The 23rd Financial Case Analysis Contest

Analysis Report

Case Name：	Estimate Walmart's Cost Of Capital
Report Title：	Estimate Walmart's Cost Of Capital By WACC Method
Team Number：	59

DATE: 02-11-2020

Catalogue

Abstract

The cost of capital is a very important concept in financial management. It reflects the risk level and target capital structure of all assets of the company as a whole, and to a certain extent has very important reference value. This research report takes Wal-Mart as the research object and adopts a top-down analysis method from the macro level to the company level. Subsequently, this report calculated the value of the cost of equity capital and the cost of debt capital separately according to the WACC model, and obtained the value of the cost of capital for Wal-Mart in 2019. In the subsequent further discussion, we analyzed some limitations of the WACC model, but it is undeniable that it still has a high reference value, so we believe that the calculated WACC value can be used as an important indicator. It is an important basis for referring to Wal-Mart's financial benchmarks and expected return risk changes in investment opportunities for selected projects in 2019, and also a significant basis for dynamically adjusting the capital structure.

Key Words

The Cost of Capital

MACC

Capital Structure and Financial Management

1 Background Introduction

1.1Macro economic background

1.1.1 The U.S. Gross Domestic Product

Gross Domestic Product (GDP) is the final result of the productive activities of all permanent units of a country (or region) at the national market price and is often recognized as the best measure of a country's economic situation. GDP is an important comprehensive statistical index in the accounting system, which reflects a country's economic strength and market size.

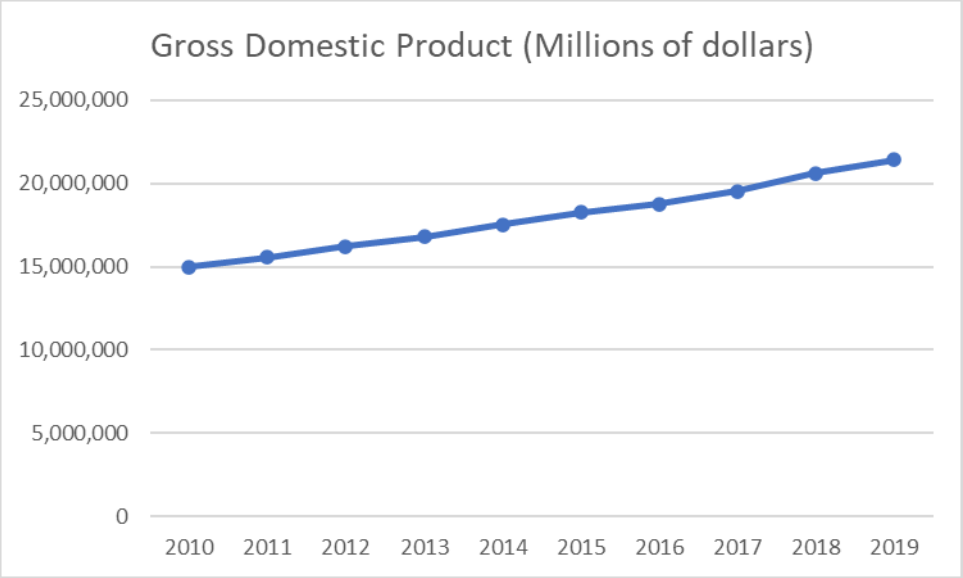

Fig.1 Gross Domestic Product (GDP) of America

Source: Bureau of Economic Analysis

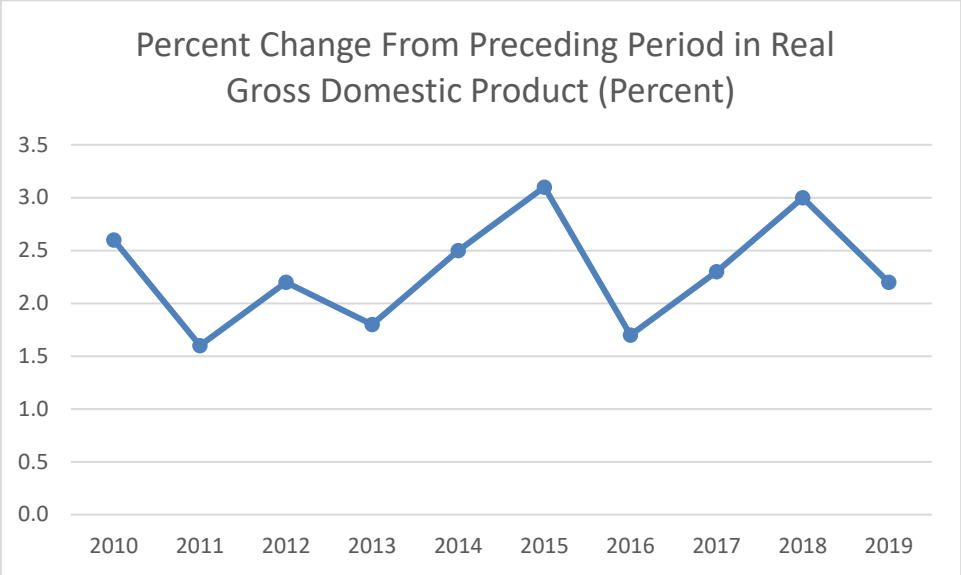

Fig.2 Percent Change From Preceding Period in Real Gross Domestic Product

Source: Bureau of Economic Analysis

As shown in figures above, the U.S. GDP has continued to grow since 2010. In 2019, the U.S. was the only country in the world with a GDP of more than $20 trillion. It is clear that the real GDP in the United States is also on the rise, and the economy's productive capacity is growing. However, the second figure shows that the GDP growth has fluctuated frequently in the past five years. At the same time, the United States has been facing with huge debt as well as face inflation problems.

In 2019, the total U.S. GDP was $21.7 trillion, at a growth rate of 2.3 percent which hit a three-year low and fell between the Trump administration's March targets for the second year in a row.

1.1.2 The U.S. Consumer Price Index

The Consumer Price Index, also known as the Consumer Price Index, is a macroeconomic indicator that reflects changes in the price levels of consumer goods

and services purchased by households in general. It is a relative number of changes in the price level of a representative set of consumer goods and services over a specified period of time, which is used to reflect the change in the price level of consumer goods and services purchased by households, and is a factor of change in the retail price of goods and services over a period of one month.

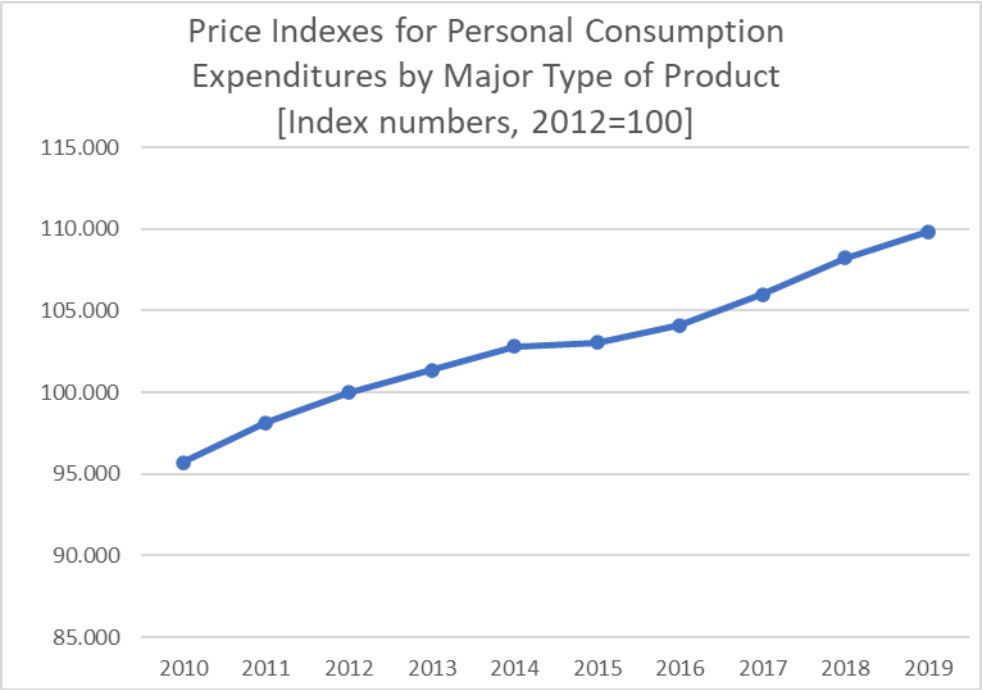

Fig.3 Price Indexes for Personal Consumption Expenditures by Major Type of Product

Source: Bureau of Economic Analysis

As can be seen from the figure, CPI has been on the rise from 2015 to 2019, indicating that the price level has been on the rise, as well as the potential inflation rate in the U.S., which may lead to the risk of currency depreciation.

1.2 Industry background

1.2.1 Introduction to the retail industry

Retail industry refers to the sale of products directly to consumers and enterprises through the form of sale and purchase of goods sales industry, but also in this case study Wal-Mart's industry, through the analysis of the current situation of the U.S. industry in recent years, we can get Wal-Mart's industry background, a deep understanding of Wal-Mart's market situation.

1.2.1.1 Retail Form

The retail industry is the largest and most traditional industry in the United States, and the development of the retail industry is closely related to the development of science and technology and the economic situation, so every development of science and technology has a significant impact on the retail industry. At the same time, economic conditions have an irrefutable impact on the retail industry, such as the collapse of many large retail companies during the global financial crisis in 2008. Today, under the impact and influence of e-commerce, the retail industry is facing new challenges.

1.2.2 Retail industry form classification

Retail industry can be divided into the several following categories:

- Dealers: a person or business that has only sales or services in a particular area.
- Direct Internet Retail: Sales via Internet and Internet TV.
- Diversified retail

The offline stores can be divided into the following categories:

- ✧ Department store
- ✧ retail companies
- ✧ Integrated Goods Store
- ✧ A comprehensive store selling all kinds of daily necessities
- ✧ Professional stores
- ✧ Specializing in the sale of a certain commodity

1.2.3 The current state of the U.S. retail industry

The U.S. retail industry is in a period of renewal, with many traditional retail companies and former leaders declaring bankruptcies in recent years. The chart below shows some of the largest retail companies that have gone bankrupt.

Brands	Classification	Time of closure
The Limited	Ladies	2017.1
The Wet Seal LLC	clouthes	2017.2
Payless Holdings LLC	shoes	2017.4
Rue21 Inc	clouthes	2017.5
Gymboree Corp	childrenwear	2017.6
Aifred Angelo	wedding dress	2017.7
Perfumania Inc	perfume	2017.8
Giggle	children's item	2017.9
Toys'R' Us Inc	toys	2017.9
Charming Charlie	accessories	2017.12
Bon-Ton Stores	department store	2018.2
Mattress Firm	mattress	2018.9

Fig.4 Largest Retail Companies Gone Bankrupt

Source: www.iylcu.com

This figure clearly analyzes that bankrupt companies are mainly selling goods that are easy to buy online, and consumers are now more likely to buy them online, and most of these companies have been weakened by the influence of e-commerce to go bankrupt. Many enterprises in order to continue to develop, have joined the ranks of transformation, began to combine online and offline. However, there is much to be

improved by such a shift. Traditional retail has its own website, but no logistics system of its own. However, with the continuous development of science and technology, the improvement of various payment software technology, logistics services, consumer satisfaction is rising, online purchases of goods and types are also increasing.

Fig.5 Changes in the Growth of the U.S. Retail Industry

Source: China Industry Network

The chart above shows the changes in U.S. retail sales growth from 2002 to 2019. From 2015 to 2018, against a backdrop of traditional retail growth of only 1-3 per year, e-commerce grew at a rate of 14-15 per year, and there is no sign of slowing down, but despite the rapid growth rate, e-commerce still accounts for a small percentage of total U.S. retail sales of 12.

1.3 Wal-Mart Background

1.3.1 The introduction of Wal-Mart

Wal-Mart Department Store Co., Ltd., referred to as Wal-Mart, is a worldwide chain enterprise in the United States, which is the largest company in the world in terms of turnover. Headquartered in Bentonville, Arkansas, USA. Wal-Mart is mainly involved in the retail industry, and it has the largest number of employees in the world. For seven consecutive years, Wal-Mart ranked first among Fortune 500 enterprises in the world. At present, Wal-Mart has become the largest private employer in the United States and the largest chain retail enterprise in the world with more than 10000 stores and 69 brands in 27 countries around the world. It employs more than 2.2 million people worldwide, and 200 million customers visit Wal-Mart every week.

Wal-Mart put forward the tenet of "helping customers save every cent", and realized the promise of the cheapest price. The company has always adhered to the principle of "service is better than others and employees are different", providing customers with new enjoyment of super first-class service. Enter Wal-Mart, customers can personally feel the thoughtful service at home. Furthermore, Wal-Mart has implemented the new concept of "one-stop" shopping. Customers can buy all the goods they need in the shortest time and at the fastest speed. It is this fast and convenient way of shopping that attracts modern consumers.

In 2008, when the world financial crisis occurred, most retail enterprises were faced with the risk of bankruptcy. Wal-Mart saw the opportunity of Chinese market and gradually launched "online shopping" service in China. With the maturity of online

payment technology, Wal-Mart cooperates with more and more online platforms to develop online business and improve the quality of distribution service.

In addition, although Wal-Mart has repeatedly cut back on advertising expenses in order to reduce costs, it has spared no money and is widely benevolent in its donations to various public welfare undertakings. Wal-Mart has made a lot of long-term investment in public welfare activities and the unique creativity of the activity itself, which has greatly improved the brand awareness and successfully shaped the excellent image of the brand in the minds of consumers.

1.3.2 Wal-Mart position in the industry

ranking	Company	The retail type	U.S. retail sales in 2018	Numbers of stores
1	Wal-Mart	Warehouse store	3876.6	5263
2	Amazon.com	Warehouse store	1209.3	490
3	The Kroger Co.	Supermarket	1197	3035
4	Costco	Warehouse store	1014.3	523
5	Walgreen Boots Alliance	Pharmacy	983.9	9451
6	The Home Depot	Household decorates	972.9	1969
7	CVS Health Corporation	Pharmacy	837.9	9954
8	Target	Warehouse store	744.8	1844
9	Lowe's Companies	Household decorates	640.9	1723
10	Albertsons Companies	Supermarket	397.1	2249

Table1 Largest Retailers of U.S. in 2018

Sources: STORES, an American retail trade magazine

From this table, we can see the retail sales in 2018 and numbers of stores of some of the largest retailers in the United States. So we can see, in 2018, bricks-and-mortar retailers dominate the U.S. retail industry, and Wal-Mart is still ahead of the curve.

As one of the largest retailers in the U.S. retail industry, Wal-Mart has been at the top of the list all year, and I remain optimistic about its future.

1.3.3 Wal-Mart Financial Analysis

As is seen in Table 1 and 2, we can make a simple analysis of Wal-Mart's financial situation.

Firstly, the net income has decreased these three years, and the Consolidated net income attributable to Wal-Mart in 2018 was $6670.

For fiscal 2019, operating, selling, general and administrative ("operating") expenses as a percentage of net sales decreased 48 basis points, when compared to the same period in the previous fiscal year. The primary drivers of the expense leverage were strong sales performance in conjunction with productivity improvements and lapping fiscal 2018 charges discussed in the following paragraph. The improvements in fiscal 2019 were partially offset by additional investments in eCommerce and technology, as well as a $160 million charge related to a securities class action lawsuit.

Then take a look at the change of liquidity:

$$Delat\ \ Current\ Ratio = \frac{Total\ current\ assets}{Current\ liabilities}$$
$$= \frac{61{,}897}{77{,}477} - \frac{59{,}664}{78{,}521} = 0.039$$

$$Delta\ Acid - test\ Ratio = \frac{Total\ current\ assets - Inventories}{Current\ liabilities}$$
$$= \frac{61{,}897 - 44{,}269}{77{,}477} - \frac{59{,}664 - 43{,}783}{78{,}521} = 0.025$$

The two indicators of 2018 were higher than that of 2017. So we can infer that Wal-Mart's liquidity has increased.

According to DuPont Analysis:

$$ROA = \frac{Total\ Net\ Income}{Total\ \ Assets} = \frac{6{,}670}{219{,}295} = 0.030$$

$$ROE = \frac{Total\ Net\ Income}{Total\ \ Equity} = \frac{6{,}670}{79{,}634} = 0.084$$

$$Equity\ Multiplier = \frac{Total\ Asset}{Total\ \ Equity} = \frac{219{,}295}{79{,}634} = 2.754$$

Other financial indexes of 2018 are as follows:

$$EPS = \$2.26$$

$$\text{(Diluted net income per common share attributable to Wal} - \text{Mart)}$$

$$DPS = \$\ 2.08$$

Consolidated Balance Sheets - USD ($) ***$ in Millions***	*Jan. 31, 2019*	*Jan. 31, 2018*
Current assets:		
Cash and cash equivalents	$ 7,722	$ 6,756

Receivables, net	6,283	5,614
Inventories	44,269	43,783
Prepaid expenses and other	3,623	3,511
Total current assets	61,897	59,664
Property and equipment:		
Property and equipment	185,810	185,154
Less accumulated depreciation	-81,493	-77,479
Property and equipment, net	104,317	107,675
Property under capital lease and financing obligations:		
Property under capital lease and financing obligations	12,760	12,703
Less accumulated amortization	-5,682	-5,560
Property under capital lease and financing obligations, net	7,078	7,143
Goodwill	31,181	18,242
Other long-term assets	14,822	11,798
Total assets	219,295	204,522
Current liabilities:		
Short-term borrowings	5,225	5,257
Accounts payable	47,060	46,092
Accrued liabilities	22,159	22,122
Accrued income taxes	428	645
Long-term debt due within one year	1,876	3,738
Capital lease and financing obligations due within one year	729	667
Total current liabilities	77,477	78,521
Long-term debt	43,520	30,045

Long-term capital lease and financing obligations	6,683	6,780
Deferred income taxes and other	11,981	8,354
Commitments and contingencies		
Equity:		
Common stock	288	295
Capital in excess of par value	2,965	2,648
Retained earnings	80,785	85,107
Accumulated other comprehensive loss	-11,542	-10,181
Total Wal-Mart shareholders' equity	72,496	77,869
Noncontrolling interest	7,138	2,953
Total equity	79,634	80,822
Total liabilities and equity	$ 219,295	$ 204,522

Table 2 Consolidated Balance Sheets

Source: www.sec.gov/

Consolidated Statements of Income - USD ($) shares in Millions, $ in Millions	*12 Months Ended*		
	Jan. 31, 2019	Jan. 31, 2018	Jan. 31, 2017
Revenues:			
Net Sales	$ 510,329	$ 495,761	$ 481,317
Membership and other income	4,076	4,582	4,556
Total revenues	514,405	500,343	485,873
Costs and expenses:			
Cost of sales	385,301	373,396	361,256

Operating, selling, general and administrative expenses	107,147	106,510	101,853
Operating income	21,957	20,437	22,764
Interest:			
Debt	1,975	1,978	2,044
Capital lease and financing obligations	371	352	323
Interest income	-217	-152	-100
Interest, net	2,129	2,178	2,267
Loss on extinguishment of debt	0	3,136	0
Other (gains) and losses	8,368	0	0
Income before income taxes	11,460	15,123	20,497
Provision for income taxes	4,281	4,600	6,204
Consolidated net income	7,179	10,523	14,293
Consolidated net income attributable to noncontrolling interest	-509	-661	-650
Consolidated net income attributable to Wal-Mart	$ 6,670	$ 9,862	$ 13,643
Net income per common share:			

Basic net income per common share attributable to Wal-Mart	$ 2.28	$ 3.29	$ 4.40
Diluted net income per common share attributable to Wal-Mart	$ 2.26	$ 3.28	$ 4.38
Weighted-average common shares outstanding:			
Basic	2,929	2,995	3,101
Diluted	2,945	3,010	3,112
Dividends declared per common share	$ 2.08	$ 2.04	$ 2

Table 3 Consolidated Statements of Income

Source: www.sec.gov/

2.The introduction of cost of capital and the model

2.1. Introduction of the cost of capital

For common capital budgeting questions, you need to determine the relevant cash flows, discount them, and then if the net present value (NPV) is positive, accept the project; if the NPV is negative, discard it. From the discussion of risks and rewards, it is known that the correct discount rate depends on the risk of the project, especially when the return rate of this project exceeds the rate of return provided by the financial

market for investments with the same risk, then there is a positive NPV. We call this minimum necessary rate of return—the cost of capital for this project.

Therefore, in a project, in order to make a correct decision, the rate of return provided by the capital market must be considered, and this information must be used to estimate the cost of capital of the project. The cost of capital of this item depends on the risk of the investment, which means that the cost of capital mainly depends on the use of funds, but not the source of funds.

The total cost of capital of a company will reflect the necessary rate of return on the company's total assets. Assuming that a company uses debt and equity capital at the same time, the total cost of capital will be the combination of the compensation required to compensate its creditors and the compensation required to compensate its shareholders. In other words, a company’s cost of capital will reflect both its cost of debt and the cost of equity capital .

2.2. Reasons to use the Weighted Average Cost of Capital （WACC）

When using the revenue approach to assess the value of a company, there are two methods widely used by appraisers—the equity method and the investment capital method (sometimes called the direct method and the indirect method). The equity method evaluates the value of the company's equity by discounting the company's dividends or equity cash flow. This discount rate should reflect the rate of return required by equity investors. The investment capital method focuses on and evaluates

the value of the company as a whole, unlike the equity method, which only evaluates equity. The evaluation result of the Investment Capital Law is the value required by all claimants, including creditors and shareholders. At this time, the value of the required equity can only be the total value of the company minus the value of the creditor's rights (so called the indirect method). The most common way to find the value of a company is to discount the cash flow of all investors in the company, including the cash flow of creditors and equity investors, and the discount rate is the weighted average cost of capital—that is, the weighted cost of equity and the cost of debt Average, abbreviated as WACC. Therefore, WACC is an important calculation parameter for the valuation of investment capital (indirect) or the valuation of company equity (direct).

The weighted average cost of capital refers to the enterprise as a whole, and is generally used to evaluate the value of the company's overall assets. However, in reality, the vast majority of enterprises carry out diversified operations. For example, a production-oriented enterprise may concurrently operate commercial or real estate, so different types of investment projects have different risks. It is obviously inappropriate to simply use the average cost of capital of the company for the evaluation of all departments and all investment projects of the company. Therefore, when using the WACC method to evaluate the value of individual risk projects, it is necessary to adjust the weighted average cost of capital. For projects with different risks, different weighted average cost of capital should be used to measure and determine a specific acceptance standard for the specific project.

2.3. The Weighted Average Cost of Capital

In this section, we will discuss an adjustment when the project is financed with both debt and equity. Suppose a firm uses both debt and equity to finance its investments. If the firm pays RB for its debt financing and RS for its equity, then the overall or average cost of its capital will contain these two parts. The cost of equity is RS, as discussed in earlier sections. The cost of debt is the firm's borrowing rate, RB, which we can often observe by looking at the yield to maturity on the firm's debt. If a firm uses both debt and equity, the cost of capital is a weighted average of each. This works out to be:

$$\frac{E}{E+D} \times R_E + \frac{D}{D+E} \times R_D$$

The weights in the formula are, respectively, the proportion of total value represented by equity:

$$\left(\frac{E}{E+D}\right)$$

and the proportion of total value represented by debt:

$$\left(\frac{D}{D+E}\right)$$

This is only natural. If the firm had issued no debt and was therefore an all-equity firm, its average cost of capital would equal its cost of equity, RS. At the other extreme, if the firm had issued so much debt that its equity was valueless, it would be an all-debt firm, and its average cost of capital would be its cost of debt, RB.

Interest is tax deductible at the corporate level, as stated in the previous section. The after-tax cost of debt is:

$$\textbf{Cost of debt (after corporate tax)} = \boldsymbol{R_D \times (1 - T_c)}$$

where t is the corporation's tax rate.

Assembling these results, we get the average cost of capital (after tax) for the firm.

$$\textbf{Average cost of capital} = WACC = (\frac{E}{E+D}) \times R_E + (\frac{D}{D+E}) \times R_D \times (1 - T_c)$$

Average cost of capital =

$$WACC = \frac{E}{E+D+P} \times R_E + \frac{D}{E+D+P} \times R_D \times (1 - T_c) + \frac{P}{E+D+P} \times R_p$$

where P is the percentage of preferred stock in the firm's capital structure and RP is the cost of preferred stock.

Because the average cost of capital weighs the cost of equity and the cost of debt, it is usually referred to as the weighted average cost of capital, RWACC, and from now on we will use this term.

3. Determination of the cost of equity

There are three main methods for determining the cost of equity capital: Gordon dividend growth model method, capital asset pricing model method (CAPM) and corporate bond income plus risk compensation method.

3.1 Calculation of cost of equity based on Gordon's dividend growth model

3.1.1 Introduction to Gordon Dividend Growth Model

The dividend discount model believes that the intrinsic value of stocks is the sum of the present value of future expected dividends, expressed by the formula:

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+R_E)^t} = \sum_{t=1}^{\infty} \frac{D_0(1+g)^t}{(1+R_E)^t}$$

Among them, R_E is the present value per share of the stock, which is the theoretical price of the stock, R_f is the expected dividend paid at the end of year t, $E(R_M)$ is the fixed growth rate of dividends, and β_E is the necessary rate of return or discount rate of the stock. The above formula can be further simplified as

$$P_0 = \frac{D_0(1+g)}{R_E - g} = \frac{D_1}{R_E - g}$$

Sorted out:

$$R_E = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0}$$

Since is the necessary rate of return required by shareholders for stocks, it can represent the company's cost of equity capital.

3.1.2 Application of the model

In order to use the dividend growth model to estimate , we need three pieces of information: ,,and . According to Wal-Mart's stock price in 2019, we can get:

$$P_0 = 96.08$$

$$D_0 = 2.08$$

For the value of dividend growth rate, through calculation, we know that the dividend growth rate from 2015 to 2019 is basically around 2%, so we take it as the dividend growth rate. The annual dividend growth rate from 2007 to 2014 is quite different, so the two-stage dividend growth model is not suitable for estimating the cost of capital equity here.(Table 4)

Year	Stock Price	EPS	DPS	Growth Rate
2009	38.36	3.39	0.95	----
2010	43.04	3.71	1.09	0.15
2011	42.33	4.47	1.21	0.11
2012	49.43	4.52	1.46	0.21
2013	60.68	5.02	1.59	0.09
2014	65.61	4.88	1.88	0.18
2015	75.56	5.06	1.92	0.02
2016	61.39	4.58	1.96	0.02
2017	67.54	4.39	2.00	0.02
2018	87.92	3.27	2.04	0.02
2019	96.08	2.28	2.08	0.02

Table 4 Selected Data on Wal-Mart Inc. Common Stock, 2010-2019

Source: Source: www.sec.gov/

Calculated:

$$R_E = \frac{D_0(1+g)}{P_0} = 0.02208 = 2.21\%$$

3.2 Calculation of the cost of equity capital based on the CAPM model

3.2.1 CAPM model introduction

The process of determining the cost of equity capital by the capital asset pricing model is actually a process of weighing between risks and benefits. For a risky investment, the necessary or expected rate of return depends on three factors: risk-free rate of return R_f,, market risk return premium $E(R_M) - R_f$, and the asset's relative to the average asset in the market. System risk is the value of risk factor β. Expressed by the formula:

$$R_E = R_f + \beta_E \times [E(R_M) - R_f]$$

Among them, R_E is the expected rate of return of risky assets, that is, the estimated value of the cost of equity; R_f is the risk-free rate of return; $E(R_M)$ is the average market rate of return; β_E is the risk coefficient of risky assets.

3.2.2 Application of the model

To request an estimate of the cost of equity, we need to know the specific values of the other three indicators. However, there is a lot of controversy in academia as to whether the arithmetic average or the geometric average is used to calculate the average return of the stock market. After consulting the literature, we found that when calculating the historical average stock market return rate, especially when investigating the long-term stock market return rate, the geometric average method is usually used for valuation and calculation. Because the enterprise value evaluation is a discount of the indicator value over a long period of time, the geometric mean value

will be better for estimating the risk premium. Therefore, in the following we choose the geometric mean value of each indicator for calculation.

First of all, for the risk-free rate of return, the risk-free rate of return refers to the rate of return of securities or portfolios of securities without any default risk and default risk, that is, the rate of return of securities with zero system risk β. In the United States, the risk-free interest rate usually adopts the annual interest rate of 3-month government bonds. Therefore, we choose the interest rate of the three-month government bonds from 2009 to 2018 as the value of the risk-free rate of return, namely:

$$R_f = 0.49\%$$

The average market rate of return is based on the S&P 500 index of the US capital market from 2009 to 2018, which is:

$$E(R_M) = 12.98\%$$

According to the information given in the case, Wal-Mart's original value is 0.56, and the adjusted value is 0.71. Because the ad hoc adjustment always makes the adjusted value closer to the market value, therefore:

$$\beta_E = 0.71$$

Substituting into the formula:

$$R_E = R_f + \beta_E \times [E(R_M) - R_f] = 9.36\%$$

3.3 Comparative analysis of the two models

After calculation, we have obtained two estimates of the cost of equity R_E under the Gordon dividend growth model and the CAPM capital pricing model. First of all, the calculated values are quite different, which shows that we need to choose the more accurate data of the two.

The dividend growth model is simpler and more convenient to calculate than the CAPM model, and it is easy to understand and use. But it also has many practical shortcomings. First, the most important underlying assumption of the dividend growth model is that dividends will grow at a fixed rate. Although Wal-Mart's dividend growth rate was basically stable from 2015 to 2019, due to many considerations such as economic operation factors, Wal-Mart's dividend growth rate may not always remain at about 2%. Second, the cost of equity estimated by the model is very sensitive to the estimated growth rate. For a given stock price, as long as changes by one percentage point, the estimated cost of equity will also increase by at least one percentage point, because the value of dividends will also change.

Finally, this method does not explicitly consider risk factors. Don't want the CAPM capital pricing model, the dividend model does not adjust the risk of investment. In contrast, the risk pricing model is applicable to a wider range of situations.

In summary, we choose to use the expected rate of return calculated by the CAPM model as the estimated value of Wal-Mart's cost of equity, which is:

$$R_E = 9.36\%$$

4.Calculation for Cost of Debt

4.1. Definition of the Cost of Debt

4.1.1The definition of cost of debt (R_D)

The cost of equity is often difficult to estimate. The task generally involves a fair amount of data gathering and the end result is often measured with error. Fortunately, the cost of debt is much easier to determine; it is simply the cost of borrowing. The firm can generally obtain this information either by checking the yield on publicly traded bonds or by talking to commercial and investment bankers. Again, the borrowing rate on the prospective loan is the cost of debt.

There is only one complication that needs to be discussed. We have ignored taxes so far, obviously an assumption at odds with reality. Under U.S. tax law, interest payments are tax deductible.

In general, the after-tax cost of debt can be written as:

Cost of Debt (After Corporate Tax)=(1-Tax rate)×Borrowing rate

$$= (1\text{-}t_c) \times R_D$$

Why have we tax-adjusted the cost of debt while we did not tax-adjust the cost of equity? Because, while firms can deduct their interest payments before paying taxes, dividends are not tax deductible.

4.1.2. The definition of Cost of Preferred Stock

The name preferred stock is an unfortunate one, because preferred stock is probably more similar to bonds than to common stock. Preferred stock pays a constant dividend in perpetuity. Interest payments on bonds are quite similar to dividends on preferred stock, though almost all bonds have a finite maturity. By contrast, dividends on common stock are not constant over time. Since preferred stocks are perpetuities, they should be priced by the perpetuity formula, **PV = C/r,** where PV is the present value, or price, C is the cash to be received each year, and r is the yield, or rate of return. Rearranging, we have:

$$\boldsymbol{r = C/PV}$$

The cost of preferred stock is simply this rate of return.

Why don't we tax-adjust the cost of preferred stock the way we did the cost of debt? We don't tax-adjust here, because dividend payments on preferred stock are not tax deductible.

4.2. Wal-Mart's cost of debt

Wal-Mart has thirty-eight long-term bond issues that account for essentially all of its long-term debt. To calculate the cost of debt, we will have to combine these thirty-eight issues and compute a weighted average.

We go to www.finra.org to find quotes on the bonds. We should note here that finding the yield to maturity for all of a company's outstanding bond issues on a single day is unusual. In our previous discussion on bonds, we found that the bond market is not as liquid as the stock market, and on many days, individual bond issues may not trade. The basic information is as follows:

Maturity	Coupon Rate (%)	Price (Market value in $ Millions）	Yield to Maturity （%）
02/15/2030	7.550	153.024	1.430
10/15/2030	6.750	116.504	1.053
09/01/2035	5.250	144.196	1.832
04/05/2027	5.875	127.703	1.356
08/15/2037	6.500	160.286	2.188
04/15/2038	6.200	159.090	2.128
04/01/2040	5.625	148.811	2.450
07/08/2040	4.875	140.903	2.284
10/25/2040	5.000	140.268	2.441
04/15/2021	4.250	101.852	0.132
04/15/2041	5.625	154.210	2.290
04/22/2024	3.300	108.851	0.524

04/22/2044	4.300	132.147	2.460
04/11/2043	4.000	125.633	2.478
04/11/2023	2.550	104.908	0.299
10/02/2043	4.750	133.317	2.750
12/15/2020	1.900	100.059	1.379
12/15/2022	2.350	104.268	0.244
12/15/2024	2.650	108.215	0.545
12/15/2047	3.625	122.479	2.468
06/23/2021	0.453	100.168	
06/23/2021	3.125	101.770	0.348
06/26/2023	3.400	107.907	0.305
06/26/2025	3.550	113.024	0.600
06/26/2028	3.700	117.049	1.277
06/28/2038	3.950	125.660	2.153
06/29/2048	4.050	129.398	2.544
07/08/2024	2.850	108.259	0.531
07/08/2026	3.050	112.067	0.808
07/08/2029	3.250	115.705	1.279
09/24/2029	2.375	108.866	1.288
09/24/2049	2.950	110.935	2.415
07/15/2026	5.502		
06/23/2020	1.235	100.025	
06/23/2020	2.850	100.006	0.680
09/15/2024	8.500	107.836	
07/08/2020	3.625	100.058	0.142
10/25/2020	3.250	99.571	79.533

Table 5 Bound Result of Wal-Mart（Last updated at 31/10/2020）

Source:www.finra.org/

To calculate the weighted average cost of debt, we take the percentage of the total debt represented by each issue and multiply by the yield on the issue. We then add to get the overall weighted average debt cost. The results of the calculations are as follows:

Maturity	Coupon Rate (%)	Price (Market value in $ Millions）	Proportion of Total Value （%）	Yield to Maturity （%）	Weighted Average Cost of Debt （%）
02/15/2030	7.550	153.024	3.4426	1.430	0.0492
10/15/2030	6.750	116.504	2.6210	1.053	0.0276
09/01/2035	5.250	144.196	3.2440	1.832	0.0594
04/05/2027	5.875	127.703	2.8729	1.356	0.0390
08/15/2037	6.500	160.286	3.6060	2.188	0.0789
04/15/2038	6.200	159.090	3.5791	2.128	0.0762
04/01/2040	5.625	148.811	3.3478	2.450	0.0820
07/08/2040	4.875	140.903	3.1699	2.284	0.0724
10/25/2040	5.000	140.268	3.1556	2.441	0.0770
04/15/2021	4.250	101.852	2.2914	0.132	0.0030
04/15/2041	5.625	154.210	3.4693	2.290	0.0794
04/22/2024	3.300	108.851	2.4488	0.524	0.0128
04/22/2044	4.300	132.147	2.9729	2.460	0.0731
04/11/2043	4.000	125.633	2.8264	2.478	0.0700
04/11/2023	2.550	104.908	2.3601	0.299	0.0071
10/02/2043	4.750	133.317	2.9992	2.750	0.0825
12/15/2020	1.900	100.059	2.2510	1.379	0.0310

12/15/2022	2.350	104.268	2.3457	0.244	0.0057
12/15/2024	2.650	108.215	2.4345	0.545	0.0133
12/15/2047	3.625	122.479	2.7554	2.468	0.0680
06/23/2021	0.453	100.168	2.2535		0.0000
06/23/2021	3.125	101.770	2.2895	0.348	0.0080
06/26/2023	3.400	107.907	2.4276	0.305	0.0074
06/26/2025	3.550	113.024	2.5427	0.600	0.0153
06/26/2028	3.700	117.049	2.6333	1.277	0.0336
06/28/2038	3.950	125.660	2.8270	2.153	0.0609
06/29/2048	4.050	129.398	2.9111	2.544	0.0741
07/08/2024	2.850	108.259	2.4355	0.531	0.0129
07/08/2026	3.050	112.067	2.5212	0.808	0.0204
07/08/2029	3.250	115.705	2.6030	1.279	0.0333
09/24/2029	2.375	108.866	2.4492	1.288	0.0315
09/24/2049	2.950	110.935	2.4957	2.415	0.0603
07/15/2026	5.502		0.0000		0.0000
06/23/2020	1.235	100.025	2.2503		0.0000
06/23/2020	2.850	100.006	2.2498	0.680	0.0153
09/15/2024	8.500	107.836	2.4260		0.0000
07/08/2020	3.625	100.058	2.2510	0.142	0.0032
10/25/2020	3.250	99.571	2.2401	79.533	1.7816
Total		4445.028	100.000	126.634	3.1654

Table 6 Processed Bound Result

As these calculations show, Wal-Mart's cost of debt is 3.0313 percent on market value basis. In general situation, whether market values or book values are used makes little

difference, so in this case, we choose to use market values in our calculations, because the market reflects current values.

4.3.Processing of other accounting subjects

4.3.1 Choice of T_c

As we discussed earlier, the interest paid by the company is deductible before tax. Payments to shareholders cannot be paid before tax. This means that the government actually paid part of the interest. Therefore, when determining the after-tax discount rate, we must distinguish between pre-tax and after-tax debt costs.

Generally speaking, the after-tax interest rate is equal to the pre-tax interest rate multiplied by (1-rate). If a TC represents the corporate income tax rate, then the after-tax interest rate can be written as $R_D \times (1 - T_c)$

It is learned from the case that due to some new U.S. tax regulations, the corporate tax rate is now lower than recently, and the new tax rate is 21%. However, Wal-Mart's recent quarterly returns shows that the company expects an effective tax rate of 27%. In this case, we calculate T_c=27%.

4.3.2 Deferred income tax

As for deferred income taxes, these are the amount of income tax that is affected by the difference between pre-tax accounting profits and taxable income due to time differences, and the amount reversed in subsequent periods.

The confirmation of deferred income tax and income tax expense is based on the Accrual basis, which predicates that the income tax expense during the period should be equal to the profit during the period multiplied by the income tax rate. However, if there is a difference between the accounting treatment and the tax treatment, the profit during the period is not equal to the taxable income, resulting in income tax expenses not equal to the taxable income. For this part of the difference, we need to analyze that the permanent difference caused by it is directly included in the income tax expense; the temporary difference caused by the deferred income tax needs to be determined and cannot be included in the current income tax expense.

Therefore, deferred income tax does not affect the calculation of WACC.

4.3.3 Other non-current liabilities

Hedging is to buy or sell a certain amount of financial assets at a certain interest rate, and after a certain period of time, sell or buy the same amount of financial assets at the same or different interest rates. In fact, it uses different time interest rates. Arbitrage based on the difference between the two can also be called time arbitrage. A hedging instrument is usually a derivative instrument designated by a company, and its fair value or cash flow expectations can offset changes in the fair value and cash flow of the hedged item.

In fair value hedging, all changes in the fair value of the hedged item and hedging instrument are included in the profit and loss; in the latter two cases, the effective part and the invalid part of the hedging need to be distinguished first, the invalid part is included in the current profit and loss, and the valid part is deferred. The "other capital reserve" included in the owner's equity shall be included in the profit and loss or adjusted to the recorded value when the transaction occurs. Derivatives are generally considered to be financial instruments held for trading or for hedging, including options, futures, forward contracts, swaps and other commonly used varieties.

In CAS22, there is a clear provision: "Financial assets or financial liabilities that meet the conditions shall be classified as trading financial assets or financial liabilities, except for derivatives that are designated and effective hedging instruments." From this perspective, other non-current liabilities can be ignored.

4.3.4 Non-controlling equity

Non-controlling equity, namely minority shareholder’s equity/minority equity, is a professional term in financial calculation and income.

When the parent company owns less than 100% of the subsidiary’s shares, that is, only part of the equity of the subsidiary’s net assets, part of the subsidiary’s shareholders’ equity belongs to the parent company, that is, majority equity, and the rest are still owned by other outside shareholders. Less than half of the total equity of the subsidiary has no control over the subsidiary, so it is called minority equity.

Minority shareholders are a special group of owners of enterprise groups. All of their powers are limited to the company they invest in, that is, they can only share the dividends distributed by the subsidiary, and when the subsidiary is liquidated and

dissolved, they can only share the creditors of the subsidiary And the rights of preferred shareholders are satisfied after the remaining property. Due to the payment responsibilities of shareholders of the parent company, the essence of minority equity is not a liability, but an owner’s equity. In practice, it can also be listed separately between liabilities and owners' equity. Therefore, non-controlling interests can be ignored.

4.3.5 Other comprehensive losses

For financial assets that are measured at fair value and whose changes are included in other comprehensive income, the enterprise should recognize its loss provision in other comprehensive income, and include the impairment gains or losses in the current profit and loss, and should not reduce the financial asset’s assets and liabilities The book value shown in the table.

The foreign exchange gains and losses refer to the foreign-related enterprises' capital accounting, the amount of domestic currency converted into foreign currency, or the amount of foreign currency converted into currency, and the difference in exchange between different foreign currencies, are treated as exchange gains and losses. The exchange gains and losses recorded in the account should be based on the actual amount and included in the current gains and losses.

The case mentioned that other comprehensive gains and losses are related to foreign exchange gains and losses. Although the US dollar is stronger relative to other currencies, it does not affect the calculation of WACC.

4.4. The Capital structure weight

We will use S to represent the market value of the company's equity, and we will calculate S by multiplying the total number of shares outstanding by the price per share. Similarly, we will use B to represent the market value of the company's debt. For long-term debt, we calculate it by multiplying the total number of bonds outstanding by the market price of each bond.

Finally, we will use V to represent the combined market value of debt and equity:

$$V = E + D$$

If we divide both sides by V, we can calculate debt and equity as a percentage of total capital:

$$100\% = \frac{E}{D} + \frac{D}{V}$$

The market values of Wal-Mart's debt and equity are $50203 millions and $282955.6 millions(Stock price × Numbers of shares outstanding=$96.08×2945million), respectively. The total value of the firm is $333158.6 millions, implying that the debt and equity percentages are

$$\frac{D}{E+D} = \frac{\$50203}{\$333158.6}$$

$$= 0.151$$

and

$$\frac{E}{E+D} = \frac{\$282955.6}{\$333158.6}$$

$$= 0.849$$

4.5. Flotation cost

If a company needs to invest in a new project, it may choose to issue new stocks or bonds out of consideration for raising funds. This means that the company will add some additional costs, which is the flotation cost. The determination of the flotation cost is closely related to the company's target capital structure. Generally speaking, for companies that can issue both stocks and bonds, the cost of debt issuance is lower than the cost of equity issuance. For Wal-Mart, if the company wants to raise funds in 2019, assuming the target capital structure remains unchanged, then the weighted average cost of capital is:

$$f_{\mathrm{A}} = E/V \times f_{\mathrm{E}} + \mathrm{D/V} \times f_{\mathrm{D}}$$

Note that the flotation cost is a very important indicator. The company should calculate the issuance cost based on the capital weight of the target to achieve better cost control.

4.6. Wal-Mart's WACC

Assembling these results, we get the weighted average cost of capital(after-tax) for the firm.

$$WACC = (\frac{E}{E+D}) \times R_E + (\frac{D}{D+E}) \times R_D \times (1 - T_c)$$

If there is preference share, we should calculate WACC as,

$$WACC = \frac{E}{E+D+P} \times R_E + \frac{D}{E+D+P} \times R_D \times (1 - T_c) + \frac{P}{E+D+P} \times R_p$$

Because there is no preference share in this case, we use the first formula. The following is the relevant data we calculated earlier,

$(\frac{E}{E+D})$=0.849

$(\frac{D}{E+D})$=0.151

$R_E = 9.36\%$

$R_D = 3.165\%$

T_c=27%

Then,×

$$WACC = (\frac{E}{D+E}) \times R_E + (\frac{D}{D+E}) \times R_D \times (1 - T_c)$$

$$= 0.849 \times 0.0936 + 0.151 \times 0.03165 \times \ (1\text{-}0.27)$$

=8.296%

×

5、Limitations of WACC model

Some inevitable variance due to ambiguous data may have an adverse impact on decision making of senior managers. For example, the change of inflation rate, the adjustment of market interest rate and the change of investors' preference for risk.

Besides, in some specific situations, the WACC method has certain limitations when evaluating the value of a single project. For example, if the company has the benefit of not needing to pay taxes temporarily, the resulting increase in value cannot be clearly revealed by the WACC. Or the debt ratio in the project capital structure is dynamically adjusted throughout the life of the project and has not remained relatively

stable. Because the debt-to-equity ratio is not fixed, the WACC method is difficult to apply.

To begin with the next content, we should first introduce an approach of project appraisal in company called net present value.

5.1.1 Benefits of NPV

Nowadays, the method of net present value is the first choice for some business companies to estimate their property according to the following reasons. Firstly, the method of net present value takes time value of capital into consideration and therefore enhances economical efficiency of investment. Secondly, it involves the whole process of net cash flow and eliminates the influence of external factors such as currency inflation and so on, reflecting the consistency of liquidity and profitability. Compared with other methods , net cash flow demonstrates the operating conditions of enterprises in a relatively objective way. Thirdly, investment risk is also mentioned in this method like: high discount rate is adopted for situations of large risk and low discount rate is adopted for that of small risk. Last but not least, it is a more comprehensive and scientific way of series economic evaluation, which attaches attention to the project's economic performance after recovering the investment within the whole life cycle.

5.1.2 Formula of NPV

The equation of net present value is as follows:

$$\boldsymbol{NPV = \sum \frac{(C_n - C_0)}{(1+i)^t}}$$

C_n: net cash flow for n year;

C_0: net cash flow for 0 year,usually base year

i: discount rate

t: number of years from 0 year to n year

5.1.3 The relationship between WACC and NPV

WACC, the cost of capital in the whole entity, is also an essential rate of pay in business. In this formula, we can substitute WACC we get through calculation into i(discount rate). It's a parameter of great importance. However, it's quite difficult to find an exact and suitable statistic of discount rate, for it depends on estimation of future cash flow, and for different decision maker, they may prefer different method and resources to calculate.

5.2. Contradiction within corporate governance

Conflict of interest between shareholders and managers is another cause of restriction of WACC method. As is known, shareholders refer to people who hold the company substantially with stocks in their hands but do not take part in daily operating activities in person, while managers are generally perceived as agents of a company, responsible for operating and managing an entity.

According to the basic assumptions of economics, both shareholders and managers are rational-economic men. A definition of rational-economic man goes like this: rational-economic man is a person who pursues maximum of utility and his/her ultimate goal is to achieve profit as much as possible. Under this circumstance, Wal-Mart also has imperfection in dealing with the relationship between separation of powers and checks and balance, although it is one of the most famous retail giants enjoying reputations all around the world.

Here, we take one of Wal-Mart's strategical target as an example. Compared to other competitors in the same industry, Wal-Mart is more likely to attach great significance to gross margin, a factor that has not deducted commodity circulation expenses and tax from sales revenue yet. This target contributes to a slack in budget and performance appraisal, resulting in subtle falsification in financial report eventually. WACC may be used to help managers to obtain the expected goal of shareholders in an unreasonable way as well.

More specifically, manager increase channel fees from suppliers in addition to commodity profits by means of decentralization and realize exaggerate cash amount to attain their own goal. However, as a rational-economic man, supplier also want to achieve maximum profit margin. The only way to do is to cut down the cost of commodity he/she supplies, then inferior goods come into being. As time passes, people will choose not to consume in Wal-Mart, resulting in decrease of goodwill, a quantized factor of recognition degree and social trust. What's worse, managers may collude with financial department and set a loose goal related to profit margin to simply and easily obtain it, which discourage the development of entity. All these above should be taken into consideration in the actual situation, and they may influence parameter in WACC formula, leading to lack of accuracy of the result.

Conclusion

- Up to now, we have made thorough and comprehensive analysis of the case and worked out to estimate the cost of capital of Wal-Mart in the former sections. In the end, we will summarize the whole passage briefly and give our conclusion.

- In the first section, we did an analysis of the background from three aspects-macro, industry and Wal-Mart itself, which makes us understand the economical situation of US, the introduction of retail industry and the essentially financial data of Wal-Mart concisely. It is useful for us to figure out the case.

- In the second part, we introduced the definition of the cost of capital, which includes the cost of equity and the cost of debt. In order to estimate the cost of capital, which is the key task we need to solve in this case, we introduced the most popular method-WACC model, which will be used in the following sections.

- In section three, we managed to estimate the cost of equity. There are two mainstream methods, the Gordon Dividend Growth Model and the CAPM model. Finally, we decided to choose the latter and the value of cost of equity is 9.36%.
- In the fourth part, we discussed the way to estimate the cost of debt based on the long-term liabilities that Wal-Mart has issued. We also discussed whether the kinds of tax will influence our outcome.

- Eventually, we got the market values of the company's equity and debts to attain the capital structure. By the means of WACC model, the estimated cost of capital is 8.296%.

- However, WACC also has kind of limitations. We gave some reasons such as the contradiction within corporate governance in the end, which will make WACC inaccurate. Nevertheless, we still hold the view that our answer is approximate to the real one.

References

[1] Ren Jing (2018). A review of the research on the cost of equity capital measurement model. *Modern marketing (next xunyao)* (08), 46 doi:.

[2] Li Cong (2014). *Determination of discount rate in enterprise value evaluation by income method* (Master's thesis, Hebei University of economics and trade) https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201402&filename=1014215171.nh

[3] Xu Qin & Wei Yi. (2007). Theoretical defects and valuation bias of the existing WACC calculation formula. *Journal of Tongji University (NATURAL SCIENCE EDITION)* (04), 562-565 doi:.

[4] Zhang Lujiao (2002). *The application of discounted cash flow method in capital budgeting* (Master's thesis, Xiamen University) https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD9904&filename=2003042511.nh