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VALUATION OF APPLE INC.

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Resumo

De um modo geral, os modelos de avaliação inserem-se em duas categorias: avaliação absoluta e avaliação relativa. Sob cada critério, existe uma ampla gama de modelos. Para se poder definir o valor justo das ações da Apple, vários modelos são aplicados, como Fluxos de Caixa Descontados e Múltiplos.

Os indicadores-chave financeiros demostram que a Apple mantém uma margem de lucro elevada mesmo recentemente, enquanto que se prevê que a concorrência na indústria eletrónica irá ficar mais renhida no futuro próximo. Quanto à estrutura do capital, a Apple tem, nos últimos anos, aumentado as suas dívidas continuamente, e o crescente ROE resulta da combinação do efeito da alta rentabilidade com o efeito de alavanca.

Grande parte dos modelos de avaliação demonstram que as ações da Apple continuam subvalorizadas, com o preço justo estimado mais alto que o preço de mercado. Apesar da empresa ter sido alvo de comentários de suspeição após o falecimento de Steve Jobs, prevê-se que o preço das ações da Apple valorizem, e, a longo prazo, atinjam o seu valor justo implícito.

Dado o facto que modelos diferentes têm resultados também diferentes, as suas hipóteses e limitações também diferem entre si. Apesar da Apple ser considerada uma empresa madura, a sua proporção de pagamentos de dividendos é baixa, e não existem dados históricos suficientes para prever dividendos futuros, tornando assim o resultado proveniente do DDM pouco fiável.

Com base nos resultados criados a partir dos modelos de avaliação e indicadores financeiros, recomenda-se aos clientes que comprem ou detenham ações da Apple. Também se sugere que a empresa considere aumentar os dividendos quando se verificar uma falta de boas oportunidades de investimento.

Palavras-chave: Avaliação, Fluxos de Caixa Descontados, Valor Atual, Múltiplos
JEL Sistema de Classificação: G30 (Finanças Corporativas); O22 (Análise de Projetos)

Abstract

Generally valuation models can be divided into two main categories: Absolute Valuation and Relative Valuation. Under each criterion there is a wide range of models. In order to define the fair value of Apple's stocks, several models are applied, including FCFF model, FCFE model, DDM, Residual Income Model and Multiples Valuation Model.

Key financial indicators show that Apple still maintains a high profit margin in the recent years, while competition in electronics industry is expected to become fiercer in the coming future. In terms of the capital structure, Apple has increased its debts continuously in the recent years, and the growing ROE actually results from the combined effect of high profitability and leverage effect.

The majority of valuation models suggest that the shares of Apple are undervalued as the estimated fair price is higher than the current market price. Despite the suspicious comments on the company after the loss of Steve Jobs, the share price of Apple is expected to appreciate and reach the implied fair value in the long run.

As different models provide various results, they have different hypothesis and limitations. Though Apple is assumed as a mature company, the payout ratio is relatively low and there is not enough historical data for the prediction of future dividends, which make the result from DDM unreliable.

Based on the results generated by valuation models and financial indicators, the recommendation for the customers is to buy or hold shares of Apple. In addition, the author also suggests that the company should consider the increase of dividends when there is a shortage of good investment opportunities.

Keywords: Valuation, Discounted Cash Flow, Present Value, Multiples
JEL Classification: G30 (Corporate Finance); O22 (Projects Analysis)

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Abbreviations

CAGR: Compound Annual Growth Rate

CAPEX: Capital Expenditures

DCF: Discounted Cash Flow

DDM: Dividend Discounted Model

DPS: Dividends per Share

E/A: Equity over Assets

EBIT: Earnings before Interests and Taxes

EBITDA: Earnings before Interests, Taxes, Depreciation and Amortization

EPS: Earnings per Share

EVA: Economic Value Added

FCF: Free Cash Flow

FCFE: Free Cash Flow to the Equity

FCFF: Free Cash Flow to the Firm

GP: Gross Profits

IC: Invested Capital

IPO: Initial Public Offering

MVA: Market Value Added

NOA: Non-Operating Assets

NWCN: Net Working Capital Needs

RIM: Residual Income Model

ROA: Return on Assets

ROE: Return on Equity

ROIC: Return on Invested Capital

ROS: Return on Sales

SWOT: Strength, Weakness, Opportunities, Threats

TIE: Times Interests Earned

WACC: Weighted Average Cost of Capital

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1. Introduction

The main purpose of this master thesis is to analyze and evaluate Apple Inc. based on different valuation models. The estimated result will be compared with the real market data in order to provide appropriate recommendations for the company and investors.

Apple Inc. is chosen as the case company due to its representativeness in the industry. During the last decade, electronic industry has grown incredibly, and it would not be too exaggerated to say that Apple pioneered the electronic industry, which has changed people's life styles dramatically. A typical example here is the mobile phone. Ten years ago, mobile phone was used mainly for the purpose of calling and texting, while today advanced technology makes it a multifunctional product equipped with various uses, such as checking mailbox, playing online games and watching movies. These amazing changes started from a product, iPhone, equipped with iOS system and produced by Apple in 2007. At the beginning of 2015, Apple became the first company with a market value exceeding 700 billion dollars, which reflects sufficiently the large market shares occupied by the company. On the other hand, the competition in electronic industry is growing increasingly. Development of other systems such as Android and Windows put a great pressure on the future of Apple and some investors question whether the market is overvaluing Apple or not. Based on all these considerations, Apple is chosen as the case company in this master thesis.

1.1 Description of Apple Inc.

Apple Inc. (commonly known as Apple), the company that designs, develops, and sells consumer electronics, computer software, online services, and personal computers, is an American multinational technology company headquartered in Cupertino, California. Apple has several products that are well known by the public, such as Mac book, iPod, iPhone, iPad, and the Apple Watch. It also has developed the online services including iCloud, iTunes Store, and the App Store, which provide platforms for customers to store their data, manage their devices and download applications. The sales targets of the company are variable, including the independent users, companies, and education institutions. So far, the company operates more than 450 retail stores in 16 countries, as well as the online store where hardware and software products are sold. In addition, Apple also has cooperation with some third-party cellular network carriers and wholesalers, which provide multiple sales channels for the company.

The fact that most of the customers of Apple have a strong sense of loyalty, which is often attributed to the early creative development of Apple, may help to explain the reason that Apple can still maintain large market shares under the fierce competition in electronic industry. On November 25 2014, in addition to being the largest publicly traded corporation in the world by market capitalization, Apple also became the first American company having a market value over $700 billion.

1.2 History of Apple Inc.

Originating from Apple Computer Inc., Apple Inc. was founded by Steve Jobs, Steve Wozniak, and Ronald Wayne on April 1, 1976. At the beginning of the business, the company mainly focused on personal computers. With the breakthrough in 1984, Apple launched Macintosh, the first personal computer to be sold without programming language at all. This success is regarded as the milestone in the development of personal computers. Later, the company also developed other products such as laser printers.

In 1985, due to the conflict between Steve Jobs and CEO John Sculley, Jobs resigned from the company and developed a new company NeXT in the same year. After that, Apple followed the "fifty-five or die" policy, referring to high margin profit of 55% of Macintosh. However, with the development of other new products in the market, this policy could not be sustained anymore. During 1990s, the company introduced identical products at different prices aimed at different markets, while the consumers were actually confused with the differences between the products. When Microsoft continued to gain market share with Windows by focusing on delivering software to cheap commodity personal computers, the expensive experience offered by Apple was not accepted by the public. Apple tried different ways to improve the company, including replacing the CEO and reducing costs. After the failure of all these attempts, Apple purchased NeXT and brought Steve Jobs back to Apple.

After several years of development, Mac OS X, based on the original NeXT's system, was released in 2001. In the same year, Apple opened the first official retail store in Virginia and California. Later in November, Apple introduced its portable digital audio player, iPod, which created a hot trend at that time and triggered the introduction of relevant software iTunes in 2003, offering an online music download service. In the following years, the company continued to grow and Jobs announced that the company would produce the Mac computers equipped with the Intel's CPU. This announcement was fulfilled in 2006 when MacBook Pro and iMac were introduced. The rising stock price during this period reflected the success of Apple, which increased from $6 to over $80 and exceeded Dell in 2006. In 2007, the company was renamed as Apple Inc. to reflect its shifted focus towards consumer electronics. From then on, Apple achieved great success from iTouch, iPhone and iPad.

After the loss of Steve Jobs in 2011, Apple introduced some new and remarkable services such as Siri and iCloud. Apple joined the Dow Jones Industrial Average on March 19, 2015.

1.3 Future of Apple

Apple was not the company that invented the personal computer, but it was the company that triggered the revolution of the personal computer; it was not the company that invented the media player, but it created a new model for digital products and became the leader in the industry. Apple became a fashion because of its creation led by Steve Jobs, and most of the investors and consumers are concerned about the creativity of the company after the death of Steve Jobs. Besides, the development of Android platform, which is accepted by most of the companies such as Samsung and Sony, as well as Window platform applied by Microsoft that acquired Nokia in 2013, continue to reduce the market share of Apple. According to annual report of Apple, the amount of sales stopped climbing steeply as before and became flat after 2012.

However, it does not necessarily lead to a pessimistic conclusion for the future of Apple. The electronic industry grew sharply and become mature in the recent years, which can also be reflected by the flat sales curve of Apple after 2012. Under this situation, the creation of the hardware is no longer the only determinant in this industry when customers will look more for the experience. On this aspect, Apple is still the leader since there are numerous creative applications applied on iOS platform and some of them are even exclusively operated on iOS system.

At the end of 2014, the sales amount of iPad was 68 million, while in 2013 the relevant figure was 74 million, and it was the first time that sales of iPad decreased since the introduction of iPad in 2010. Actually not only iPad, most of the tablets products suffered from the reducing sales curve. The declining trend of iPad, to some extent, indicates future trend of electronic products, that is, integration. People tend to finish everything with just one or two electronic products, and this trend also motivates the companies to produce mobile phones with larger screens, which are more convenient for people to deal with business without carrying heavy and big tablets or laptops. Apple also responded to this trend by releasing iPhone 6 and iPhone 6 plus (and more recently iPhone 7) at the same time to meet different needs. Besides, at the beginning of 2015, Apple introduced its first smartwatch, Apple Watch, which is integrated with applications supported by iOS system and provides new experiences for the customers. With the development of integration technologies, it is necessary for the companies to find an appropriate position for tablets in the market, while most of its functions now may actually be fulfilled with laptops and mobile phones.

The future of Apple also depends on whether it can maintain the loyalty of customers. Nowadays, Apple represents more than just a name of an electronic company. The trademark, a bitten apple, becomes a fashion trend today and represents creativity, advanced technology and good quality, which is the reason why some people show strong loyalty to Apple by using a set of electronic products produced by Apple including iMac, MacBook, iTouch, iPhone and iPad. However, the loyalty comes

from trust and, more importantly, from experiences. Today customers are facing more choices in terms of electronic products than before. If the further development of Apple could not meet the expectation of its customers, people would turn to other products for better experience. A good example here is Nokia. During 1990s, Nokia occupied a large proportion of market shares in electronic products, especially in mobile phone market. It originated from Finland, and from 1996, it was the leader in the industry and occupied the largest market shares in the following 14 years. Newsweek once commented, "because of Nokia, the future belongs to Finland". Nokia made mobile phone a common electronic product during 1990s, at the peak of the business, at least one people was using a Nokia mobile phone per 5.7 people on global average and Nokia even contributed to 4% of the GDP of Finland. However, though the CEO predicted in 2006 that in the future the mobile phone would be integrated with Internet, it still lagged behind Apple and Google when in 2007 Apple introduced iPhone and Google released the Android platform. Nokia was also one step behind its competitors in terms of online service. Only in 2009 did Nokia introduce Ovi application store, when iTunes and other application stores had already occupied the market. Even though latter Nokia gave up the Symbian system and built up cooperation with Microsoft, it was already too late to reverse the trend and the development of Window phone system was actually not mature compared to iOS and Android at that time. At the beginning of 2014, Microsoft announced the completed acquisition of mobile phone business of Nokia, representing the end of the era of Nokia. As the enterprise with 146 years history, Nokia went down in only 4 years

because of lagging behind in Internet integration technology and customers experience. Although Nokia had led the industry for 14 years, once the company could not meet the customers' expectations compared to other competitors, the loyalty decreased gradually when people looked for better experience offered by other companies.

2. Literature Review

It is not difficult to understand the reason why corporate valuation is always an attractive topic in financial industry. Investors are not willing to pay more than the actual value of an asset while the fluctuation of the market may not reflect the actual value all the time. Corporate valuation also plays a very important role in the companies since the fair value based on the valuation will be the reference in the negotiation between the buyer and the seller in terms of acquisition and merger. Besides, valuation can also provide investment bank and companies a reference when preparing IPOs. According to Benninga and Sarig (1997), it is more preferable to use more than one estimation model in corporate valuation, for the reason that, since valuation is based on the future prediction of the company, different models make different assumptions and contain uncertainty between the estimated value and actual value. If different models produce similar results, the estimated results are considered to be more reliable, otherwise, the estimated value should be chosen from the most suitable model for the company. With this consideration, several models are used in this master's thesis, and in general terms, they can be divided into two methods. The first one is Absolute Valuation Model, where the present value of estimated future cash flow is taken into account. The second one is Relative Valuation Model, which use comparative multiples of a common variable, like earnings, cash flow, book value or sales to estimate the value of an asset.

2.1 Discounted Cash Flow Valuation

The discounted cash flow model (DCF) is used widely in valuation of projects, investments, and companies. The basic idea of discounted cash flow model is very simple and easy to understand, that is, the value of an asset depends on the future cash flow that can be generated from that asset. Based on this, in order to get the fair price of an asset, the future cash flows have to be estimated and discounted by at a suitable rate reflecting the risk. According to Modigliani and Miller (1958), discounted cash flow model can be suitable to evaluate a company by regarding the whole company as an investment pool consisting of numerous projects. Additionally, the discounted cash flow model can be distributed into three categories by using different estimated cash flows. If the dividends are estimated as the future cash flows, the model is Dividend Discounted Model (DDM); if free cash flows are used in the valuation, the model will turn to Free Cash Flow Model (FCF); if the accounting earnings, that is, the residual income, is applied, the valuation will be based on the Residual Income Model (RIM). All of these models, though with different names and using different estimated cash flows, are based on the core of the discounted cash flow model by valuating the company with the future cash flow generated by the company, and they will be discussed separately in the following sections.

2.1.1 Free Cash Flow Model (FCF)

The free cash flow model can be divided into two approaches based on the definition of the free cash flow. The first approach is to consider the free cash flow for the firm (FCFF), referring to the free cash flow available for the company after paying all the expenses and reinvestments, while the second approach is to estimate the free cash flow for the equity (FCFE), that is, the free cash flow available for the shareholders after the paying all the expenses including the taxes, interest expenses due to debts and reinvestments expenses. To illustrate the difference distinctly, the calculations of these two types of free cash flows are shown below:

$$FCFF_t = EBIT_t \times (1 - tax\ rate) - \Delta Net\ Working\ Capital\ Needs_t - Net\ Capex_t \quad (1)$$

$$FCFE_t = FCFF_t + (Debt_t - Debt_{t-1}) - Interest\ Expense_t \times (1 - tax\ rate) \quad (2)$$

Depending on different cash flow used in the model, different discount rate should be applied. In other words, if the free cash flow to the firm (FCFF) is used to evaluate the company, the discount rate has to reflect the overall risk of the company. The most common used discount rate is weighted average cost of capital (WACC), which takes into account both equity and debt financed by the firm.

$$WACC = \frac{Equity}{Debt+Equity} \times Cost\ of\ Equity + \frac{Debt}{Debt+Equity} \times Cost\ of\ Debt \times (1 - tax\ rate) \quad (3)$$

On the other hand, if the valuation is based on free cash for the equity (FCFE), the discount rate is actually the return required by the shareholders who bear the equity risk.

Overall, based on the above, the valuation of the company based on Free Cash Flow method (FCF) can be generally shown as follows:

$$Firm\ value = \frac{FCFF_1}{(1+WACC)^1} + \frac{FCFF_2}{(1+WACC)^2} + \frac{FCFF_3}{(1+WACC)^3} + \frac{FCFF_4}{(1+WACC)^4}\ ... \quad (4)$$

$$Equity\ Value = \frac{FCFE_1}{(1+r_e)^1} + \frac{FCFE_2}{(1+r_e)^2} + \frac{FCFE_3}{(1+r_e)^3} + \frac{FCFE_4}{(1+r_e)^4}\ ... \quad (5)$$

It should be noted that since FCFF refers to free cash flow to the firm while WACC also takes into account required return of the whole company, the present value calculated from this model is the estimated firm value, and in order to achieve the equity value, value of debts should be subtracted.

There are two critical points here. First, since the results are very sensitive to the inputs, the cash flow and the discount rate should be estimated carefully based on the realistic situation of the company. Besides, it is impossible to estimate the infinite free cash flows and a terminal value should be estimated properly with some appropriate assumptions, such as perpetual growth and no growth model.

2.1.2 Dividend Discounted Model (DDM)

$$V = \frac{Dividend_1}{(1+r_e)^1} + \frac{Dividend_2}{(1+r_e)^2} + \frac{Dividend_3}{(1+r_e)^3} + \frac{Dividend_4}{(1+r_e)^4} \dots \quad (6)$$

Instead of discounting the free cash flow for the equity (FCFE), the dividend discounted model (DDM) values the company with the present value of the estimated dividends that the shareholders will receive in the future. Free cash flow to the equity (FCFE) is a measure of what a firm can afford to pay out as dividends. However, it is the company who decides the actual dividend paid out. Some companies may maintain 100% payout ratio and pay out all the free cash flow for the equity (FCFE), while others may pay less or even pay more at some exceptional years. According to Damodaran (1994), dividends paid are different from the free cash flow to the equity (FCFE) for several reasons:

(1) Desire for stability. Overall, firms tend to maintain stable dividends paid out and are unwilling to change dividends frequently, especially when firms have to reduce dividends in some cases. The empirical fact shows that most of the companies often refuse to increase dividends even when free cash flows to the equity (FCFE) increase because they are not sure whether the higher dividends can be maintained in the future. Correspondingly dividends usually have low variability compared to free cash flow to the equity (FCFE) by maintaining dividends far below free cash flow to the equity (FCFE).

(2) Future investment needs. It is easy to understand that a company may want to hold a sufficient amount of free cash flows to meet the future investment needs while too many debts would increase the leverage risk and equity is an expensive way to finance.

(3) Tax factors. If dividends are taxed at a higher rate compared to capital gains, companies may prefer keeping the excess cash than paying out dividends.

(4) Signaling prerogatives. Dividends are usually regarded as signals to predict the future movement of the companies. Based on this consideration, firms may allocate the dividends for the purposes of sending the messages to the public, which can also explain the differences between dividends and free cash flow to the equity (FCFE).

Similarly, since it is impossible to evaluate the future dividend infinitely, some assumptions, such as perpetual growth or no growth model, will be considered carefully and applied to the valuation.

2.1.3   Residual Income Model (RIM)

In 1961, Modigliani and Miller introduced the "dividend policy irrelevancy", which triggered the later argument of whether DDM is reasonable in evaluating firms. Edwards and Bell (1961) also pointed out that instead of dividends, another more fundamental variable that is not affected by dividends should be used in the valuation. Ohlson (1995) illustrated this idea systematically in his essay by defining a valuation model based on the residual income.

Generally, shareholders require a certain rate of return at which they are willing to offer funds and invested the companies, and this rate of return is considered to be the cost of equity for the companies. In order to maintain normal operation, firms should generate return at least equal to the cost of capital so that they can afford the normal capital cost. When the return is higher than the cost of capital, the exceeded part is regarded as residual income. The relation is shown as below:

$$Normal\ Equity\ Cost = Equity\ capital\ \times Cost\ of\ Equity \quad (7)$$

$$Residual\ Income = Net\ Income - Normal\ Equity\ Cost \quad (8)$$

According to Ohlson (1995), the company can be evaluated based on the book value and the present value of the residual income as illustrated in the following equation:

$$V_0 = BV_0 + \frac{RI_1}{(1+r)^1} + \frac{RI_2}{(1+r)^2} + \frac{RI_3}{(1+r)^3} + \cdots \qquad (9)$$

With the basic idea of residual income, the model is extended today to Economic Value Added and Market Value Added (EVA/MVA) approach. In this approach, the residual income is considered on the aspect of the whole company instead of just equity. Correspondingly, the require rate of return is replaced by weighted average cost of capital (WACC) introduced before, which taking into account both equity and debt. To illustrate it more distinctly, the relevant formula is shown below:

$$Normal\ Profit_t = Invested\ Capital_t \times WACC \qquad (10)$$

$$EVA_t = EBIT_t \times (1 - tax\ rate) - Normal\ Profit_t \qquad (11)$$

$$MVA_0 = \frac{EVA_1}{(1+WACC)^1} + \frac{EVA_2}{(1+WACC)^2} + \frac{EVA_3}{(1+WACC)^3} + \cdots \qquad (12)$$

In EVA/MVA approach, the normal profit for the company is invested capital times WACC with the consideration of the cost of capital, including debt and equity, that need to be covered. The exceeded profit from the operation, that is, EVA, is regarded as the residual income. By discounting estimated EVA at WACC, MVA is available for the further valuation of the company.

2.2 Multiples Valuation Model

Multiples Valuation Model is basically a very straightforward relative valuation method. Damodaran (1994: p.15) illustrated that, "In relative valuation, the value of an asset is derived from the pricing of 'comparable' assets, standardized using a common variable such as earnings, cash flows, book value, or revenues." The valuation process in this model can be concluded into the following steps:

1. Gather comparable industry peers with similar background, taking into consideration company size, business, operation, etc.

2. Achieve the multiples of these companies. The average of the peer group will be considered as industry average value.

3. Calculate the intrinsic value of Apple by applying the actual company´s data to the average value of multiples from step 2.

Generally, industry average ratios, such as price/earnings, price/book value and price/sales, are used to evaluate the firm in this approach with the assumption that these average ratios in the industry are comparable and can reflect the similar situation of the firm.

3. Industry Analysis

Obviously, the main products of Apple, including iTouch, iPhone, iPad and MacBook clarify sufficiently that the company operates in the electronic industry. As stated before, the electronics industry grew increasingly from 2007 to 2012 and tends to be mature during the recent years. The main motivation for the development of the industry is technology innovation. In order to analyze the industrial environment, the Porter's five forces analysis will be introduced and applied.

3.1 Porter's Five Forces Analysis

According to Porter (1980), who introduced Porter's five forces analysis, an industry is influenced by five main factors: existing rivalry in the industry, threat of new entrants, bargaining power of suppliers, bargaining power of buyers, substitute products and services. These five factors help to clarify the current competition level within an industry and business strategy development. Since the most popular products of Apple Inc. are iPhone, iTouch and iPad, the analysis will focus mainly on the mobile phones and tablets area.

3.1.1 Existing Rivalry in the Industry

The more players in the industry, the more intense the competition is for the same amount of customers. In order to gain the pricing power, companies have to

differentiate their products by introducing attractive features.

In terms of mobile phones and tablets, Apple is the only company using iOX system in the industry, while most of its competitors such as Samsung, Sony and Nokia stand for Android and Microsoft systems. According to the report from International Data Corporation, in 2014 the amount of Android users accounted for 81.46% on global average, while iOS users occupied 14.81% and the rest was shared by other systems. Although Android systems are the most popular system based on the statistical data, one thing needs to be emphasized here, Apple is the exclusive company that develops and applies iOS system in the industry while there are numerous companies producing with Android systems and sharing those 81.46% market share, and to this extent 14.81% market share exclusively occupied by Apple seems to be persuasive to conclude the leading position of the company in the industry. However, if comparing the statistical data from 2011 to 2014, the market share of iOS has been actually following a decreasing trend and according to the projection of International Data Corporation the iOS users' proportion will continue to decrease to 14.1% in 2019. The declining tendency is mainly due to the rapid development of Android system. Though iOS system is well known for its user-friendly characteristics, as stated before, numerous companies in the industry are developing and producing their products based on the Android system. Under this situation, Android system has a strong motivation to be improved and customized. Besides, for the fact that a vast number of mobile phones are integrated with Android system, customers have more choices if

they turn to Android system while the iOS users have a great limitation in terms of brand, outlook and color.

Additionally, average selling prices of iOS are the highest among all the systems existing in the industry, which indicates that Apple still maintains its leading position in the high price brand. However, taking the entire industry as the analysis target, mid-range and low-end mobile phones are still the most popular products and occupy the largest market shares, which also explains the rapid growth of Samsung and Huawei.

Based on the above analysis, although Apple still has a very competitive leading position in the industry, the level of existing rivalry in the industry cannot be underestimated and is considered to be medium here.

3.1.2   Threat of New Entrants

Apple Inc. operates mainly in the electronics industry, which requires some certain thresholds for the new competitors to enter the market, such as technology, educated employees, etc. But generally it is not difficult for the new competitors to join the industry, especially in 21st century there are numerous innovative and competent talents and the raw materials are generally inexpensive in this industry. This also helps to explain why many companies turn to develop electronic products today even

though originally they were operating other businesses. For example, Huawei, which focused on the Internet service and telecommunication in the past, has developed its mobile phones and achieved a great success in the recent years.

On the other hand, Apple is still the only company that develops iOS system in the industry and has a strong brand image in the market. Besides, as mentioned before, Apple has accounted a large proportion of market shares and most of its customers show a sense of loyalty to Apple products, leading to the fact that it is difficult for the new entrants to compete with Apple.

In general, it is more appropriate to take "medium" as the level of the threat of new entrants.

3.1.3   Bargaining Power of Buyers

As stated before, Apple has a strong brand image and most of its customers are loyal to Apple products. Most of the targeted customers are not very sensitive to the price and value more in terms of the brand, experience and quality, which also explains the reason that Apple can have the highest profit margin in the industry. Additionally, Apple produces its critical products based on iOS system and provides a serial of consistent services like iTunes and iCloud. These services are generally accepted by the public with their user-friendly characteristics, and once the customers get used to

iOS system and these integrated services, it may take time for them to accommodate to the Android platform. In other words, the switching cost is high for the consumers, which reduce the bargaining power of buyers to a relatively low level.

3.1.4 Bargaining Power of Supplier

Apple has a strong control on the supply chain. By designing the chips by itself, the reliance of the chip suppliers is reduced to a large extent. The strong controlling power can also be reflected on the equipment. For example, Foxconn, as one of the biggest partners of Apple, can only assemble the products with the components provided by Apple. Additionally, Apple has also purchased the manufacturing equipment that can be used for Apple products exclusively, which also reduce the dependence on suppliers. Overall, the bargaining power of suppliers is weakened to a low level.

3.1.5 Threat of Substitute Products or Services

Mobile phones, tablets and laptops are the most popular products in the electronics industry. The future trend, however, lies not only on the further development of the design, quality and function, but also on the integration of different products. Today people expect more on the electronic products and prefer to finish everything with minimum amount of products. With the development of technology, the possibility of fulfilling this expectation becomes higher. It may not take a very long period before

the appearance of a new product that is multifunctional and portable. A directive indicator here is the reducing sale of iPad mentioned before. In the past, iPad was very popular because it could fulfill some of the functions of laptop and in the meanwhile it was very portable and equipped with convenient touch-screen. However, laptop becomes more thin and portable today when the mobile phone is also equipped with more and more functions. In other words, the development of technology increases the substitutability of iPad, which leads to the decreasing sale trend of this product. Although at the present moment, there is still no perfect substitute for mobile phone and laptop, the threat of substitute products cannot be underestimated, and it is more appropriate to be considered as medium level, taking into account the increasing possibility of integration in the future imposed by the modern technology.

4. Corporate Analysis

As stated before that electronics industry is a competitive industry depending on the technology innovation. In order to define the market position and market share owned by Apple Inc., the SWOT analysis, one of the most classical models, will be applied to determine the strengths, weaknesses, opportunities and threats as shown in the following table.

Table 1: SWOT Analysis

Strengths	Weakness
1. Brand loyalty of the customers	1. Expensiveness
2. Popular trademark	2. Declining profit margin
3. High market value	3. Loss of the Steve Jobs
4. Successful marketing strategy	4. Incompatibility with other systems
5. Strong and creative technical team	5. Fewer innovation on new products
6. Leading position in the industry	
Opportunities	**Threats**
1. Higher demands for advanced technology	1. Development of other systems
2. Development of mobile software	2. Relatively lower price of other brands
3. Launch of new products	3. Rising labor cost
4. Acquisition of patent and technology	4. Rapid change in electronics industry
5. Growth of mobile advertisement	5. Piracy problem
6. Improvement of iCloud and iTunes	

Source: Author

5. Financial Statement Analysis

Before the valuation of the company, a brief financial statement analysis will be applied, which may give investors a better understanding about the financial situation of the company before making the investment. The financial analysis will be divided into four parts: Profitability Analysis, Liquidity Analysis, Solvency Analysis and Growth Analysis.

5.1 Profitability Analysis

Table 2: Profitability ratios

	Apple			Competitors (as of 2015)	
	2013	2014	2015	Google	Microsoft
ROS	28.48%	28.49%	30.09%	25.82%	19.41%
ROA	17.89%	17.04%	18.38%	11.36%	7.00%
ROIC	46.49%	40.46%	45.37%	12.82%	10.71%
ROE	29.98%	35.42%	44.74%	14.08%	14.36%

Source: Author; Morningstar

Return on Sales (ROS), which is equal to EBIT over Net Sales, is also referred as Operating Margin and reflects the profitability of the company. Over the last three years, Return on Sales of Apple remained stable at around 29%, which indicates that for every dollar achieved from sale, the company can maintain about 29 cents in operating return. Compared to its competitors, it is obvious that Apple maintains a relatively higher profit margin.

Return on Assets (ROA) is another important profitability ratio which shows the profits that company has earned compared with their assets. The data indicates that during the last three years Return on Assets also shows a very stable trend at around 18%, which refers that generally 18% of the Assets are generated into Net Income.

In addition, the ability of the company to generate profit with the Invested Capital can be indicated by the ratio Return on Invested Capital. The invested capital is actually the total amount of money that company received from shareholders and bondholders by issuing stocks and securities. During the last three years Apple maintained a ROIC over 40% generally.

The last ratio in the table, Return on Equity, attracts attentions of many stock investors. It represents the profit generated by the company compared to the capital invested by its shareholders. In the last three years, Return on Equity of Apple increased rapidly from 30% in 2013 to almost 45% in 2015. However, an increasing ROE is not necessarily a good signal for the investor. An increasing ROE could be either caused by increasing profitability or increasing debts. Shareholders should be clear about the main reason behind the high ROE, which is important to determine the financial health of the company. To analyze the actual reason behind the increasing ROE of Apple, a decomposition will be applied on ROE.

Table 3: Decomposition of ROE

Decomposition	2013	2014	2015
GP/Sales	40.83%	42.13%	**43.65%**
Fixed expenses effect	77.61%	76.02%	77.16%
Cash flow margin	31.69%	32.03%	33.68%
Depreciation effect	89.87%	88.95%	89.34%
ROS	28.48%	28.49%	30.09%
invested capital turnover	163.25%	142.03%	150.78%
ROIC	46.49%	40.46%	45.37%
net interest expense effect	1.03	1.03	1.03
IC/E	0.85	1.15	**1.30**
Financial leverage effect	0.87	1.19	1.34
Tax effect	73.85%	73.87%	73.63%
ROE	**29.98%**	**35.42%**	**44.74%**

Source: Author

From the table it is obvious that the increase of ROE can be attributed to the increase of Gross Profit Margin and Invested Capital over Equity. The higher Gross Profit Margin indicates stronger profitability and cost control ability of the company, while higher Invested Capital over Equity could indicate higher leverage effect and correspondingly higher risk for the company. In general, the increasing ROE could be due to the combined effect of better profitability and higher leverage.

Comparing Apple to its competitors, it is possible to conclude that in 2015 Apple has higher profitability with its higher operating margin, which may be attributed to its higher sale price and better use of resources, while the acquisition of Nokia lead to a sharp decrease of profitability ratios of Microsoft.

5.2 Liquidity Analysis

Table 4: Liquidity ratios

	Apple			Competitors (as of 2015)	
	2013	2014	2015	Google	Microsoft
Current ratio	1.68	1.08	1.11	4.67	2.50
Quick Ratio	1.64	1.05	1.08	4.50	2.30

Source: Author; Morningstar

The Current Ratio represents the ability of the company to meet the needs of repaying all the current liabilities with its current assets. Current Ratio around 2 could be considered as ideal benchmark for the company. However, the table above indicates that the Current Ratios of Apple are all below 2 during the last three years. Besides, the Current Ratio decreases from 2013 to 2015, and in 2015 it was only around 1.1, which indicates that if Apple needs to repay all of its current liabilities with current assets, there would be almost nothing left in the current assets.

In the Liquidity Analysis, Quick Ratio, or Acid Test, is also calculated. It is very similar with Current Ratio, and the only difference is that inventories are excluded from current assets since inventories may be less liquid compared to other current assets and it may take longer time to transfer inventories into cash when company needs to repay all of its current liabilities. The table above shows that the difference between Current Ratio and Quick Ratio of the company is small, which suggests that inventories only account for a small proportion of the current assets of the company.

Comparing Apple to its competitors, it is possible to conclude that in 2015 Apple has the lowest liquidity among the three companies, while both Google and Microsoft have current ratios and quick ratios higher than 2.

5.3 Solvency Analysis

Table 5: Solvency ratios

Solvency	Apple			Competitors (as of 2015)	
	2013	2014	2015	Google	Microsoft
E/A	59.69%	48.11%	41.09%	81.60%	45.44%
TIE	369.79	140.28	99.93	189.95	24.70
Debt repayment period	0.15	0.38	0.64	0.06	2.34

Source: Author; Morningstar

The Equity over Assets ratio indicates that the proportion of equity decreased during the last three years. In other words, the company has an increasing percentage of debt in its capital structure, which is also consistent with the larger financial leverage effect shown in the decomposition of Return on Equity.

Times Interest Earned, or Interest Coverage Ratio, measures the company capacity to meet its debt obligation by dividing the EBIT by interest expenses. Compared to the interest expenses, the EBIT is much higher, which indicates that Apple has great capacity to meet the debt obligation with its earnings.

Debt Repayment Period can also reflect the capacity of repaying debt with company's

internally generated funds. It is calculated by dividing interest bearing debts by the sum of retained earnings and depreciation and amortization, and the results show that Apple has the ability to repay its debts in around half a year.

Comparing Apple to its competitors, it is possible to conclude that in 2015:

- Apple has a larger portion of liabilities in its capital structure with the lowest Equity to Assets ratio.

- Both TIE and Debt Repayment Period indicate that Google has the greatest ability to meet its debt obligation, while Apple takes the second place among the three companies.

5.4 Growth Analysis

Table 6: Growth rates

3-year Compound growth rate			
	Apple	Google	Microsoft
sales	16.94%	14.33%	8.27%
EBITDA	21.32%	15.77%	-10,10%
EBIT	20.20%	14.91%	-5.85%
Net Income	20.07%	15.04%	-10.45%
EPS	27.41%	12.20%	-9.55%
DPS	9.88%	-	16.60%
Total Assets	18.46%	15.30%	11.23%
Equity	-1.71%	17.40%	0.72%
Liabilities	43.20%	7.19%	23.06%

Source: Author; Morningstar

The Compound Annual Growth Rate (CAGR) of EBITDA and EBIT are both higher than CAGR Sales, which indicates that the operating leverage effect has a positive influence on the company. By combining fixed cost and variable cost, Apple can make a better use of operating resources and achieve higher profitability. The growth rate of taxes and interest may not have a very significant effect on the results as CAGR Net Income stays more or less the same as CAGR EBIT.

Earnings per Share (EPS) are growing much faster than Dividend per Share (DPS), which can be due to the low payout ratio of the company.

CAGR Assets is higher than CAGR Sales, which implies a decreasing asset turnover ratio. In other words, the company needs to increase its assets at a larger scale if it wants to increase the sales.

CAGR Equity shows an opposite trend compared to CAGR Asset with a slight decrease, and Liabilities have increased greatly during the last three years. In general, the company has increased total amount of asset by issuing debt instead of stocks, while the latter may be assumed as a more expensive way to raise capital.

Comparing Apple to its competitors, it is possible to conclude that over the last three years Apple has a more rapid growth generally, except for DPS and Equity. Google does not pay out any dividend while Microsoft has higher growth rate of DPS

compared to Apple. Both Google and Microsoft show an increasing trend in terms of

Equity, while Apple has a slight decrease in Equity along with great increase in

Liabilities over the last three years.

6. Corporate Valuation

The valuation of the company is based on the assumption that the company will continue its operation as a going on concern, and correspondingly the main present business will remain intact. Taking into consideration the company was renamed in 2007 in order to represent the shift of main business from computers to consumer electronics, as well as the changing environment of technology industry in the last few years, it is more appropriate to do the future 5 years projection with the recent three years records. After 2020, the company is assumed to reach the mature status and will operate stably, and the growth rate will be assumed to be 0.

6.1 Key Projections

In order to apply the valuation model, future forecasting is necessary and correspondingly several assumptions have to be made.

6.1.1 Revenues

The net sales of Apple can be divided into different segments by products – iPhone, iPad, Mac, Services and Other Products. For the consideration of valuation, the following projections are made:

- The projection for the sales of iPhone in 2016 will be based on the average growth rate of the last three years (32%), and then the growth rate is projected

to decrease 5% annually, which is related to the more fierce competition in cell phone market.

- Sales of iPad are projected to decrease in 2016 according to the average decrease rate in the last three years (-14%). For the remaining years, the declining trend is assumed to be continuous with -3% annual growth rate based on the global trend of tablets products as stated in the industry analysis.

- For Mac products, sales in 2016 will still be calculated with the average growth rate of the last three years (9%), and after that the sales are assumed to stay constant.

- The projection for the sales of Services and Other Products are very similar to the methods applied for the Mac products. In 2016 projected sales are calculated based on the average growth rate of the last three years (11% and 1.5% respectively), and then remains constant for the following years.

Table 7: Sales projection

Net sales by products (in mil)	2015H	2016	2017	2018	2019	2020
iPhone	155,041	204,654	259,911	317,091	370,997	415,516
iPad	23,227	19,975	19,376	18,795	18,231	17,684
Mac	25,471	27,763	27,763	27,763	27,763	27,763
Services	19,909	22,099	22,099	22,099	22,099	22,099
Other products	10,067	10,218	10,218	10,218	10,218	10,218
Total Net Sales	233,715	284,710	339,367	395,966	449,308	493,280

Source: Author

6.1.2 Cost Structure

The cost structure of Apple can also be divided into two big segments – Cost of Sales (excluding Depreciation and Amortization) and Operating Fixed Cost.

- Cost of Sales (excluding Depreciation and Amortization) reflects the variable cost of goods sold. During the last three years the Cost of Sales accounts for 58% of Net Sales, and this proportion is projected to remain stable in the following years.

- The projection of Depreciation and Amortization in 2016 will be made according to the average percentage of Property, Plant and Equipment (PPE) during the last three years (34%), and remains constant proportion of PPE in the following years.

- The cost for Research and Development will be assumed to grow at the average rate of last three years in 2016, after that it is assumed to grow at a constant rate at around 2.5%.

6.1.3 Tax rate

The tax rate for the last three years remained stable around 26%, thus in the following years the average tax rate of the last three years will be applied.

6.1.4 Balance Sheet Items

For the balance sheet items, most of them will be assumed to grow at a constant rate at 2.5% to represent a mature status and going on concern of the company, except some items like goodwill, which only appear in specific condition, will be assumed to grow at a lower rate of 1%.

6.2 Discounted Cash Flow Model (DCF)

As discussed in the previous sections, Discounted Cash Flow Model, as one of the most classic valuation model, will be applied in this thesis. In this part four methods will be applied – Free Cash Flow (Firm Approach), Free Cash Flow (Equity Approach), Dividend Discounted Model (DDM) and Residual Income Model (RIM).

6.2.1 Weighted Average Cost of Capital (WACC)

Weighted Average Cost of Capital (WACC) is one of the parameters used to discount the cash flow. It takes into account the risk of the whole company, including both equity and debts.

In the calculation of WACC, since it is difficult to estimate the market value of debt, the book value of debt will be applied, while the market value of the equity is achieved by multiplying the market price and shares outstanding. The yield of 10-year

US government bonds will be regarded as risk free rate. In addition, the cost of debt will be calculated by dividing interest expense by total debt, subject to a minimum value equal to risk free rate.

The calculation of WACC is shown in the below table.

Table 8: WACC Calculation

Weighted Average Cost of Capital (WACC)	Estimations
Market Value of Debt	64,462 (book value)
Market Value of Equity	659,975
D/V	8.90%
E/V	91.10%
Tax rate	26.00% (average)
Cost of Debt	1.65%
Risk free rate	1.65% (Bloomberg)
Equity market risk premium	9.24% (Bloomberg)
β	1.07 (Bloomberg)
Re = rf + (rm-rf) * β	11.54%
WACC= [(E/V)*Re] + [(D/V)*Rd]*(1-t)	10.62%

Source: Author

The Weighted Average Cost of Capital will be applied in the further calculation in different models, and it is assumed to stay constant in the future.

6.2.2   Free Cash Flow to the Firm (FCFF)

Based on the previous assumption, the FCFF is projected and shown in the following table:

Table 9: FCFF Calculation

FCFF	2015H	2016	2017	2018	2019	2020
EBIT(1-T)	52,042	60,544	76,833	93,708	109,553	122,467
Δ NWCN	-12,839	-11,505	-1,108	-1,136	-1,165	-1,194
NET CAPEX	10,242	12,566	9,766	10,010	10,260	10,517
FCFF	54,639	59,483	68,176	84,834	100,457	113,144

Source: Author

As stated before, after 2020, the company will assumed to enter into a mature status with a zero growth rate. Since FCFF represents the future free cash flow to the firm, the discount factor should consider the risk of the whole company, and correspondingly WACC will be applied. By calculating the present value of future FCFF, Enterprise Value can be achieved. After adding the Non-Operating Assets (NOA), which are the sum of Cash and Equivalent and Marketable Securities in September 2015, the Firm Value is available for the further calculation of implied share price. The precise value is shown in the following table:

Enterprise value	950,853
NOA	41,601
Firm Value	992,454
Debt	64,462
Equity Value	927,992
Outstanding shares	5,753
Implied share price (1)	161.29

Source: Author

As of the end of September in 2015, the outstanding shares are 5,753 million, and the implied fair price given by this model is 161.29 dollars per share.

6.2.3 Free Cash Flow to the Equity (FCFE)

As illustrated in the previous section, FCFE represents the free cash flow available for the shareholders after all the expenses, reinvestment and debts repayment. Correspondingly, the discount factor of FCFE should only include the risk of the Equity, and Cost of Equity (Re) will be applied to calculate the present value of FCFE.

The value of FCFE can be achieved with the following formula:

$$FCFE_t = FCFF_t + (Debt_t - Debt_{t-1}) - Interest\ Expense_t \times (1 - tax\ rate) \quad (2)$$

The formula is very straightforward. Since FCFE is the free cash flow for the equity, it can be calculated by combining FCFF and the cash flow of debt. The use of debt

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can lead to the inflow of cash (issuing new debt) and also the outflow of cash (interest expense and repayments). Since the interest expense is paid before calculating income tax, the tax shield caused by the interest expense should also be considered.

Table 11: FCFE Calculation

	2015H	2016	2017	2018	2019	2020
FCFF	54,639	59,483	68,176	84,834	100,457	113,144
Interest expense*(1-t)	542	1,330	1,363	1,397	1,432	1,468
Increase in debt	29,167	44,474	2,723	2,791	2,861	2,933
FCFE	83,264	102,627	69,536	86,228	101,886	114,609

Source: Author

After discounting FCFE by Re, the present value of FCFE will be added with Non-operating Asset to get the Equity Value.

Table 12: Implied share price (2)

PV of FCFE	917,770
NOA	41,601
Equity Value	959,371
Outstanding shares	5,753
Implied share price (2)	166.75

Source: Author

As shown in the table, in this model the implied fair share price is around 166.75 dollars per share.

6.2.4 Dividend Discounted Model (DDM)

In the Dividend Discounted Model (DDM) the predicted future dividends are discounted back to get the value of shares. Apple started paying out dividends in 2012, and during the last three years it maintained a payout ratio higher than 20%. The average payout ratio of last three years is around 26%, and here it is assumed that this payout ratio would grow 5% each year until 2020.

Table 13: Dividends Projection

	2016	2017	2018	2019	2020	After 2020
Assumed payout ratio	31.1%	36.1%	41.1%	46.1%	51.1%	100%
Dividends	18,329	27,143	37,821	49,708	61,676	120,669

Source: Author

According to the previous assumptions, the company would enter into no growth model after 2020, and correspondingly the payout ratio will be 100% after 2020.

Table 14: Implied share price (3)

PV of dividend	739,281
Outstanding shares	5,753
Implied share price (3)	128.49

Source: Author

In this model, the implied share price is around 128.49 dollars per share, which is much lower than the implied share value achieved from Free Cash Flow model.

However, the company only started paying out dividends since 2012, and there is not enough historical data to predict the future dividends accurately. In addition, generally mature companies tend to have a high payout ratio, which is the important assumption applied to Apple in this thesis. Nevertheless, Apple actually maintained relatively low payout ratios in the last three years at around 26%.

6.2.5 Residual Income Model (RIM)

The basic idea of Residual Income Model (RIM) is that the return earned by the company should at least cover the cost of the capital, and this portion of return is called "Normal Profit". The exceeded (deficit) part, which is supposed to be the "Abnormal Profit", will increase (decrease) the value of the company. The Normal Profit of the company is equal to Invested Capital times WACC, representing the profit that the company should earn to satisfy its shareholders and debtholders. The Abnormal Profit, which actually refers to Economic Value Added (EVA), is the residual return by subtracting Normal Profit from earnings.

Table 15: EVA Calculation

	2015H	2016	2017	2018	2019	2020
EBIT*(1-t)	52,042	60,544	76,833	93,708	109,553	122,467
Normal profit	16,459	19,766	20,252	20,749	21,260	21,783
EVA	35,583	40,779	56,582	72,959	88,293	100,684

Source: Author

By discounting EVA by WACC, the present value of EVA represents the Market Value

Added (MVA). The sum of MVA, Non-Operating Assets (NOA) and Invested Capital

represents the implied Firm Value for the further calculations. After subtracting the

amount of Debt from Firm Value, the Equity Value can lead to the implied share price.

Table 16: Implied share price (4)

MVA	829,207
Invested capital	155,002
NOA	41,601
Firm value	1,025,810
Debt	64,462
Equity value	961,348
Outstanding shares	5,753
Implied share price (4)	167.09

Source: Author

The above table shows that in this model the fair share price should be 167.09 dollars

per share, which is higher than the share price (114.71 dollars per share) at the end of

September 2015. The explanation drawn from this model is that actual Market Value

Added (MVA) is lower than the MVA achieved from the above calculation. In order to

get the real MVA in the market, the above calculation will be reversed and Market

Capitalization will be the starting point.

Table 17: Implied MVA

Market cap	659,975
Debt	64,462
Firm value	724,437
Invested capital	155,002
NOA	41,601
Implied MVA	527,834

Source: Author

The result shows that the implied MVA provided by the market data is much lower than the MVA achieved from book value. The main reason is that the market future expectations for the company are lower than the value it can generate actually, which also explains the lower share price compared to the implied fair share price.

6.3 Relative Valuation Model (Multiples)

In Relative Valuation, the value of the company will be estimated by using the key indicators of other peers in the same or similar industry.

The main multiples applied in this model is shown below:

- $\dfrac{Price}{Sales}$

- $\dfrac{Price}{Book\ Value}$

- $\dfrac{Price}{Earnings}$

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Taking the industry peers list provided by Morning Star as a reference, the following

9 companies are selected as peer group in this model:

Table 18: Peer groups

	P/Sales	P/BV	P/E
Samsung Electronics Co Ltd	1.10	1.40	12.30
Sony Corp	0.50	1.80	52.50
Microsoft Corp	5.50	6.30	27.60
Casio Computer Co Ltd	1.00	2.00	13.80
Fingerprint Cards AB	6.40	17.20	19.60
Harman International Industries Inc	0.90	2.40	16.80
Fabrinet	1.70	2.90	26.60
Kyocera Corp	1.20	0.80	18.60
Haier Electronics Group Co Ltd	0.50	2.00	11.70
Average	2.09	4.09	22.17

Source: Morningstar

After getting the average value from the peer group, the implied share price could be

achieved by applying relative data of Apple.

Table 19: Implied share prices from multiples

P/Sales - Industry Average	2.09
Sales - Apple Inc	233,715
Implied share price (5)	84.85
P/Book Value - Industry Average	4.09
Book Value - Apple Inc	119,355
Implied share price (6)	84.82
P/Earnings - Industry Average	22.17
Earnings - Apple Inc	53,394
Implied share price (7)	205.72
Average implied share price	125.13

Source: Author

From the above table it is obvious that the implied share price provided by Price/Sales is much lower than the actual share price of the company; On the other hand, the implied share price provided by Price/Earnings is much higher than the market share price. These results indicate that compared to its peers, Apple is achieving higher profit margin. In addition, the implied share price provided by Price/Book Value is also much lower than the actual share price, which suggests that investors have higher expectations for Apple compared to other companies in the industry.

7. Comparison and Conclusion

In this sector the results of different valuation models will be taken into comparison, as well as the actual market price at the end of September in 2015. After comparing share value, there also is a simple discussion of various valuation models and recommendations for investors and the company.

7.1 Comparison of Share Value from Different Models

Figure 1: Comparison of share value from different models

	FCFF	FCFE	DDM	RIM	RV P/Sales	RV P/BV	RV P/E	Mkt Price @ 30th September 2015
Valur Per Share	161,29	166,75	128,49	167,09	84,85	84,82	205,72	114,71
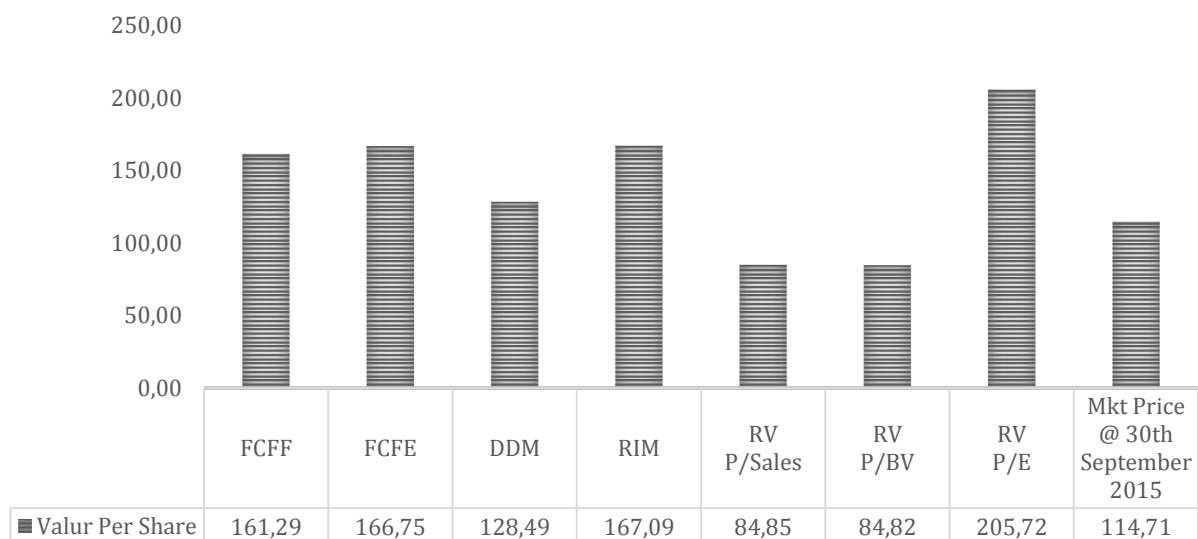
Source: Author

The above figure shows clearly that in most of the valuation models the value of shares of Apple is undervalued compared to the market price. However, result from Dividends Discounted Model (DDM) may not be reliable. As mentioned before, a mature company is supposed to have a high payout ratio, while Apple actually maintained relatively low payout ratios in the last three years. Additionally, Apple

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only started paying out dividends since 2012, and there is not enough data to have a better prediction about the future dividends.

In conclusion, the range of results from different valuation models [84.82, 167.72] covers the actual share price at the end of September in 2015, which is around 114.71 dollars per share, although most of the models suggest that the shares of Apple are worth more than the market price.

7.2 Comparison of Different Valuation Models

In this thesis four main models are applied: Free Cash Flow Model (FCF), Discounted Dividend Model (DDM), Residual Income Model (RIM) and Relative Valuation Model.

In Free Cash Flow Model, the present value of future cash flow is regarded as the fair value of the company. In other words, the value per share provided by this model is actually the Net Present Value (NPV) of cash flow per share. However, the future cash flow generated by the company is not necessarily the actual cash amount that can be received by the investors, while the company may retain part of its cash flow for investment or other consideration. Besides, the prediction of future cash flow involves many assumptions, and in the FCF model, the result could be very sensitive to the parameters. Here FCFF method is taken as an example.

The discount factor applied in FCFF method is WACC, which is 10.62% in this case. When the discount factor changes by 1%, the recalculated output is shown in the following table:

Table 20: Discount factor

Discount factor	9.62%	10.62%	11.62%
Output	180.17	161.29	145.68

Source: Author

That is, when the discount factor changes for around 1%, the output will change for almost 10%, which is ten times the change of discount factor. This phenomenon also appears in most of the Discounted Cash Flow Models (DCF), like the Dividend Discounted Model (DDM) and Residual Income Model (RIM). In other words, the prediction of the discount factor is one of the crucial steps in these models. However, in reality, the discount factor could change from time to time due to the macro environment and company situation, and it is difficult to predict the suitable discount factor for each future year, which is also one of the big limitations in this thesis.

While FCF regards the net present value of cash flow as the value of share, the intrinsic value implied by Dividend Discounted Model (DDM) represents the present value of future dividends. Unlike free cash flow, dividends are the amount of cash

flow investors could actually receive while holding the shares. In order to apply DDM, dividends should be sustainable and predictable, otherwise the model will not work and the result may be unreliable, which is the reason that this model is not suitable for Apple. Another limitation of this model is that it does not consider the reinvestment of dividends. In this model the dividends are simply assumed to be reinvested with the Cost of Equity (Re), while in this thesis Re is supposed to be constant. In other words, investors would be supposed to reinvest the dividends with the same return rate perpetually, which is obviously not realistic.

FCF model and DDM are two fundamental valuation models. However, they all require the prediction of future cash flows. When the free cash flows or dividends are unsustainable, these models cannot work well. Besides, for those companies who have negative free cash flow or do not intend to pay dividends, FCF model and DDM also cannot be applied. In this case, Residual Income Model (RIM) could be a solution by capturing the economic profit instead of relying on the forecast of future cash flow. However, RIM sometimes can be confusing for the investors when comparing the residual income of divisions with different sizes. In some cases the larger residual income may come from the bigger size rather than from better management.

All of the models discussed so far can be attributed to Absolute Valuation Model, and to be specific, they are all Present Value Models, which evaluate entity as the present

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value of future benefits. One of the big advantages of this traditional method is that the results are usually based on the intrinsic value of equity, however, as stated before, the output could be very sensitive to the input data and models are usually based on many assumptions.

On the other hand, Relative Valuation Model uses the ratios of the peer group in the same or similar industry to estimate the company's value, which reduces the dependence on too many assumptions before applying the model. Besides, the valuation process is simple and easy to understand as long as the multiples of the peer group are available in the market. However, one big assumption in this model is that the market is efficient and values the peer group accurately, while this is not always true in the real market. In addition, although it is better to choose the peer group with similar size and operation, this condition could also be difficult to fulfill sufficiently in reality, and the choices of multiples are usually subjective without clear rules or standards.

7.3 Recommendations to Investors and Company

Based on the results provided by several models applied in this thesis, the recommendation for investors is to buy or hold the shares of Apple. Most of the estimations indicate that the shares of Apple are underestimated in the market, which could be the combined effect of the fierce competition in the industry and the sudden

change of CEO. However, generally the market would tend to reflect the intrinsic value of the company and correspondingly the share price of Apple is supposed to increase to its fair value in the future.

For the company, it is important for Apple to maintain customers' loyalty and high-tech brand image, which also is the reason that Apple has achieved high profit margin so far. However, in recent years, the competition in electronics industry has become fiercer and it is obvious that Apple could not sustain determinant market share any more. Although the total sales amount still increased in 2015, according to International Data Corporation (IDC), the general market shares occupied by iOS system has decreased, and it is predicted to continue this declining trend in the following years. Besides, the latest technology introduced by Apple, including Apple Watch and Apple Pencil, did not achieve too much attention and good comments as before. The main reason is that similar products already exist in the market, yet the experience provided by Apple is not worthy. Apple Watch, which is actually the smartwatch connecting to iPhone, is supposed to be a multifunctional product helping people to finish daily operation without taking out cell phone. However, some companies, such as Sony, already produced similar products through Bluetooth several years before. Although Apple Watch could have better connection with iPhone, the price is relatively expensive and the functions inside are not mature yet. Because of the limitation of batteries, most apps and functions still need to be operated on iPhone. Some people even criticized that it is ridiculous to purchase a smartwatch

over two hundred dollars just to remind people to watch the phone. Another new product, Apple pencil, which can only be operated on the latest iPad Pro, is available on the market in 2015, while some customers also criticized that it is actually contradictory to the original idea of touchscreen introduced by Steve Jobs in 2007 at the initial iPhone reveal: "Who wants a stylus? You have to get em', put em' away. You lose them. Yuck."

Nevertheless, the general direction of Apple is still on the right track. Although the recent technology provided by the company did not achieve great success in the market, innovation is one of the determinant factors in electronics industry and new technology is necessary to sustain the position in the market. As stated at the beginning of this thesis, the future development of electronics industry would no longer focus only on the hardware, customers are looking for more interesting experience and innovation, where Apple did very well in the past few years. At the present stage, the traditional products of Apple, including iPod, iPhone, iPad and Mac, are already equipped with overall stable functions and designs, thus in addition to maintain the market shares with these traditional products, investment on R&D sector could be crucial for the company in the future. With the development of science, new and advanced technology, as well as talents, will continue showing up. Apple should always pay attention to the latest trend of science and technology, and also set up reasonable policy to attract and develop skillful employees. Merging and Acquisition (M&A) is also a good channel for the company to absorb advanced resources and new

technology. On the other hand, when there are no suitable investment projects, the

company is also suggested to payout more dividends to its shareholders.

8. Appendix

8.1 Income Statement

in $ millions	2013	2014	2015	2016	2017	2018	2019	2020
Net sales	$ 170.910	$ 182.795	$ 233.715	284.710	339.367	395.966	449.308	493.280
Cost of sales (excluding D&A)	$ 101.119	$ 105.789	$ 131.694	165.132	196.833	229.660	260.599	286.103
Gross margin	69.791	77.006	102.021	119.578	142.534	166.306	188.709	207.178
operating fixed cost	15.629	18.465	23.299	28.872	29.593	30.333	31.092	31.869
EBITDA	54.162	58.541	78.722	90.706	112.941	135.972	157.618	175.309
Depreciation and amortization	5.487	6.469	8.395	8.890	9.112	9.340	9.573	9.813
EBIT	48.675	52.072	70.327	81.816	103.829	126.633	148.044	165.496
interest income	1.616	1.795	2.921	3.999	4.099	4.201	4.306	4.414
interest expense	136	384	733	1.239	1.270	1.301	1.334	1.367
net interest income	1.480	1.411	2.188	2.760	2.829	2.900	2.972	3.047
EBT	50.155	53.483	72.515	79.056	100.999	123.733	145.072	162.449
Provision for income taxes	13.118	13.973	19.121	20.555	26.260	32.170	37.719	42.237
Net income	$ 37.037	$ 39.510	$ 53.394	$ 58.502	$ 74.739	$ 91.562	$ 107.353	$ 120.212

8.2 Balance Sheet

In $ Millions, unless otherwise specified	2013	2014	2015	2016	2017	2018	2019	2020
Current assets:								
Cash and cash equivalents	$14.259	$ 13.844	$ 21.120	25.704	26.346	27.005	27.680	28.372
Short-term marketable securities	26.287	11.233	20.481	18.078	18.530	18.993	19.468	19.955
Accounts receivable	13.102	17.460	16.849	19.107	19.585	20.074	20.576	21.091
Inventories	1.764	2.111	2.349	2.711	2.778	2.848	2.919	2.992
Deferred tax assets	3.453	4.318	5.546	7.029	7.204	7.384	7.569	7.758
Vendor non-trade receivables	7.539	9.759	13.494	18.053	18.505	18.967	19.441	19.927
Other current assets	6.882	9.806	9.539	11.230	11.511	11.799	12.094	12.396
Total current assets	73.286	68.531	89.378	101.912	104.460	107.071	109.748	112.492
Long-term marketable securities	106.215	130.162	164.065	203.906	209.004	214.229	219.585	225.075
Gross Property, plant and equipment	28.519	39.015	49.257	61.823	71.589	81.599	91.859	102.376
Accumulated depreciation & amortization	11.922	18.391	26.786	35.676	44.788	54.128	63.702	73.514
Property, plant and equipment, net	16.597	20.624	22.471	26.147	26.800	27.470	28.157	28.861
Goodwill	1.577	4.616	5.116	5.167	5.219	5.271	5.324	5.377
Acquired intangible assets, net	4.179	4.142	3.893	3.757	3.851	3.948	4.046	4.147
Other assets	5.146	3.764	5.556	5.773	5.917	6.065	6.217	6.372
Total assets	207.000	231.839	290.479	244.751	250.792	256.984	263.329	269.833
Current liabilities:								
Accounts payable	22.367	30.196	35.490	44.705	45.823	46.968	48.142	49.346
Accrued expenses	13.856	18.453	25.181	33.946	34.795	35.665	36.556	37.470
Deferred revenue	7.435	8.491	8.940	9.803	10.048	10.299	10.557	10.821
Commercial paper	0	6.308	8.499	11.451	11.737	12.031	12.331	12.640
Current portion of long-term debt	0	0	2.500	2.563	2.627	2.692	2.760	2.829
Total current liabilities	43.658	63.448	80.610	102.468	105.029	107.655	110.347	113.105
Deferred revenue - non-current	2.625	3.031	3.624	4.258	4.365	4.474	4.586	4.700
Long-term debt	16.960	28.987	53.463	94.922	97.295	99.727	102.221	104.776
Other non-current liabilities	20.208	24.826	33.427	42.992	44.066	45.168	46.297	47.455
Total liabilities	83.451	$ 120.292	$ 171.124	244.640	250.756	257.024	263.450	270.036
Shareholders' equity:	'							
Common stock and additional paid-in capital	19.764	$ 23.313	$ 27.416	32.290	33.097	33.925	34.773	35.642
Retained earnings	104.256	87.152	92.284	86.824	88.994	91.219	93.500	95.837
Accumulated other comprehensive income/(loss)	-471	1.082	-345	-295	-303	-310	-318	-326
Total shareholders' equity	123.549	111.547	119.355	118.819	121.789	124.834	127.955	131.154
Total liabilities and shareholders' equity	$207.000	$ 231.839	$ 290.479	363.458	372.545	381.858	391.405	401.190

8.3 Working Capital

$ millions	2014	2015	2016	2017	2018	2019	2020
Accounts receivable	17.460	16.849	19.107	19.585	20.074	20.576	21.091
Inventories	2.111	2.349	2.711	2.778	2.848	2.919	2.992
Vendor non-trade receivables	9.759	13.494	18.053	18.505	18.967	19.441	19.927
operating current assets	**29.330**	**32.692**	**39.871**	**40.868**	**41.889**	**42.937**	**44.010**
Accounts payable	30.196	35.490	44.705	45.823	46.968	48.142	49.346
Accrued expenses	18.453	25.181	33.946	34.795	35.665	36.556	37.470
Deferred revenue	8.491	8.940	9.803	10.048	10.299	10.557	10.821
operating current liabilities	**57.140**	**69.611**	**88.454**	**90.666**	**92.932**	**95.256**	**97.637**
net operating working capital needs	**-27.810**	**-36.919**	**-48.583**	**-49.798**	**-51.043**	**-52.319**	**-53.627**
Deferred tax assets	4.318	5.546	7.029	7.204	7.384	7.569	7.758
Other current assets	9.806	9.539	11.230	11.511	11.799	12.094	12.396
non operating current asset	**14.124**	**15.085**	**18.259**	**18.716**	**19.183**	**19.663**	**20.155**
Commercial paper	6.308	8.499	11.451	11.737	12.031	12.331	12.640
Current portion of long-term debt	0	2.500	2.563	2.627	2.692	2.760	2.829
non operating current liabilities	6.308	10.999	14.014	14.364	14.723	15.091	15.468
net non operating working capital needs	**7.816**	**4.086**	**4.246**	**4.352**	**4.461**	**4.572**	**4.686**
total net working capital needs	**-19.994**	**-32.833**	**-44.338**	**-45.446**	**-46.582**	**-47.747**	**-48.941**
Δ NWCN		**-12.839**	**-11.505**	**-1.108**	**-1.136**	**-1.165**	**-1.194**

8.4 Beta Regression

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