 31, depending on the weekend of the year. After applying for an appropriate time period and the daily frequency, we can click “apply” to get our data. On the December 31, 2021, we can see there are open price, high price, low price, close price, and adjust close price for JNJ. We choose close price in our project, and it is $171.07 for the year 2021. Based on this same procedure, students are able to find the price of the last trading day of their company and in different years.

#### Figure 5: Price of the last trading day for JNJ in the year 2021

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Lastly, we enter all the 20 financial input variables under Excel sheet, and we can see all the information for both 2021 and 2020 is easy to read in Figure 6. The column A is the name of input variable. The column B shows the value of each variable in 2021 and column C shows the value in 2020.

#### Table 1: Table of the 20 financial input variables

|  |  |  |  |
| --- | --- | --- | --- |
| **Input financial variables** | **2021** | **2020** | **2019** |
| Cash and Cash equivalents | 14487 | 13,985 | 17,305 |
| Marketable securities | 17121 | 11,200 | 1,982 |
| Account Receivables | 15283 | 13,576 | 14,481 |
| Inventory | 10387 | 9,344 | 9,020 |
| Current Asset | 60979 | 51,237 | 45,274 |
| Fixed Asset | 18962 | 18,766 | 17,658 |
| Total Asset | 182018 | 174,894 | 157,728 |
| Current Liability | 45226 | 42,493 | 35,964 |
| Long term debt | 29985 | 32,635 | 26,494 |
| Total Liability | 107995 | 111,616 | 98,257 |
| Total Equity | 74023 | 63,278 | 59,471 |
| Sales | 93775 | 82,584 | 82,059 |
| Cost of Goods Sold | 29855 | 28,427 | 27,556 |
| Interest Expense | 183 | 201 | 318 |
| Provision for taxes on income (taxes expense) | 1898 | 1,783 | 2,209 |
| Net Income | 20878 | 14,714 | 15,119 |
| Total common share outstanding (Common stock issued amount) | 2632.1 | 2,632.8 | 2,645.1 |
| Dividend payout | 11032 | 10,481 | 9,917 |
| Depreciation and amortization of property and intangible | 7390 | 7,231 | 7,009 |
| Price of last trading day | 171.07 | 157.38 | 145.75 |

## 1.3. Calculate 27 financial ratios and Sustainable Growth Rate with Excel

We use the 20 financial input variables of 2021 and 2020 fisical year of Johnson & Johnson annual report as the example and show how to calculate the 27 financial ratios and sustainable growth rate across five groups.

### 1.3.1. Liquidity Ratio

First, we focus on the liquidity ratio, which measures relative strength of a firm’s financial position. It usually includes current ratio, quick ratio, cash ratio and networking capital to total asset ratio. The formula for each ratio is defined as follows:

The formula to calculate net working capital is current asset minus current liability.

The following figure shows how to calculate these ratios based on the formulae with Excel. To compute the current ratio, we only need to find the cell in which the value of current asset locates (B7) and the cell in which the value of current liabilty belongs to (B10) and then find an empty cell to input “=B7/B10”, which means divding current asset by current liability. The Excel will show the results 1.35.

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Similarly, we can compute the Quick ratio and Cash Ratio as the following two figures instruct. Compared with calculating the current ratio, the only difference for computing the Quick ratio or the Cash ratio is that differenct numerator is used. We have to use the sum of Cash and cash equivalent and Marketable securities [=(B3+B4)] as the numerator in order to calculate the Cash ratio or use the sum of Cash and cash equivalent, Marketable securities and Accounting receivables[=(B3+B4+B5)] as the numerator in order to calculate the Quick ratio.

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For the net working capital to total asset ratio,we firstly need to calculate “Net working capital” and then divide it by current asset. As net working capital is defined as “ Current asset minus current liability”, we compute this ratio by inputing “=(B7-B10)/B9”, which gives us 0.09 in the figure below.

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### 1.3.2. Financial Leverage Ratio

In this section, we compute the financial leverage ratios, which reflect financial risk posture of a firm, with Excel. There are six ratios which are commonly used in financial analysis.

For the first four ratios, their calculations are quite simple. We input “=B12/B9” to get 0.59 for the Debt to Asset ratio, “=B12/B13” to get 1.46 for the Debt to Equity ratio, “=B9/B13” to get 2.46 for the Equity Multiplier, “=(B18+B16+B17)/B16” to get 125.46 for the Times interested paid.

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The following figure shows how to calculate the Long term debt ratio. We input “=B11/(B11+B13)” in an empty cell, where (B11+B13) equals the sum of long term debt and total equity. Excel gives us 0.29.

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Similarly, the Cash coverage ratio can be computed based on the formula by inputting “=(B18+B17+B16+B21)/B16”. Then we obtain 165.84 as the value of this ratio.

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### 1.3.3. Asset Efficiency Ratios

These ratios mainly reflect how a firm is utilzing its asset. We list 7 common ratios used in financial analysis.They are Day's sales in receivables, Receivables Turnover, Day's sales in Inventory, Inventory Turnover, Fixed Asset Turnover, Total Asset Turnover, Net working capital turnover.

Again, the net working capital is defined as current asset minus current liability.

It is very simple to compute Receivable turnover by inputting “=B14/B5”, to calculate Inventory Turnover by inputting “=B15/B6”, to obtain Fixed Asset Turnover via inputting “=B14/B8” and to get Total Asset Turnover via inputting “=B14/B9”. Excel will show all these values.

The following two figures shows that we calculate the Day’s sales in Receivables by inputting “=B5/(B14/365)” and that we calculate the Day’s sales in Inventory by inputting “=B6/(B15/365)”. The key point here is to add a bracket to denominator when we calculate “Sales/365”.

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In order to calculate the Net Working capital Turnover, we input “=B14/(B7-B10)” since “B7-B10” equals to the working capital of JNJ in 2021. Excel shows the final value of 5.95.

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### 1.3.4. Profitability Ratios

These ratios reflect the profitability of a firm’s operations. Profit Margin, Return on Asset and Return on Equity are widely used in empirical research.

Similar to the skills used before, we only need to divide one variable (X1) by another one (X2) with inputting “=X1/X2” to obtain the ratios. The figure below gives an example of how to calculate the Profit Margin (22.26%). ROA and ROE can be obtained in a similar way.

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### 1.3.5. Market Value Ratios

This group includes market value ratios, which indicate an assessment of value of a firm’s stock. We calculate six ratios in this section.

The following two figures show how to compute PE ratio and MB ratio. For the PE ratio, the price of the last trading day is the numerator, so we only need to calculate for the earnings per share (EPS) for the denominator. According to the definition of EPS, it is computed as net income divided by shares outstanding. Similarly, book value per share can be calculated as total equity devided by shares outstanding. Therefore, we can calcualte PE ratio and MB ratio as “=B22/(B18/B19)” and “=B22/(B13/B19)”, respectively. The values are 21.57 and 6.08, respectively.

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Additionally, the earnings yield is simply the reciprocal of PE ratio, so that we get it (1/21.57=0.0464). Dividend yield can be computed via inputing “=(B20/B19)/B22” and equals 0.0245. The following figure shows the result.

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For enterprise-EBITDA ratio, we firstly calculate enterprise value on the numerator according to the definition “Total market value of equity+Book value of Total Liability-Cash” and then input “=B22\*B19+B12-B3”. Next, we divide enterprise value by EBITDA, which is “=B18+B16+B17+B21”. So the one-step formula is “=(B22\*B19+B12-B3)/(B18+B16+B17+B21)”. Excel gives us the value of 17.92.

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For the dividend payout ratio, it is computed as “=B20/B18”, and excel gives us 0.5284. The PEG ratio equals to PE ratio divided by sustainable growth rate. Since we already have PE ratio, we only need to find the value of sustainable growth rate. Based on the formula: , we input sustainable grouwth rate = H28\*(1-B27). Therefore, we get PEG ratio by inputting “=H31/(H28\*(1-B27))”, which equals to 162.14. The result is as follows.

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### 1.3.6. Policy Ratios

The last group is developed by Professor Lee, which includes debt to asset ratio, dividend payout ratio, and sustainable growth rate. Debt to asset ratio is the same as in the financial leverage ratio group, and dividend payout ratio is the same as in the market value ratio group.

Sustainable growth rate (SGR) has been used to calculate PEG ratio in the market value ratio group. When calculating PEG ratio, we present that the formula for sustainable growth rate is . We further define the calculations for sustainable growth rate as follows. Sustainable growth rate can be either estimated by (i) using both external and internal source of fund or (ii) using only internal source of fund.

**Method 1: The sustainable growth rate with both external and internal source of fund can be defined as (Lee 2017).**

Dividend Payout Ratio = Dividends / Net Income

**Method 2: The sustainable growth rate with considering internal source of fund.**

ROE = Net Income/Total Equity

ROE = (Net Income/Assets) x (Assets/Equity)

ROE = (Net Income/Sales) x (Sales/Assets) x (Assets/Equity)

SGR = (Net Income/Sales) x (Retention Rate) x (Sales/Assets) x (Assets/Equity)

=

**Example:**

With the data from JNJ financial statement of 2021 fiscal year, we estimate obtain

ROE = Net Income/Total Equity = 20,878/ 74,023 = 0.282

Dividend Payout Ratio = Dividends/Net Income = 11,032/ 20,878 = 0.5284

According to the method 1, SGR = (1-0.5284)\*0.282/1-[(1-0.5284)\*0.282] = 0.153

According to the method 2, SGR = 0.282\*(1-0.5284) = 0.133

**The difference between method 1 and method 2:**

Technically, as is the numerator of and ,it is easy to prove .

In addition, we can transform and transform . It is obvious to see since .If we use equity value at the end of this year, then can be interpreted as the equity value at the beginning of this year under the condition of no external finance.

Consequently, the SGR from method 1 is usually greater than that from method 2. The JNJ 2021 numerical result 0.153 > 0.133 confirms this.

**Calculate SGR with two methods with Excel:**

We compute the SGR with method 1 by inputting “=((1-B27)\*H28)/(1-((1-B27)\*H28))” and then obtain 0.153. With method 2, we input “=H28\*(1-B27)” and then obtain 0.133. The following figures show the calculation.

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Combining all the six groups from liquidity ratios, including financial leverage ratios, asset efficiency ratios, profitability ratios, market value ratios, and policy ratios, we are able to get all the financial ratios results in Table 2.

#### Table 2: 27 financial ratios and sustainable growth rate for JNJ

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Liquidity ratios** | **2021** | **2020** | **2019** |
| **1** | Current Ratio | 1.35 | 1.21 | 1.26 |
| **2** | Quick Ratio | 1.04 | 0.91 | 0.94 |
| **3** | Cash Ratio | 0.70 | 0.59 | 0.54 |
| **4** | Net working capital to total asset | 0.09 | 0.05 | 0.06 |
|  |  |  |  |  |
|  | **Financial Leverage ratios** |  |  |  |
| **5** | Debt to Asset | 0.59 | 0.64 | 0.62 |
| **6** | Debt to Equity | 1.46 | 1.76 | 1.65 |
| **7** | Equity Multiplier | 2.46 | 2.76 | 2.65 |
| **8** | Times Interest Paid | 125.46 | 83.07 | 55.49 |
| **9** | Long term debt ratio | 0.29 | 0.34 | 0.31 |
| **10** | Cash coverage ratio | 165.84 | 119.05 | 77.53 |
|  |  |  |  |  |
|  | **Asset Efficiency ratios** |  |  |  |
| **11** | Day's sales in receivables | 59.49 | 60.00 | 64.41 |
| **12** | Receivables Turnover | 6.14 | 6.08 | 5.67 |
| **13** | Day's sales in Inventory | 126.99 | 119.98 | 119.48 |
| **14** | Inventory Turnover | 2.87 | 3.04 | 3.05 |
| **15** | Fixed Asset Turnover | 4.95 | 4.40 | 4.65 |
| **16** | Total Asset Turnover | 0.52 | 0.47 | 0.52 |
| **17** | Net working capital turnover | 5.95 | 9.44 | 8.81 |
|  |  |  |  |  |
|  | **Profitability ratios (percentage)** |  |  |  |
| **18** | Profit Margin | 22.26% | 17.82% | 18.42% |
| **19** | ROA | 11.47% | 8.41% | 9.59% |
| **20** | ROE | 28.20% | 23.25% | 25.42% |
|  |  |  |  |  |
|  | **Market Value Ratios** |  |  |  |
| **21** | Price-Earnings Ratio | 21.57 | 28.16 | 25.50 |
| **22** | Market-to-book ratio | 6.08 | 6.55 | 6.48 |
| **23** | Earning yield | 0.0464 | 0.0355 | 0.0392 |
| **24** | Dividend yield | 0.0245 | 0.0253 | 0.0257 |
| **25** | Price/Earnings to growth ratio (PEG) ratio | 162.14 | 420.96 | 291.52 |
| **26** | Enterprise value-EBITDA ratio | 17.92 | 21.40 | 18.92 |
| **27** | Dividend payout ratio | 0.5284 | 0.7123 | 0.6559 |
|  |  |  |  |  |
|  | **Policy Ratios (from above ratios)** |  |  |  |
| **5** | Debt to Asset | 0.59 | 0.64 | 0.62 |
| **27** | Dividend payout ratio | 0.53 | 0.71 | 0.66 |
| **28** | Sustainable growth rate | 0.153 | 0.072 | 0.096 |

### 1.3.7. DOL, DFL, and DCL

In this session, we first define the definitions of DOL, DFL, and DCL in terms of elasticity definition, then we show how Excel program can be used to calculate these three variables in terms of financial statement data.

Degree of operating leverage (DOL) is important to the financial manager. DOL is a measure of the sensitivity of EBIT to a change in unit volume in sales, assuming a constant price-variable cost margin. Formally, DOL is determined as:

There is a more straightforward way to compute a firm’s degree of operating leverage. If the firm’s revenue, total variable costs, and fixed costs are known, the DOL can be computed as:

Or, stated with variables, the formula for DOL can be written as:

Where the variables are defined as:

**Q**: quantity of goods sold

**p**: price per unit

**v**: variable cost per unit

**F**: total fixed cost

**EBIT**: earnings before interest and taxes

Therefore, from equations (1), (2), and (3), DOL can be written as:

DOL is a multiple that measures how much the operating income of a company (EBIT) will change in response to a change in sales. DOL can be calculated in many ways. For this project, it was calculated by taking the percentage change in EBIT and dividing it by the percentage change in sales. EBIT is calculated as net income plus provision for taxes plus interest expense. From the input Table 2, we get the EBIT for 2021, which is 20,878+ 1,898+183 which equals 22,959. The EBIT for 2020 is 14,714+1,783+201 which equals 16,698. The percentage change in EBIT is 0.375. From Table 1, we can also calculate the percentage change in sales for the year 2021 is (93,775- 82,584)/82,584= 0.136. Thus, we can calculate JNJ’s DOL as 0.375/0.136 = 2.75. This means that for every 1% increase in sales, EBIT increased by 0.136%.

By using Excel program, the DOL can be calculated as follows. We firstly compute the percentage change in EBIT by inputting “((B37-C37)/C37)”. Then, compute the percentage change in Sale by inputting “((B37-C37)/C37)”. Put them together, we input “=((B37-C37)/C37)/((B14-C14)/C14)” to get DOL= 2.7670.

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A firm’s financial risk reflects its interest expense, or in financial jargon, its financial leverage. A quick way to determine a firm’s exposure to financial risk is to compute its degree of financial leverage. The degree of financial leverage (DFL) measures the sensitivity of EPS to changes in EBIT:

Where the variables are defined as:

**Q**: quantity of goods sold

**p**: price per unit

**v**: variable cost per unit

**F**: total fixed cost

**EBIT**: earnings before interest and taxes

**EPS**: earnings per share

**I**: interest

EPS is calculated as net income divided by total common share outstanding, which we can find in Table 2. We can get the EPS for 2021, which is 20,878 / 2,632.1 = 7.932. The EPS for 2020 is 14,714 / 2,632.8 = 5.588. The percentage change in EPS is 0.419. From DOL, we know that the percentage change in EBIT is 0.375. Thus, we can calculate JNJ’s DFL as 0.419/0.375= 1.117. This means that for every 1% increase in EBIT, its earnings per share will increase by 1.117%.

To calculate the degree of operating leverage in Excel, we firstly compute EPS (Net income / Total shares) by inputting “=B18/B19”. And then we compute the percentage change in EPS by inputting “((B28-C28)/C28)”, which is the percentage change in EPS. Then, compute the percentage change in EBIT in inputting “((B29-C29)/C29)”. Put them together, we input “=((B28-C28)/C28)/((B29-C29)/C29)”, to get DFL=1.1183.

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Together, operating and financial leverage produce an effect called combined leverage. A firm’s degree of combined leverage (DCL) is the percentage change in earnings per share that results from a 1-percent change in sales volume:

Where the variables are defined as:

**Q**: quantity of goods sold

**p**: price per unit

**v**: variable cost per unit

**F**: total fixed cost

**EBIT**: earnings before interest and taxes

**EPS**: earnings per share

**I**: interest

Finally, the DCL combines DOL and DFL and shows the effect a percent change in sales has on earnings per share. For calculating DCL, we can simply use DOL times DFL. For JNJ, its DCL was 2.767 times 1.1183 which equals 3.0942. This means that for every 1% increase in sales, EPS goes up 3.0942 percentage points.

To calculate the degree of combined leverage in Excel, we simply input “=H27\*H28” to get the same result since DCL=DFL\*DOL= 3.0942.

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DOL, DFL, and DCL can be used to perform security analyses. Bodie et al. (2021) have used DOL to analyze how fixed cost can affect companies’ EBIT. Lee and Lee (2017) have used DOL, DFL, DCL to analyze how fixed cost and interest expense can affect the company’s net income.

Overall, we teach students how to calculate financial ratios based on company’s annual report. Together with the information from sustainable growth rate, DOL, DFL, and DCL, students are able to finish the project one and have a comprehensive understanding of their company.

# 2. Project Three: Portfolio Analysis, CML, SML, and the Cost of Capital: Johnson & Johnson vs. XYZ Company.

The main purpose of this project is to perform portfolio analysis and estimate capital market line, security market line, and cost of capital by using the data of Johnson & Johnson, IBM, and S&P 500 index. First, we perform a portfolio analysis of Johnson & Johnson, IBM, and market rate of return. Secondly, we estimate beta coefficient in terms of monthly rate of return of Johnson & Johnson, IBM, and market rate of return. In addition, we estimate cost of capital for both Johnson & Johnson and IBM in terms of three different methods, including discounted cash flow (DCF) approach, CAPM approach, and Chase approach. Thirdly, we estimate Sharpe, Treynor, and Jensen performance measures, then we compare the historical performance of Johnson & Johnson, IBM, and S&P 500 index. Finally, we summarize the results of this paper and make some concluding remarks.

## 2.1. Portfolio Analysis of JNJ, XYZ Company, and market rates of returns

For this project, you will need to gather the 5-year monthly stock returns of companies. In our example, we demonstrate JNJ, IBM, and market index (S&P 500). For students, they need to have monthly stock returns for their chosen company, JNJ, and market index.

First, we show students how to collect monthly stock returns from Yahoo finance[[5]](#footnote-5). Again, just like what we have done in project one, we type company name and select the company.

Table

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Then, we click on the “historical data” to get the historical price information from Yahoo finance.

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For the time period, we need to have 5-year monthly stock price, so we select the time period from May 01, 2017 to July 07, 2022. For the frequency, we change it from daily to monthly because we need the monthly data for this project. After checking all the information is correct, we can click “apply” to get the data. Then, we click “download” to get the data excel sheet because it is easy to deal with the data after downloading it. By applying the same method, we can get monthly stock price for IBM and S&P 500.

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In the download excel sheet, we choose the “adjust close” price in this project.

Table

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Then, we paste the JNJ, IBM, and S&P 500 in the same excel sheet.

Table

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We use the below formula to calculate the monthly rate of return:

In the excel program, we enter “=(C3-C2)/C2” to calculate the JNJ’s monthly rate of return. Since the monthly return is calculated by the current period and the previous period, we will not have the monthly return for May 01, 2017 because there is no data to calculate with.

Graphical user interface, application, table, Excel

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After collecting the monthly return data, we can calculate the monthly average returns, monthly standard deviations, monthly skewness, monthly kurtosis, and variance-covariance matrix. Students only need to change IBM data into their own company data and compare their company with JNJ and market index (S&P 500).

For JNJ’s monthly average return, we enter “=AVERAGE(B2:B51)” to get the average return from June 01, 2017 to July 01, 2022. The monthly average return for JNJ is 0.0094. With the same idea, we can calculate monthly average returns for IBM and S&P 500, and the excel shows 0.0051 and 0.0132, respectively. Based on the information, we know that JNJ did not perform as good as market, but JNJ performed better than IBM.

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For JNJ’s monthly standard deviation, we enter “=STDEV.S(B2:B51)”, and the excel program shows the standard deviation is 0.0504 from June 01, 2017 to July 01, 2022. With the same idea, we can calculate monthly standard deviations for IBM and S&P 500, and the excel shows 0.074 and 0.0468, respectively. The information tells that both JNJ and IBM are riskier than the market.

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For JNJ’s monthly skewness, we enter “=SKEW.P(B2:B51)”, and get the number -0.1568.

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For JNJ’s monthly kurtosis, we enter “=KURT(B2:B51)”, and get the number 0.5870.

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Combining all the information together, we show the summary statistics for monthly returns for JNJ, IBM, and S&P 500 in Table 2.

#### Table 2: Summary Statistics for Monthly Returns

|  |  |  |  |
| --- | --- | --- | --- |
|  | **JNJ** | **IBM** | **GSPC** |
| **Monthly Average Returns** | 0.0094 | 0.0051 | 0.0132 |
| Monthly Std. Deviation | 0.0504 | 0.0740 | 0.0468 |
| Monthly Skewness | -0.1568 | -0.4358 | -0.5940 |
| Monthly Kurtosis | 0.5870 | 1.5791 | 1.5346 |

In the variance-covariance matrix, we calculate variance for JNJ, IBM, and S&P 500, and the covariance for JNJ vs. IBM, JNJ vs. S&P 500, and IBM vs. S&P 500. For the variance of JNJ, we enter “=VARP('Stock Returns'!$B$2:$B$63)”, and get the JNJ’s monthly return variance is 0.002465957.

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For the covariance between JNJ and IBM, we enter “=COVARIANCE.P(B2:B63, C2:C63)”, and get the number is 0.001970476.

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The variance-covariance matrix for all JNJ, IBM, and S&P 500 is shown in Table 3. From Table 3 we note that the variances for JNJ, IBM, and S&P 500 are 0.002465957, 0.005250935, and 0.002275126, respectively. In addition, 0.001429239 and 0.002146888 are covariances for JNJ and S&P 500 and IBM and S&P 500, respectively.

#### Table 3: Variance-Covariance Matrix

|  |  |  |  |
| --- | --- | --- | --- |
|  | *JNJ Returns* | *IBM Returns* | *GSPC Returns* |
| JNJ Returns | 0.002465957 |  |  |
| IBM Returns | 0.001970476 | 0.005250935 |  |
| GSPC Returns | 0.001429239 | 0.002146888 | 0.002275126 |

## 2.2. Regression Analysis and Three Approaches of Cost of Capital

### 2.2.1. Regression analysis for Beta coefficients

Based upon the monthly rates of return that we collected previously, we can now analysis JNJ and IBM again market rate of return. In the excel program, we select “Data”, and then click on “Data Analysis”. Under data analysis, we choose “Regression” and click “OK”.

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If students’ Excel sheets do not show “Data Analysis”, then you can do the following steps: (i) click to “File”, (ii) select “Options”, (iii) click “Add-ins”, (iv) under manage, select “Excel Add-ins” and click “Go”, (v) check “Analysis ToolPak”, and then click “OK”. After finishing those steps, the Excel will show “Data Analysis” under “Data”.

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In the “Regression”, we select JNJ monthly returns in the “Input Y Range”, and then S&P 500 monthly returns in the “Input X Range”. Same idea, we always put market index in the X variable, and company data in the Y variable, which student’s company should be put under X range.

Graphical user interface, application

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After clicking “OK”, Excel will provide a new sheet and show the regression results for running the regression on JNJ and S&P 500. We can find that the alpha value in this regression is 0.003465096, and the beta is 0.628772176.

Graphical user interface, application, table, Excel

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The following table shows the regression intercepts and slopes of JNJ and IBM.

#### Table 4: Alphas and Betas for JNJ and IBM

|  |  |  |
| --- | --- | --- |
|  | JNJ | IBM |
| Regression Intercept (Alpha) | 0.003465096 | -0.004653991 |
| Regression slope (Beta) | 0.628772176 | 0.942533144 |

The following figure shows the regression graph for both JNJ and IBM. The orange color line presents IBM’s regression, and the blue color line presents JNJ’s regression. Because the regression slope for IBM is 0.943, which is larger than JNJ’s slope 0.629. The graph shows the regression for IBM is steeper than JNJ.

#### Figure 2: Regressions for JNJ and IBM

Combining all the information together, we have beta coefficient of JNJ is 0.6288, monthly average return of JNJ is 0.0094, and the annual monthly average return of JNJ is 0.0094 times 12, which equals to 0.1131. The monthly risk-free rate, annual risk free rate, and long-term market risk premium is assigned by Professor Lee, which are 0.0025, 0.03, and 0.07, respectively.

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### 2.2.2. Three Approaches of Cost of Capital

Next, we are able to calculate the CAPM cost of equity for JNJ by entering “=J27+J25\*J28”, and the Excel shows 7.4%.

Graphical user interface, application, table, Excel

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We can also compare our beta coefficient with Yahoo finance. In our Excel regression, we get beta coefficient is 0.6288, and we can see that Yahoo finance shows the beta coefficient is 0.66 for JNJ. Although the numbers are not the same, they are pretty close. Since both beta coefficients are smaller than 1, we say JNJ has defensive beta during this period.

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Secondly, we show how to calculate discounted cash flow (DCF) approach. Based on the first project, we have dividend yield and sustainable growth rate when we calculate financial ratios. We only need to copy and paste the previous results, and then the DCF can be easily calculated as dividend yield plus sustainable growth rate. Here, the DCF approach of JNJ is 15.75%.

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Finally, we show how to calculate Chase method based on several information. The formula of Chase method is defined as below.

Chart

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For the , we can simply use the CAPM cost of equity, which is 7.4% in this case. For tax rate, interest rate, and debt to equity information, we need to use average data, which means we need to at least have two years data to calculate average numbers.

#### Table 5: JNJ’s information for calculating Chase method

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| JNJ | 2021 | 2020 | 2019 | **Average** |  |
| Tax rate | 0.083 | 0.108 | 0.127 | **0.106** | from annual report |
| Interest rate | 2.89 | 2.85 | 3.19 | **2.977** | from annual report |
| Debt to Equity | 1.46 | 1.76 | 1.65 | **1.625** | from project 1 |

For calculating the tax rate, we find the “provision for taxes on income” and “tax expense” in earnings statement. Thus, JNJ’s tax rate for the year 2021 is calculated as 1,898 / 22,776 = 0.083.

Table

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For the interest rate, we look for the information in the annual report. JNJ shows their borrowing information in the “Borrowings” session on page 60 of JNJ’s 2021 annual report. From here, we can get the interest rate for JNJ is 2.89% in 2021 and 2.85% in 2020.

Graphical user interface, table

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The debt-to-equity ratio is already calculated in project one, and we can simply copy-paste the number here.

Finally, by entering all the data in the Excel program, we can calculate the Chase method as “=(J30+(1-K44)\*K46\*K45)/1+((1-K44)\*K46)”. Excel shows the number of Chase method is 5.85 for JNJ.

Application, table, Excel

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By applying the same concept, we can calculate the three approaches of cost of capital for IBM, and Table 6 shows the results for both JNJ and IBM.

#### Table 6: Regression results and three approaches of Cost of Capital

|  |  |  |
| --- | --- | --- |
|  | JNJ | IBM |
| Regression Intercept (Alpha) | 0.003465096 | -0.004653991 |
| Regression slope (Beta) | 0.628772176 | 0.942533144 |
| CAPM Method | 7.4% | 8.1% |
| DCF Method | 15.75% | 4.24% |
| Chase Method | 5.85 | 25.747 |

## 2.3. Sharpe, Treynor, and Jensen Performance Measures

By using the monthly rates of return of Johnson & Johnson, IBM, and S&P 500, we estimate optimal weights in terms of Sharpe performance, Treynor performance, and Jensen performance measures.

For the Sharpe performance measure, we enter “=(G2-$G$15)/G3” in excel program. Then, we get the Sharpe performance measure is 0.1375 for JNJ. We can apply the same idea to get the Sharpe performance measures for IBM and S&P 500.

Graphical user interface, table

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For the Treynor performance measure, we need to obtain the regression coefficient, which is the beta value for JNJ. In the previous session, we get the regression betas for JNJ is 0.629 and 0.943 for IBM. Thus, we enter the values in the G21 and G22 cells in the Excel sheet. Next, we enter “=(G2-$G$15)/G21” to calculate Treynor performance measure for JNJ. Then, we get the Treynor performance measure is 0.011 for JNJ. We can apply the same idea to get the Treynor performance measures for IBM and S&P 500. The beta value for S&P 500 is assumed to be 1.

Graphical user interface, application, table, Excel

Description automatically generated

For the Jensen performance measure, we enter “=(G2-$G$15)-G21\*($I$2-$G$15)” in excel program. Then, we get the Jensen performance measure is 0.000 for JNJ. We can apply the same idea to get the Jensen performance measures for IBM and S&P 500.

Graphical user interface, application, table

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The empirical results for all performance measures are presented in the following table.

#### Table 7: Performance measures

|  |  |  |  |
| --- | --- | --- | --- |
|  | **JNJ** | **IBM** | **S&P 500** |
| **Sharpe Performance Measure** | 0.1375 | 0.0352 | 0.2279 |
| **Treynor Performance Measure** | 0.011 | 0.003 | 0.011 |
| **Jensen Performance Measure** | 0.000 | -0.007 | 0.000 |

## 2.4. Calculation of the Optimal Portfolio Weights

For the approach of variance minimization, we follow the formulas shown below. All the input variables are already obtained from previous sessions.

Where,

represents JNJ and represents IBM in our example.

= JNJ’s monthly returns’ variance

= IBM’s monthly returns’ variance

= covariance between JNJ and IBM’s monthly returns.

By applying the formula in Excel program, we enter “=(B9-B10)/(B8+B9-B10)” to calculate the variance minimization for JNJ. Excel shows the number is 0.571.

Graphical user interface, application, table, Excel

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For the approach of Sharpe performance measure maximization, we follow the formulas shown below. And the excess returns are defined as the difference between the average monthly return and the monthly risk-free return.

Where,

represents JNJ and represents IBM in our example.

= JNJ’s monthly returns’ variance

= IBM’s monthly returns’ variance

= Monthly Average Return of JNJ

= Monthly Average Return of IBM

= Monthly Average Returns of S&P 500

= covariance between JNJ and IBM’s monthly returns.

By applying the formula in Excel program, we first calculate the excess returns for JNJ and IBM, which is the company’s monthly average returns minus market average return (S&P 500 in this case).

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Next, we enter “=(F8\*F11-F9\*F12)/(F8\*F11+F9\*F10-(F8+F9)\*F12)” to calculate the Sharpe Performance Maximization for JNJ. Excel shows the number is 1.301.

Graphical user interface, application, table, Excel

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The following table shows the overall results for both JNJ and IBM.

#### Table 8: Variance Minimization and Sharpe Performance Maximization

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Variance Minimization** | | **Sharpe Performance Maximization** | |
| **Inputs** | Variance\_A (JNJ) | 0.0025 | ExcessReturns\_1 (JNJ) | 0.0069 |
| Variance\_B (IBM) | 0.0053 | ExcessReturns\_2 (IBM) | 0.0026 |
| Covariance | 0.0020 | Variance\_1 | 0.0025 |
|  |  | Variance\_2 | 0.0053 |
|  |  | Covariance | 0.0020 |
| **Output** | **W\_A (JNJ)** | **0.5701** | **W\_1 (JNJ)** | **1.301** |
| **W\_B (IBM)** | **0.429** | **W\_2 (IBM)** | **-0.301** |

# 3. Project Six: Alternative Policy Analysis and Share Price Forecasting: XYZ as a Case Study.

In this project, we present the financial planning approach of Warren and Shelton (1971), which is based on a simultaneous equationsconcept. The model, called FINPLAN, deals with overall corporate financial planning as opposed to just some are of planning, such as capital budgeting. The objective of the FINPLAN model is not to optimize anything, but rather, to serve as a tool to provide relevant information to the decision-maker. One of the strengths of this planning model, in addition to its construction, is that it allows the user to simulate the financial impacts of changing assumptions regarding such variables as sales, operating ratios, price-to-earnings ratios, retention rates, and debt-to-equity ratios.

The advantage of utilizing a simultaneous equation structure to represent a firm’s investment, financing, production, and dividend policies is the enhanced ability for the interaction of these decision-making areas. The Warren and Shelton (WS) model is a system of 20 equations which are listed in the following table. These equations are segmented into distinct subgroups corresponding to sales, investment, financing, and per share (return to investors) data. The flowchart describing the interrelationships of the equations is shown in following figure.

#### Table 9: Warren and Shelton Model

|  |
| --- |
| Section 1 – Generation of Sales and Earnings before Interest and Taxes for Period *t*.   1. *SALESt* = *SALESt – 1*(1 + *GSALSt*) 2. *EBITt* = *REBITtSALESt*   Section 2 – Generation of Total Assets Required for Period *t.*   1. *CAt* = *RCAtSALESt* 2. *FAt = RFAtSALESt* 3. *At = CAt + FAt*   Section 3 – Financing the Desired Level of Assets.   1. *CLt = RCLtSALESt* 2. *NFt = (At – CLt – PFDSKt) – (Lt – 1 – LRt) – St – 1 – Rt – 1 – br{(1 – Tt)[EBITt – it -1(Lt – 1 – LRt)] – PFDIVt}* 3. *NFt + bt (1-Tt)[ietNLt + U1tNLt] = NLt + NSt* 4. *Lt = Lt – 1 – LRt + NLt* 5. *St = St – 1 + NSt* 6. *Rt = Rt-1 + bt{(1-Tt)[EBITt – itLt – U1tNLt] – PFDIVt}* 7. *it = it -1+ iet*   Section 4 – Generation of Per Share Data for Period *t*   1. *EAFCDt = (1 – Tt)[EBITt – itLt – U1tNLt] - PFDIVt* 2. *CMDIVt = (1 – bt)EAFCDt* 3. *NUMCSt = NUMCSt-1 + NEWCSt* 4. *NEWCSt =* 5. *Pt = mtEPSt* 6. *EPSt =* 7. *DPSt =* |

Source: Adapted from Warren and Shelton, 1971.

There are 20 equation and 20 unknowns for this model. The unknowns are listed and defined in Table 21-2. In addition, Table 21-2 lists and defines parameters (inputs).

#### Figure 3: Flow Chart of a Simplified Financial Planning Model



#### Table 10: List of Unknowns and List of Parameters Provided by Management

|  |  |
| --- | --- |
| 1. Unknowns | |
| 1. *SALESt* | Sales |
| 1. *CAt* | Current assets |
| 1. *FAt* | Fixed assets |
| 1. *At* | Total assets |
| 1. *CLt* | Current payables |
| 1. *NFt* | Needed funds |
| 1. *EBITt* | Earnings before interest and taxes |
| 1. *NLt* | New debt |
| 1. *NSt* | New stock |
| 1. *Lt* | Total debt |
| 1. *St* | Common stock |
| 1. *Rt* | Retained earnings |
| 1. *It* | Interest rate on debt |
| 1. *EAFCDt* | Earnings available for common dividends |
| 1. *CMDIVt* | Common dividends |
| 1. *NUMCSt* | Number of common shares outstanding |
| 1. *NEWCSt* | New common shares issued |
| 1. *Pt* | Price per share |
| 1. *EPSt* | Earnings per share |
| 1. *DPSt* | Dividends per share |
| 1. Provided by Management | |
| 1. *SALESt-1* | Sales in previous period |
| 1. *GSALSt* | Sustainable growth rate |
| 1. *RCAt* | Current assets as a percent of sales |
| 1. *RFAt* | Fixed assets as a percent of sales |
| 1. *RCLt* | Current payables as a percent of sales |
| 1. *PFDSKt* | Preferred stock |
| 1. *PFDIVt* | Preferred dividends |
| 1. *Lt-1* | Debt in previous period |
| 1. *LRt* | Debt repayment |
| 1. *St-1* | Common stock in previous period |
| 1. *Rt-1* | Retained earnings in previous period |
| 1. *bt* | Retention rate |
| 1. *Tt* | Average tax rate |
| 1. *it-1* | Average interest rate in previous period |
| 1. *iet* | Expected interest rate on new debt |
| 1. *REBITt* | Operating income as a percent of sales |
| 1. *U1t* | Underwriting cost of debt |
| 1. *Ust* | Underwriting cost of equity |
| 1. *Kt* | Ratio of debt to equity |
| 1. *NUMSCSt-1* | Number of common shares outstanding in previous period |
| 1. *mt* | Price-earnings ratio |

Source: Adapted from Warren and Shelton, 1971.

Financing of the desired level of assets is undertaken in section 3 of the table. In Equation 6, current liabilities in period *t* are derived from the ratio of *CL/SALES* multiplied by *SALES.* Equation 7 represents the funds required (*NFt).* FINPLAN assumes that the amount of preferred stock is constant over the planning horizon. In determining what funds are needed and where they are to come from, FINPLAN uses a source-and-use-of-funds accounting identity. For instance, Equation 7 shows that the assets for period *t* are the basis for the firm’s financing needs. Current liabilities, as determined in the prior equation, are one source of funds and therefore are subtracted from asset levels. As mentioned above, preferred stock is a constant and therefore must be subtracted also. After the first term in Equation 7, *(At – CLt – PFDSKt),* we have the financing that must come from internal sources (retained earnings and operations) and long-term external sources (debt and stock issues). The term in the second parenthesis, *(Lt – 1 – LRt)*, takes into account the remaining old debt outstanding, after retirements, in period *t*. Then the funds provided by existing stock and retained earnings are subtracted out. The last quantity is the funds provided by operations during period *t*.

Once the funds needed for operations are defined, Equation 8 specifies that new funds, after taking into account underwriting costs and additional interest costs from new debt, are to come from long-term debt and new stock issues. Equations 9 and 10 simply update the debt and equity accounts for the new issues. Equation 11 updates the retained-earnings account for the portion of earnings available to common stockholders from operations during period *t*. Specifically, *b*t is the retention rate in period *t* and (1 – *T*t) is the after-tax percentage, which is multiplied by the earnings from the period after netting out interest costs on both new and old debt. Since preferred stockholders must be paid before common stockholders, preferred dividends must be subtracted from funds available for common stockholders. Equation 12 calculates the new weighted-average interest rate for the firm’s debt. Equation 13 is the new debt-to-equity ratio for period *t*.

In the following sections, we show students how to collect the 21 input variables before applying FINPLAN forecasting. Next, we compare our 2021 forecast results with JNJ’s actual numbers and calculate the mean absolute deviation errors. Finally, we show sensitivity analysis and see how the forecast results will change based on different input variables.

### 3.1. Collecting 21 input variables for FINPLAN forecasting

In this project, we will use our input variables to forecast the pro forma balance sheet and pro forma income statement by applying FINPLAN model for JNJ. Since we want to compare our forecast results to the true numbers, we use 2020 as all the inputs variables, and then forecast for the years 2021, 2022, 2023, and 2024. By doing this, we can compare our forecast results for the year 2021 to the true results for the year 2021. The following table shows all the input variables JNJ in the year 2020.

#### Table 9: 21 Input Parameters for JNJ (Year 2020)

|  |  |  |
| --- | --- | --- |
| Variables | Descriptions | JNJ |
|  | The number of years to be simulated | 4 |
| *SALESt-1* | Net Sales at t-1=2020 | 82,584 |
| *GSALSt* | Sustainable Growth Rate | 0.0669 |
| *RCAt* | Current Assets as a Percent of Sales | 0.6204 |
| *RFAt* | Non-current Assets as a Percent of Sales | 1.4973 |
| *RCLt* | Current Payables as a Percent of Sales | 0.5145 |
| *PFDSKt* | Preferred Stock | 0 |
| *PFDIVt* | Preferred Dividends | 0 |
| *Lt-1* | Long Term Debt in Previous Period | 32,635 |
| *LRt* | Long Term Debt Repayment (Reduction) | 1,064 |
| *St-1* | Common Stock in Previous Period | 3,120 |
| *Rt-1* | Retained Earnings in Previous Period | 113,890 |
| *bt* | Retention Rate (1% high and 1% low for payout ratio) | 0.2877 |
| *Tt* | Average Tax Rate | 0.1081 |
| *it-1* | Average Interest Rate in Previous Period | 0.0062 |
| *iet* | Expected Interest Rate on New Debt | 0.0120 |
| *REBITt* | Operating Income as a Percentage of Sales | 0.2022 |
| *U1t* | Underwriting Cost of Debt | 0.0200 |
| *Ust* | Underwriting Cost of Equity | 0.0100 |
| *Kt* | Ratio of Debt to Equity (5% up and 5% down) | 1.7639 |
| *NUMSCSt-1* | Number of Common Shares Outstanding in Previous Period | 2,632.80 |
| *mt* | Price-Earnings Ratio | 28.1603 |

Here, we present how to collect all the 21 inputs from the project 1 data and from 2021 JNJ’s annual report. First, the number of years to be simulated is four years, which means we will forecast the future four years of the financial information. Next, net sales and sustainable growth rate are already presented in project one. Thus, we only need to enter the values in the input table, and they are 82,584 and 0.0669, respectively. For sustainable growth rate, we presented two methods of calculations, and we can enter either one of the values here.

For the current assets as a percent of sales, non-current assets as a percent of sales, and current payables as a percent of sales, we have all the information from project 1 input table. So, we only need to enter the numbers to calculate those inputs for FINPLAN forecasting.

Current assets as a percent of sales is calculated as current asset divided by sales, so we enter “=51237/D3” in Excel program, and get the result 0.6204. Again, the 51237 is the current asset that we obtained from project 1 for the 2020 JNJ input table.

Graphical user interface, text, application, email

Description automatically generated

Non-current assets as a percent of sales is calculated as total asset minus current asset, and then divided by sales. So, we enter “=(174894-51237)/D3” in Excel program, and get the result 1.4973. Again, the 174894 is the total asset and the 51237 is the current asset that we obtained from project 1 for the 2020 JNJ input table.

Graphical user interface, text, application, email

Description automatically generated

Current payables as a percent of sales is calculated as current liabilities divided by sales, so we enter “=42493/D3” in Excel program, and get the result 0.5145. Again, the 42493 is the current liabilities that we obtained from project 1 for the 2020 JNJ input table.

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Both preferred stock and preferred dividends inputs are zero because JNJ does not issue preferred stocks recently. Most of the companies that students use do not issue preferred stocks. Next, the long term debt is 32,635, which we can easily get from project 1 input table.

The long term debt repayment (reduction), common stock in previous period, and retained earnings in previous period can be calculated from JNJ’s annual report.

Long term debt repayment is in the cash flow statement on the page 45 of 2021 JNJ annual report.

Graphical user interface, application

Description automatically generated

Common stock in previous period and retained earnings can be found in the balance sheet, which is on the page 41 of 2021 JNJ annual report.

Text, application, table

Description automatically generated with medium confidence

Next, we calculate for retention rate. Retention rate can be calculated as 1 min dividend payout divided by net income. Thus, we enter “= 1-(10481/14714)” in Excel program, and get 0.2877. Again, the 10481 is the dividend payout and the 14714 is the net income that we obtained from project 1 for the 2020 JNJ input table.

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For the average tax rate, we calculate it by using tax expense divided by earnings before tax. From the earnings statement on the page 41 of 2021 JNJ annual report, we can get the tax expense as 16,497 and the earnings before tax is 1,783 for the year 2020.

Table

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Then, we can enter “=1783/16497” in Excel program to get the average tax rate is 0.1081.

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For the average interest rate in previous period, we calculate it by using interest expense divided by long term debt. In Excel sheet, we enter “=201/32635” and get the value 0.0062. Again, the 201 is the interest expense and the 32635 is the long term debt that we obtained from project 1 for the 2020 JNJ input table.

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The Expected Interest Rate on New Debt is defined by Professor Lee, and we calculate the number by adding 0.005 on the average interest rate. Thus, in the Excel program, we enter “=D16+0.005” and get the value is 0.0112.

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For the Operating Income as a Percentage of Sales, we calculated as earnings before tax plus interest expense and then divided by sales. In the Excel program, we enter “=(16497+201)/D3” and get the value is 0.2022. Again, the 201 is the interest expense and 16,497 is the tax expense as we have all the information from previous calculations.

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Next, the values of underwriting cost of debt and underwriting cost of equity are provided by Professor Lee. So, we enter 0.02 and 0.01, respectively. Finally, for the values of debt to equity ratio, number of common shares outstanding and Price to earnings ratio are from project 1 input table.

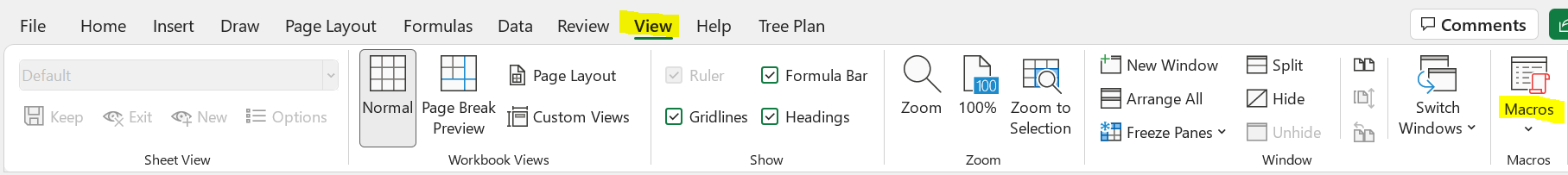
### 3.2. Applying FINPLAN forecasting

From the previous session, we get all the 21 input variables that we need to forecast FINPLAN model. In Excel program, we open the FINPLAN Macro file and click “Enable Content” if the security warning shows up. Next, we copy and paste all the 21 input variables into FINPLAN Excel sheet.

Graphical user interface, table

Description automatically generated

Then, we click “View” and then we go to “Macors”.



In the Macros’ panel, we do not need to do anything, and just simply click “Run”.

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After finishing all the steps, we will get the forecasting results for both Pro forma income statement, Pro forma balance sheet, and the per share data, including EPS, DPS, and PPS.

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The following tables are pro forma income statement and pro forma balance sheet for JNJ by applying financial information from 2020 to forecast 2021, 2022, 2023, and 2024.

#### Table 10: Pro Forma Income Statement for JNJ

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **2020** | **2021** | **2022** | **2023** | **2024** |
| Sales | 82584.00 | 88108.48 | 94002.52 | 100290.85 | 106999.83 |
| Operating income | 0.00 | 17815.02 | 19006.76 | 20278.22 | 21634.74 |
| Interest expense | 0.00 | 897.55 | 972.11 | 1051.35 | 1135.62 |
| Underwriting commission -- debt | 0.00 | 1171.58 | 141.89 | 149.96 | 158.57 |
| Income before taxes | 0.00 | 15745.89 | 17892.75 | 19076.91 | 20340.55 |
| Taxes | 0.00 | 1701.82 | 1933.85 | 2061.84 | 2198.41 |
| Net income | 0.00 | 14044.07 | 15958.90 | 17015.07 | 18142.14 |
| Preferred dividends | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Available for common dividends | 0.00 | 14044.07 | 15958.90 | 17015.07 | 18142.14 |
| Common dividends | 0.00 | 10003.80 | 11367.76 | 12120.09 | 12922.92 |
| Debt repayments | 0.00 | 1064.00 | 1064.00 | 1064.00 | 1064.00 |
| Actl funds needed for investment | 0.00 | 758.73 | 5922.36 | 6250.64 | 6600.81 |

#### Table 11: Pro Forma Balance Statement for JNJ

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **2020** | **2021** | **2022** | **2023** | **2024** |
| **Assets** |  |  |  |  |  |
| Current assets | 0.00 | 54664.51 | 58321.31 | 62222.73 | 66385.14 |
| Fixed assets | 0.00 | 131929.07 | 140754.50 | 150170.32 | 160216.00 |
| Total assets | 0.00 | 186593.58 | 199075.82 | 212393.05 | 226601.14 |
| **Liabilities and net worth** |  |  |  |  |  |
| Current liabilities | 0.00 | 45335.58 | 48368.32 | 51603.93 | 55055.99 |
| Long term debt | 32635.00 | 90149.77 | 96180.36 | 102614.37 | 109478.79 |
| Preferred stock | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Common stock | 3120.00 | -54700.03 | -55872.27 | -57119.65 | -58447.26 |
| Retained earnings | 101768.00 | 105808.27 | 110399.41 | 115294.39 | 120513.62 |
| Total liabilities and net worth | 0.00 | 186593.58 | 199075.82 | 212393.05 | 226601.14 |
| Computed DBT/EQ | 0.0000 | 1.7639 | 1.7639 | 1.7639 | 1.7639 |
| Int. rate on total debt | 0.0062 | 0.0100 | 0.0101 | 0.0102 | 0.0104 |
| **Per share data** |  |  |  |  |  |
| Earnings | 0.0000 | 6.1220 | 6.9751 | 7.4562 | 7.9710 |
| Dividends | 0.0000 | 4.3608 | 4.9684 | 5.3112 | 5.6779 |
| Price | 0.0000 | 172.3977 | 196.4194 | 209.9692 | 224.4651 |

After we obtain the forecasted values from the model, we compare them with the actual data of JNJ in 2021 via calculating the absolute percentage change of error. We use actual numbers minus the pro forma results as the denominator, and then divide by the actual numbers for the year 2021. From the mean absolute deviation error calculations, the results are shown in the following table. The interest expense, fixed assets, long-term debt, and common stock show a significant percentage error between actual and pro forma results. These are items that we normally get different between our forecast and actual numbers.

In the per share data, JNJ performed 22.8% higher for the earnings per share, and 6.63% higher for the dividend per share. JNJ performed outstanding than our forecasting results. Our 2021 forecasting with smaller numbers might be because we use the 2020 input variables, which is the year that was significantly affected by COVID-19. For the stock price, the actual 2021 stock price is 0.78% smaller than our forecast result. The stock price forecasting is pretty close to the actual stock price.

#### Table 12: Mean Absolute Deviation Errors for Comparing Actual vs. Forecasted Numbers for 2021

|  |  |  |  |
| --- | --- | --- | --- |
| **Income Statement** | **Pro forma 2021** | **Actual 2021** | **Mean absolute deviation error for forecast variables** |
| Sales | 88108.48 | 93,775 | 6.04% |
| Operating income | 17815.02 | 23,410 | 23.90% |
| Interest expense | 897.55 | 183 | -390.47% |
| Income before taxes | 15745.89 | 22,776 | 30.87% |
| Taxes | 1701.82 | 1,898 | 10.34% |
| Net income | 14044.07 | 20,878 | 32.73% |
| Common dividends | 10003.80 | 11,032 | 9.32% |
| Debt repayments | 1064.00 | 1,802 | 40.95% |
| **Balance Sheet** |  |  |  |
| **Assets** | | | |
| Current assets | 54664.51 | 60,979 | 10.36% |
| Fixed assets | 131929.07 | 18,962 | -595.76% |
| Total assets | 186593.58 | 182,018 | -2.51% |
| **Liabilities and net worth** |  |  |  |
| Current liabilities | 45335.58 | 45,226 | -0.24% |
| Long term debt | 90149.77 | 29,985 | -200.65% |
| Common stock | -54700.03 | 3,120 | 1853.21% |
| Retained earnings | 105808.27 | 123,060 | 14.02% |
| Total liabilities and net worth | 186593.58 | 182,018 | -2.51% |
| Debt to equity | 1.7639 | 1.46 | -20.81% |
| Interest rate on total debt | 0.0100 | 0.006 | -63.14% |
| **Per share data** |  |  |  |
| Earnings | 6.1220 | 7.93 | 22.80% |
| Dividends | 4.3608 | 4.67 | 6.63% |
| Price | 172.3977 | 171.07 | -0.78% |

Most of the 2021 JNJ actual financial information can be found in earnings statement and balance sheet, including sales, operating income, interest expense, income before taxes, taxes, net income, common dividends, debt repayments, current assets, fixed assets, total assets, current liabilities, long term debt, common stock, retained earnings, and total liabilities and net worth.

For the actual debt-to-equity ratio, we can find the number, 1.46, in our project 1 ratio calculations. For the actual interest rate on total debt, we can calculate as interest expense divided by long term debt, and the numbers are all shown in project 1 input table. So, we get 0.006 = 183/29985. For the actual earnings per share, we can find the information in the earnings statement, or we can also calculate as net income divided by shares outstanding. So, the EPS is 7.93 in 2021. For the actual dividend per share, we calculate as dividend payout divided by shares outstanding, and again, we have all the numbers in project 1 input table. The DPS is 4.67 in 2021. Finally, we use the price of the last trading day from December 31, 2021 as the actual stock price, and the number is 171.07.

### 3.3. Sensitivity Analysis

In this session, we will show sensitivity analysis based on the 21 input parameters for forecasting JNJ future performance. The main purpose of sensitivity analysis is to know how input variables change will affect the forecasting results. For those input parameters, we select sustainable growth rate, retention rate, and debt to equity ratio parameters to adjust. For the sustainable growth rate, we change the original number of additional 2% higher and 2% lower. For the retention rate, we change the original number of additional 5% higher and 5% lower. For the debt to equity ratio, we change the original number of additional 5% higher and 5% lower. Therefore, we will have additional six different forecasting results based on the sensitivity analysis.

#### Table 13: Sensitivity Analysis Adjustments

|  |  |  |
| --- | --- | --- |
| **Parameters** | **Sensitivity Analysis Groups** | **Alternative Values** |
| Sustainable Growth Rate | 1 | +0.02 |
| 2 | -0.02 |
| Retention Rate | 3 | +0.05 |
| 4 | -0.05 |
| Debt to Equity Ratio | 5 | +0.05 |
| 6 | -0.05 |

By using sustainable growth rate change 2% higher as an example, we present how to use Excel program to get the results. First, we copy all the 21 forecast parameters and paste into a new Excel sheet. The original sustainable growth rate is 0.0669, which is the same number that we obtained from previous session. Then, we simply enter “=0.0669+0.02” to get a different sustainable growth rate with 2% higher than the original number, which is 0.0869.

Table

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#### Table 14: Sensitivity Analysis Parameters with JNJ 2020 input variables

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Debt/Equity 5% higher** | **Debt/Equity 5% lower** | **Retention rate 5% higher** | **Retention rate 5% lower** | **Growth rate 2% higher** | **Growth rate 2% lower** |
| The number of years to be simulated | 4 | 4 | 4 | 4 | 4 | 4 |
| Net Sales | 82,584 | 82,584 | 82,584 | 82,584 | 82,584 | 82,584 |
| Sustainable Growth Rate | 0.0669 | 0.0669 | 0.0669 | 0.0669 | **0.0869** | **0.0469** |
| Current Assets as a Percent of Sales | 0.6204 | 0.6204 | 0.6204 | 0.6204 | 0.6204 | 0.6204 |
| Non-current Assets as a Percent of Sales | 1.4973 | 1.4973 | 1.4973 | 1.4973 | 1.4973 | 1.4973 |
| Current Payables as a Percent of Sales | 0.5145 | 0.5145 | 0.5145 | 0.5145 | 0.5145 | 0.5145 |
| Preferred Stock | 0 | 0 | 0 | 0 | 0 | 0 |
| Preferred Dividends | 0 | 0 | 0 | 0 | 0 | 0 |
| Long Term Debt | 32,635 | 32,635 | 32,635 | 32,635 | 32,635 | 32,635 |
| Long Term Debt Repayment (Reduction) | 1,064 | 1,064 | 1,064 | 1,064 | 1,064 | 1,064 |
| Common Stock | 3,120 | 3,120 | 3,120 | 3,120 | 3,120 | 3,120 |
| Retained Earnings | 113,890 | 113,890 | 113,890 | 113,890 | 113,890 | 113,890 |
| Retention Rate | 0.2877 | 0.2877 | **0.3377** | **0.2377** | 0.2877 | 0.2877 |
| Average Tax Rate | 0.1081 | 0.1081 | 0.1081 | 0.1081 | 0.1081 | 0.1081 |
| Average Interest Rate | 0.0062 | 0.0062 | 0.0062 | 0.0062 | 0.0062 | 0.0062 |
| Expected Interest Rate on New Debt | 0.0112 | 0.0112 | 0.0112 | 0.0112 | 0.0112 | 0.0112 |
| Operating Income as a Percentage of Sales | 0.2022 | 0.2022 | 0.2022 | 0.2022 | 0.2022 | 0.2022 |
| Underwriting Cost of Debt | 0.0200 | 0.0200 | 0.0200 | 0.0200 | 0.0200 | 0.0200 |
| Underwriting Cost of Equity | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 |
| Ratio of Debt to Equity | **1.8139** | **1.7139** | 1.7639 | 1.7639 | 1.7639 | 1.7639 |
| Number of Common Shares Outstanding | 2,632.80 | 2,632.80 | 2,632.80 | 2,632.80 | 2,632.80 | 2,632.80 |
| Price-Earnings Ratio | 28.1603 | 28.1603 | 28.1603 | 28.1603 | 28.1603 | 28.1603 |

Next, we apply the same process in Excel program as we did for the FINPLAN Macro forecasting. We also using the year of 2020 input parameters to forecast 2021, 2022, 2023, and 2024 JNJ financial performance. But unlike we only use one group of input parameters, we use six groups of input parameters. So, we run FINPLAN Macro forecasting six times to get six different results.

The following table shows the actual EPS, DPS, and stock price the JNJ in the year 2021, and our forecasting results with different input parameters, including the original data and the sensitivity adjustments.

#### Table 15: Sensitivity Analysis Results Comparison for the JNJ 2021

|  |  |  |  |
| --- | --- | --- | --- |
|  | Earnings per share | Dividend per share | Stock Price |
| 2021 Actual numbers | 7.93 | 4.67 | 171.07 |
| Original Forecasting | 6.12 | 4.36 | 172.40 |
| Sustainable Growth Rate 2% higher | 6.39 | 4.55 | 179.87 |
| Sustainable Growth Rate 2% lower | 6.22 | 4.43 | 175.18 |
| Retention Rate 5% higher | 6.31 | 4.18 | 177.80 |
| Retention Rate 5% lower | 6.29 | 4.80 | 177.25 |
| Debt to Equity 5% higher | 6.31 | 4.49 | 177.60 |
| Debt to Equity 5% lower | 6.30 | 4.49 | 177.45 |

# 4. Summary and Conclusion

In this chapter, we have discussed how 27 financial ratios and sustainable growth rate can be estimated and their applications. Then, we reviewed how alternative ratio and Tobin Q could be estimated, and discussed how important of intangible assets to Tobin Q. Further, we discussed how simultaneous equation model could be used to forecast pro forma balance sheet and pro forma income statement. We also forecasted earnings per share and price per share. By using JNJ’s 2020 financial statement information as an example, we first showed how the 20 inputs were used to calculate 27 financial ratios and sustainable growth rate. These 27 financial ratios and sustainable growth rate can be classified into liquidity ratios, financial leverage ratios, asset efficiency ratios, profitability ratios, market value ratios, policy ratios. We also showed how these ratios could be used to perform financial statement analyses and security evaluation. Using JNJ financial statement information, we also showed how DOL, DFL, DCL could be calculated. Finally, we calculated financial Altman (1968) Z-score, which can be used to determine the probability, and discussed how the financial Z-score can be used to determine the probability of company’s insolvency.

We reviewed how alternative ratio and Tobin Q can be estimated and discussed how intangible assets can affect the value of Tobin Q. Based upon previous literature. We reviewed the five theoretical definitions of Tobin Q. In addition, we also calculated some Tobin Q in terms of JNJ 2020 financial statement information. Using financial statement information and ratios, we performed four years forecast of the balance sheet and income statement. Furthermore, we compared the pro forma results with the actual results for the year 2020 and showed the mean absolute deviation errors.

# Appendix: Websites for Project One, Project Three, Project Six, and FINPLAN Excel Programs

This appendix shows the four Excel programs we use for this paper. You can download the Excel programs by clicking on the websites, go to “File”, select “Download”, and then choose the correct file format.

Website for Project One (.xlsx):

<https://docs.google.com/spreadsheets/d/1j1jN6_j7ZuwXAWm_3iBeGFZoxZp3XfFL/edit?usp=sharing&ouid=114323373077945112601&rtpof=true&sd=true>

Website for Project Three (.xlsx):

<https://docs.google.com/spreadsheets/d/1ebmWxTwmh6fl2B9gcEK-7BBIiqc_Od_U/edit?usp=sharing&ouid=114323373077945112601&rtpof=true&sd=true>

Website for Project Six and FINPLAN:

Project Six (.xlsx):

<https://docs.google.com/spreadsheets/d/1Nx0AIN54GeGHAM917cd6dYg2_5VNbUPq/edit?usp=sharing&ouid=114323373077945112601&rtpof=true&sd=true>

FINPLAN (.xls):

<https://docs.google.com/spreadsheets/d/1FLlHgKKB_Af4Roy6dM6HBqicQQLKhf-_/edit?usp=sharing&ouid=114323373077945112601&rtpof=true&sd=true>

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1. <http://centerforpbbefr.rutgers.edu/> [↑](#footnote-ref-1)
2. <https://www.jnj.com/about-jnj/corporate-reports> [↑](#footnote-ref-2)
3. <https://www.investor.jnj.com/annual-meeting-materials/2021-annual-report> [↑](#footnote-ref-3)
4. <https://finance.yahoo.com/> [↑](#footnote-ref-4)
5. <https://finance.yahoo.com/> [↑](#footnote-ref-5)