



UNIVERSITY OF INDONESIA

**FACEBOOK, INC. IPO VALUATION USING LOGISTIC
FUNCTION AND FAMA/FRENCH THREE FACTORS MODEL**

MASTER THESIS

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management**

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**FACULTY OF ECONOMICS
MASTER OF MANAGEMENT
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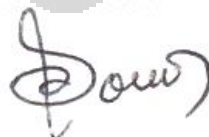
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ABSTRAK

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Judul : Valuasi IPO Facebook, Inc. Menggunakan Fungsi Logistik dan Model Tiga Faktor Fama/French

Tesis ini membahas mengenai penghitungan *value* dari Facebook, Inc. saat melakukan penawaran saham perdana di bursa saham. Penggunaan internet sebagai *platform* dalam menghasilkan pendapatan memberikan tantangan tersendiri dalam melakukan valuasi bagi perusahaan semacam ini. Pada dasarnya, semua aspek fundamental dari valuasi tetap berlaku. Penelitian ini menggunakan fungsi logistik untuk memproyeksikan pertumbuhan pengguna Facebook serta pendapatan Facebook, Inc. Untuk komponen *cost of equity*, penelitian ini menggunakan Model Tiga Faktor Fama/French. Tiga skenario dikembangkan untuk mengetahui potensi dari Facebook, Inc. Hasil perhitungan harga wajar saham untuk skenario 1, 2, dan 3 adalah \$14.24, \$19.04, dan \$25.00 masing-masing.

Kata kunci:

Valuasi, Perusahaan Internet, IPO, Model Tiga Faktor Fama/French, Fungsi Logistik

ABSTRACT

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The purpose of this thesis is to determine the value of Facebook Inc. at the time of its initial public offering (IPO). Its use of internet as platform to generate revenue has poses several challenges in valuing this kind of firm. However, every fundamental aspects of valuation also holds true for internet firms. This research used logistic function to project user growth and hence Facebook Inc. revenue. For cost of equity component, this research used Fama/French Three Factors Model. Three scenarios are developed to examine the potentials of Facebook, Inc. The value per share under scenario1, 2, and 3 are \$14.24, \$19.04, and \$25.00, respectively.

Keywords:

Valuation, Internet Company, IPO, Fama/French Three Factors Model, Logistic Function

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CHAPTER 1

INTRODUCTION

1.1 Background

Men have created wealth throughout the ages, and it has advanced the civilization of the human race. Wealth takes many forms. In the past, wealth was generated primarily through agriculture in the form of land or livestock ownership. Goods exchange was not seen as a primary mean to create wealth. Trade was deemed secondary to agriculture in the creation of wealth although labor specialization, demand and supply in a market, profit motives, money, and banking activities already existed in ancient times. Much of the trade was controlled by religious or political institutions (Sobel, 2000).

Adam Smith in *Wealth of Nations* said that wealth is not a fixed concept. The value of something is determined by how it is perceived by people and how much people are willing to pay for it. Nowadays, wealth in developed countries is most likely intangible. This encompasses wealth in the form of, for example, currency, stocks, bonds, futures and options (Beinhocker, 2006). However, many people still accumulate tangible wealth in the form of land, real estate, and gold. A person's wealth is measured by the value of these assets.

The creation of corporations as a separate legal entity from their owners has brought massive consequences. Corporation was born in the era of Mercantilism, the economic ideology that (zero-sum) control of land is the foundation of all economic power (Rao, 2011). In the New Year's Eve of 1600, the British East India Company was born and granted Royal Charter, making it the oldest among other similar companies such as the European East Indies Company. Despite its semi-sovereign status, privileges to rule territories and raise armies, its structure of governance, financing, and business dynamics resembles that of modern corporation (Robins, 2006).

Legally, corporations can act on behalf of their own, own assets, sue or be sued, generate income, and be levied taxes on. As a consequence, not only men could acquire wealth; corporations were able as well. It is not unusual for individuals to use corporations as a vehicle to amass wealth. Business/company owners (actively managing, passively owning or being the business himself/herself i.e. professionals) face lower effective tax rates than those working for salary (Faisal, 2009). This is not even taking in considering tax haven entities which are used to gain tax advantages, thereby amassing even more wealth (Barber, 2007).

The Dotcom bubble in 1999 has shown that the behavior of amassing wealth could be detrimental to the public. The stratospheric price of internet companies' stocks induced greater fools to join the game. In late 1990's, many of these companies were facing their all-time high stock price, just to see it slump after the bubble burst and no more greater fools join the game. Many companies survived and are still on the market, however. Yahoo!, eBay and Amazon.com are a few examples. Even further, new companies, such as Google, Zynga, LinkedIn, and Netflix, emerged and went public. The founders and investors of these companies raked in enormous amount of cash or saw their individual net worth skyrocket after their company goes public.

The highly optimistic view of internet industry enshrouded investors during the end of 90's decade brought other consequences. WorldCom case in 2002 warrants a mention to remind investors regarding this optimism. WorldCom was a typical New Economy company with business in providing long-distance telecommunication and carrier of internet traffic and electronic commerce. Its strategy was inorganic, acquiring other company (UUNET, MCI, and CompuServe) using its own highly leveraged stocks to raise debt to make the otherwise expensive acquisitions possible. This gives way to unhealthy growth. Analysts and investment bankers ignore the fundamentals of the company (Sridhar, 2002). Its mount of debt was finally overloaded in 2002. One month after it disclosed that it had inappropriately booked \$3.8 billion in expenses, WorldCom filed for Chapter 11 bankruptcy protection (Beltran, 2002). Its stocks, which were used to collateralized the debt, dropped by 80 percent (Sridhar, 2002).

Facebook, Inc. was one of the companies that rode the wave of the internet. It was founded by Mark Zuckerberg in 2004 together with Eduardo Saverin, Dustin Moskovitz, and Chris Hughes. It was intended as a website to connect Harvard students. Later, it included other universities such as Stanford, Yale, MIT, Boston University, and other Ivy League universities. After 8 years, it made plans to go public and raise US\$16 billion from the market. At US\$16 billion, Facebook's IPO would be the biggest Internet IPO in history and beat Google's offering of US\$1.9 billion in 2004. Facebook's IPO also has beat Infineon's US\$5.9 billion offering, which is back then the biggest global technology IPO on record (Epstein, 2012). While many people are enthusiastic of this IPO, few remain skeptical. The market had learned its lesson: the internet euphoria of the 1990's is no longer prevails. Investors use the fundamental approach to value internet companies despite adjustments needed.

Every investor wants to know the 'true' worth of the company he/she buys, and whether the company is undervalued or overvalued relative to its market value. The growth of the investment value determines the wealth of investors. Thus, valuation is an important tool for investors to measure their investment value, albeit being imprecise.

There are four main valuation models: asset-based valuation, relative valuation, contingent claim valuation and discounted cash flow valuation. These four models usage are subject to the characteristics of the company being valued. For some companies, relative valuation is convenient. For other companies, contingent claim valuation would be more appropriate.

This research will employ Free Cash Flow to the Firm to value Facebook Inc. Revenue growth will be projected using logistic functions, indirectly. Logistic function assumes that there is no infinite growth. There is carrying capacity that limits the growth. The focus on revenue growth is appropriate as Facebook is in its growth phase of life cycle. At this phase, revenue growth rate changes as the company gets larger (Damodaran, 2010). For the cost of equity, this research uses Fama/French Three Factors Model.

Three growth scenarios will be considered in this research. In the first scenario, Facebook, Inc. is assumed to rely solely on its online display ads and virtual goods payment as sources of revenue. In the second scenario, in addition to sources of revenue in the first scenario, Facebook, Inc. is assumed to exploit mobile advertising and mobile apps as its new source of revenue. Logistic function is used to estimate the growth of mobile ad and app market size growth. In the third scenario, in addition to sources of revenue in the second scenario, Facebook, Inc. is assumed to capitalize on social commerce. Logistic function will also be employed to estimate the growth of social commerce market size. The value per share under these three scenarios will be computed. Also, this research tries to determine whether Facebook's IPO offer price of \$38 per share is overpriced or underpriced.

1.2 Problems Identification

- What is the carrying capacity of Facebook, Inc. user using logistic function?
- What is the cost of equity for Facebook, Inc. using Fama/French Three Factors Model?
- What is the value of Facebook, Inc. per share under:
 - a. Scenario 1;
 - b. Scenario 2; and
 - c. Scenario 3?
- Is the offer price \$38.00 per share underpriced or overpriced?

1.3 Research Objectives

The objectives of this research are:

- To determine Facebook, Inc. user growth carrying capacity using logistic function

- To determine the cost of equity of Facebook, Inc. using Fama/French Three Factors Model
- To determine the value of Facebook, Inc. equity under each of the three scenarios; and
- To determine whether the offer price of \$38.00 per share of Facebook, Inc. is fair relative to its fundamentals

1.4 Research Contributions

Research contributions are:

- To gain understanding of the process of projecting a company's revenue growth using logistic function
- To gain understanding of the process of obtaining cost of equity using Fama/French Three Factors Model
- To gain understanding of the process of the valuation of a company's operating assets
- To be a consideration for investors to make a decision on whether to invest in Facebook, Inc.; and
- To be a reference for other scholars researching in the topic of valuation.

1.5 Scope of Research

The scope of this research is determining the value of Facebook, Inc. equity and its value per share using the free cash flow to the firm method under each of the three scenarios. The valuation is done to determine the fairness of the offer price in its IPO.

1.6 Research Method

This research uses the literature review method in collecting data. Company-specific data will be taken from Facebook, Inc. SEC filings. In addition, several online sources will also be utilized.

1.7 Thesis Structure

This thesis consists of five chapters as follows: (i) Introduction; (ii) Theoretical Framework; (iii) Fundamentals; (iv) Analysis; and (v) Conclusions and Suggestions. The brief descriptions for each chapter are as follow:

Chapter 1: Introduction

This chapter comprises of Background, Problems Identification, Research Objectives, Research Contributions, Scope of Research, Research Method and Thesis Structure. This chapter serves as a bird-eye-view of the content of the research.

Chapter 2: Theoretical Framework

This chapter comprises of literature review and theories used in this research.

Chapter 3: Fundamentals

This chapter explains global economy outlook, industry analysis and trends, and company profile of Facebook, Inc.

Chapter 4: Analysis

This chapter comprises of the calculation of value and its analysis.

Chapter 5: Conclusions and Suggestions

This chapter comprises of the conclusions of the research. Suggestions would also be described here for future research.

CHAPTER 2

THEORETICAL FRAMEWORK

2.1 Valuation Method

A person's wealth is determined by the value of his/her assets. An asset can be valued given that the appropriate approach is used. The character of the asset determines the valuation approach. Thus, valuing a real asset will be different from valuing financial asset such as publicly traded stock albeit both of them share few things in common regarding basic principles (Damodaran, 2002).

One way to value a company stock is to discount all of its future cash flow using an appropriate discount rate. The discount rate used must reflect the riskiness of the cash flow. A company's cash flow was not only generated by existing assets that it has but also by new assets in the future. The creation of new assets in the future depends on investments the company commits to make (Damodaran, 2010).

There are four basic approaches in valuation: asset-based valuation, relative valuation, contingent-claim valuation and discounted cash flow valuation. Emphasis will be given to discounted cash flow valuation as this research uses free cash flow to equity.

2.1.1 Asset-Based Valuation

Valuing a company can be done by valuing each of its assets. This individual asset's value is then aggregated to arrive at firm value. There are two kinds in this approach: liquidation value and replacement cost. Asset-based valuation is a derivation from three other valuation approaches because in obtaining liquidation value and replacement cost, one or another of the three approaches will be used (Damodaran, 2002).

2.1.2 Relative Valuation

In this approach, an asset is valued by comparing it to similar asset in the marketplace. This approach relies on the assumption that, averagely, market prices stocks correctly. Any error on individual stocks will be corrected over time. Multiple of a company is used in relative valuation. This multiple can be based on either comparables or fundamentals. The former is more common in relative valuation (Damodaran, 2002).

2.1.3 Contingent Claim Valuation

There are assets that its cash flow depends on whether an event happens. Assets that have this option-like feature are best valued by using option pricing models. The examples of these are undeveloped oil reserve and patent of a product. The owner of the option will only exercise his right if the value of the underlying asset exceeds a pre-specified value for a call or less than a pre-specified value for a put. The value of an option is a function of its current value, its strike price, the variance in the value of the underlying asset, the time to expiration of the option and the riskless interest rate (Damodaran, 2002).

2.1.4 Discounted Cash Flow Valuation

Issuing financial asset, such as stock, is a way of a company to fund its operation. The fund received from investors is then used to buy assets that generate cash flow. The investors have right to this cash flow. The value of the stock that he owns is determined by the sum of this cash flow, discounted to its present value. The discounted cash flow valuation was pioneered by Alfred Marshall and Bohm-Bawerk in the early of twentieth century while the modern principles of valuation were developed by Irving Fisher in two of his book, *The Rate of Interest* in 1907 and *The Theory of Interest* in 1930 (Damodaran 2010).

The aim of discounted cash flow valuation was to estimate intrinsic value. Intrinsic value is a value attached by an all-knowing analyst with access to all information available right now and a perfect valuation model. By using

discounted cash flow, an analyst is looking into the fundamentals of a company (Damodaran 2010).

According to Damodaran (2002), there are several model of discounted cash flow valuation: equity valuation, firm valuation and adjusted present value (APV) valuation. In equity valuation, the cash flow used is the residual cash flow after satisfying all expense, tax obligations, reinvestment needs, interest and principal payment. The discount rate used is cost of equity; the required rate of return of equity investors. Mathematically:

$$\text{Value of equity} = \sum_{t=1}^{t=n} \frac{CF \text{ to equity}_t}{(1 + k_e)^t} \quad (2.1)$$

where n = Life of the asset

$CF \text{ to equity}_t$ = Expected cash flow to equity in period t

k_e = Cost of equity

In firm valuation, the cash flow used is the residual cash flow after satisfying all operating expenses, reinvestment needs, and taxes, but before any payments to either debt or equity holders. The discount rate is the weighted average cost of capital (WACC). This is sum of the cost of debt and cost of equity weighted by their market value proportions. Mathematically:

$$\text{Value of the firm} = \sum_{t=1}^{t=n} \frac{CF \text{ to the firm}_t}{(1 + WACC)^t} \quad (2.2)$$

where n = Life of the asset

$CF \text{ to the firm}_t$ = Expected cash flow to the firm in period t

WACC = Weighted average cost of capital

In adjusted present value valuation, the firm is valued as if it was financed using only equity. Then, the value added (or taken away) by debt is considered. This is done by discounting the tax benefits that flow from debt to its present value. Expected bankruptcy costs are also considered. Mathematically:

$$\begin{aligned}
 \text{Value of the firm} \\
 &= \text{Value of all equity financed firm} + \text{PV of tax benefits} \\
 &+ \text{Expected bankruptcy costs}
 \end{aligned}
 \tag{2.3}$$

2.2 Free Cash Flow to the Firm

Free cash flow to the firm, as Damodaran (2002) put it, is the sum of the cash flows to all claim holders in the firm such as stockholders, bondholders, and preferred stockholders. This free cash flow is then discounted at weighted average cost of capital. Free cash flow to the firm is formulated as:

$$\begin{aligned}
 FCFF = EBIT * (1 - \text{Tax Rate}) + \text{Depreciation} - \text{Capital Expenditure} \\
 - \Delta \text{Working Capital}
 \end{aligned}
 \tag{2.4}$$

The latter terms after after-tax EBIT can be put into one term 'reinvestment'. Thus, the equation becomes:

$$FCFF = EBIT * (1 - \text{Tax Rate}) - \text{Reinvestment}
 \tag{2.5}$$

The reinvestment in the second term is calculated by using revenue-to-capital ratio. Capital is defined as book value of equity and debt, minus cash and marketable securities. As of end of March 2012, Facebook, Inc. revenue-to-capital ratio stands at 1.59. Reinvestment is calculated as follows:

$$\text{Reinvestment}_t = \frac{\text{Revenue}_t - \text{Revenue}_{t-1}}{\text{Revenue to Capital Ratio}}
 \tag{2.6}$$

Meanwhile, the weighted average cost of capital is formulated as:

$$WACC = \frac{E}{D + E} * \text{Cost of Equity} + \frac{D}{D + E} * \text{Cost of Debt} * (1 - \text{tax rate})$$

(2.7)

D and E represent market value of debt and market value of equity. Tax rate used is marginal tax rate. For Facebook, Inc., the marginal tax rate is 35 percent, the federal income tax rate. The equation above assumes there is no preferred stock.

2.3 Growth

2.3.1 Logistic Function in Revenue Projection

Logistic Function describes a growth process under competition. The shape of the curve resembles the letter S. The logistic function was common in demography or biology context. However, it is also applicable to business and economics context. Modis (2009) asserts that whenever there is growth in competition (survival of the fittest), a 'population' will evolve along an S-curve, be it sales of a newly launched product, the diffusion of a new technology or idea, an athlete's performance, or the life-long achievement of an artist's creativity. Further, because every niche in nature -and in the marketplace- generally becomes filled to completion, S-curves possess predictability.

This function will be applied to Facebook users' growth. At first, the growth of Facebook users is exponential. Exponential growth assumes infinity, without limitation of resources and without any competition against competitors. However, this is unrealistic as there is only finite number of world population and finite number of user devices (PC or smartphones). Thus, after certain point, the growth of Facebook users will be leveled off. The users' number growth will be the key to revenue growth of Facebook, Inc and thus its valuation. In addition, logistic function will also be applied to estimate mobile ad and apps market size and social commerce market size. The application of logistic function to project

Facebook users' growth was developed by Cauwels and Sornette (2011). Much of the discussion here is derived from their work.

2.3.1.1 Logistic Function

The population at time period t under competition that follows s-curve shape is formulated as follows:

$$P(t) = \frac{KP_0 e^{rt}}{K + P_0(e^{rt} - 1)} \quad (2.8)$$

where

P_0 = Initial population

r = Initial growth rate

K = Carrying capacity (maximum number of population)

$P(t)$ = Population at t

2.3.1.2 Initial Growth Rates and Carrying Capacity

To obtain r , initial growth rate, the discrete growth rate of logistic function will be fitted to continuous growth rate of logistic function. The discrete growth rate of logistic function, R_i^d , between two observations P_i and P_{i-1} at time t_i and t_{i-1} , is as follows:

$$R_i^d = \frac{\ln\left(\frac{P_i}{P_{i-1}}\right)}{(t_i - t_{i-1})} \quad (2.9)$$

The continuous growth rate of logistic function is as follows:

$$R_i^c = \frac{1}{P} \frac{dP}{dt} = r \left[1 - \frac{P}{K} \right] \quad (2.10)$$

The fitted form of discrete growth rate function into continuous growth rate function is as follows:

$$\frac{\ln\left(\frac{P_i}{P_{i-t}}\right)}{t_i - t_{i-1}} = r \left[1 - \frac{P_i}{K}\right] \quad (2.11)$$

Equation 2.11 is expressing $y = R_i^d$ as a function of $x = P_i$ using linear regression $y = a + bx$. From this regression, $a = r$ (initial growth rate) and $-a/b = K$ (carrying capacity).

Data used for this regression is obtained from Facebook, Inc. prospectus. Quarterly Monthly Active Users (MAU) is used as proxy for Facebook users. The data is attached in Attachment 2.1

2.3.1.3 Initial Population

Initial population can be calculated by rearranging Equation 2.8. This is done after K and r are obtained. Initial population for every observation P_i at time t_i is:

$$P_{0,i} = \frac{-P_i K}{P_i(e^{rt_i} - 1) - Ke^{rt_i}} \quad (2.12)$$

Figures in Attachment 2.1, K , and r will be used to obtain initial population for every observation. The average of them is then used.

2.3.1.4 Revenue per User

Revenue per user was obtained by regressing time period (t) to actual revenue per user per year. Revenue per user per year will be the dependent variable. The data used is attached in Attachment 2.2

2.3.1.5 Operating Margin Projection

As the company grows, the margins will evolve and move toward its optimum level. This is also applicable to Facebook. Currently, operating margin of

Facebook stands at 43.34 percent (before adjusting for research asset and capitalized operating lease). It is projected that at the terminal phase operating margin rate will stand at 35% under scenario 1, 33% under scenario 2 and 30 % under scenario three. The gradual change of this percentage is given by the following equation (Damodaran, 2002):

$$Rate_t = \frac{Stable\ Rate - Rate_{t=0}}{n} * (n - t) \quad (2.13)$$

where n = Number of years of cash flow

This equation will be employed for gradual change in operating margin, debt-to-equity ratio and revenue-to-capital ratio.

2.3.2 Mobile Advertising and Apps Revenue

Facebook has introduced mobile app since April 2004. However, it hasn't effectively monetized its mobile presence. Scenario 2 will incorporate the mobile ads and apps centre revenue to the valuation. Facebook's share of revenue will be estimated from global mobile ad and apps market size. The data used is attached in Attachment 2.3. Attempts will be made to see if they fit into logistic function.

2.3.3 Social Commerce Revenue

Facebook has potential to develop platform for people to sell and buy real, physical goods. People can buy goods from other people or businesses and pay them using Facebook Credits (which is now used to buy virtual goods of games in Facebook and Facebook cuts 30% of the goods value for the services). This opportunity will be incorporated into scenario 3 where Facebook continues its display ads and payment for virtual goods business, developed mobile ads and apps centre and later, develop social commerce. The data used is attached in Attachment 2.4. Facebook's share will be estimated. Attempt will also be made to see if it fits into logistic function.

2.4 Cost of Equity and Cost of Debt

2.4.1 Risk and Return Relationship Models

Researchers have developed theories and models to explain risk and return relationship. This relationship will ultimately determine whether the return of an investment is 'fair' with regard to its risks. A fair return will be the expected return of an investment. In the case of stock investment, it is the cost of equity. The risk-return relationship models are Markowitz model, Sharpe-Lintner-Mossin model, Multifactor model, and Arbitrage Pricing Theory. Each will be described briefly below.

Harry Markowitz developed a model to quantify the effect of diversification in investment in 1952. He asserts that for any given risk level, investors only interested in portfolio with highest expected return. This portfolio can be found on *efficient frontier of risky assets*. This line is a set of points, representing many portfolios, that minimizing the variance for any target expected return (Bodie, Kane, & Marcus, 2011).

This model has weaknesses. It requires a huge amount of estimates. For example, an analysis of 50 stocks would require 1,325 estimates. If the stocks being analyzed were 100 stocks, the number of estimates required would be 5,150. In addition, Markowitz model application, errors in estimation of correlation coefficients can be nonsense and inconsistent (Bodie, Kane, & Marcus, 2011).

In 1964, Sharpe, Lintner and Mossin developed capital asset pricing model (CAPM). This model has been the cornerstone of modern financial economics. It decomposed risk into non-diversifiable risk (systematic; market) and diversifiable risk (company-specific). This model has two functions: providing a benchmark rate of return and providing guess to the expected return of an asset that have not yet been traded. The basic version of capital asset pricing model has several assumptions which simplifying the realistic world. The assumptions are:

- Each investor is endowed with small wealth compared to total wealth of all investors. There are many investors and they are price-takers

- All investors plan for one identical period
- Investments are limited to a universe of publicly traded financial assets
- Investors don't pay taxes on returns and no transaction costs
- All investors are rational mean-variance optimizer i.e. they use Markowitz model
- All securities are analyzed in the same way by investors and the same economic view of the world is also being shared

In the real world, CAPM fails empirical tests. One test using S&P 500 index found that the data reject the hypothesis that alpha values are uniformly zero at acceptable levels of significance. Despite this fact, CAPM is widely accepted in many developed countries for two reasons: the logic of decomposing market risk and company-specific risk is convincing and the less-formal evidence that the efficient market condition is not all that far from the reality (Bodie, Kane, & Marcus, 2011).

Multifactor model is one of CAPM refinement. In CAPM, risk was decomposed into market risk and company-specific risk. Market risk, systematic and non-diversifiable, is driven by various macro factors. CAPM summarizes this various macroeconomic forces into a single factor. Multifactor model refined that assumption and introduced several factors as a proxy of market risk. These factors include uncertainty about business cycle, inflation, interest rate, etc hence the name Multifactor model (Bodie, Kane, & Marcus, 2011).

Arbitrage Pricing Theory was developed by Stephen Ross in 1976. This model tries to link between risk and return in the same way as CAPM despite its different approach to security market line. It relies on three key propositions: security returns can be described by a factor model, there are sufficient securities to diversify away idiosyncratic risk, and the security markets do not allow for arbitrage opportunities. Arbitrage Pricing Theory can be applied to single factor model and multifactor model (Bodie, Kane, & Marcus, 2011).

2.4.2 Fama/French Three Factors Model

Eugene F. Fama and Kenneth R. French in 1993 proposed several multifactor models of risk and return for stocks and bonds in their article journal *Common Risk Factors in the Returns on Stocks and Bonds*. One of the models, later known as Fama/French Three Factors Model, is as follows:

$$E(R_i) - R_f = b_i[E(R_M) - R_f] + s_iE(\text{SMB}) + h_iE(\text{HML}) \quad (2.14)$$

The expected return of a portfolio over a risk-free rate is explained by three factors: the excess return on a broad market portfolio $[E(R_M) - R_f]$, the expected difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks $E(\text{SMB})$, and the expected difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks $E(\text{HML})$. The factor sensitivities, b_i , s_i , and h_i are the slopes in the time-series regression as below:

$$R_i - R_f = \alpha_i + b_i(R_M - R_f) + s_i\text{SMB} + h_i\text{HML} + \varepsilon_i \quad (2.15)$$

The Fama/French factors (SMB and HML) are constructed using six value-weight portfolios formed on size and book-to-market. SMB is the average return on the three small portfolios minus the average return on the three big portfolios. Mathematically:

$$\text{SMB} = 1/3 * (\text{Small Value} + \text{Small Neutral} + \text{Small Growth}) - 1/3 * (\text{Big Value} + \text{Big Neutral} + \text{Big Growth}) \quad (2.16)$$

Meanwhile, HML is the average return on the two value portfolios minus the average return on the two growth portfolios. Mathematically:

$$HML = 1/2 * (Small Value + Big Value) - 1/2 * (Small Growth + Big Growth)$$

(2.17)

Market risk premium, $R_m - R_f$, is the value-weight return on all NYSE, AMEX and NASDAQ stocks minus one-month Treasury bill rate. It includes all NYSE, AMEX and NASDAQ firms (French, 2012).

This research will use Fama/French model to obtain cost of equity. Two public companies are selected as Facebook, Inc. comparables (discussed in chapter 3.2.3). Their annual return will be used in time-series regression. Every regression will yield b_i , s_i , and h_i . The average of each slope will be used in Equation 2.14 to obtain $E(R_i)$ for Facebook, Inc.

2.4.3 Cost of Debt

Cost of debt is the cost an entity borne for borrowing funds from creditor. According to Damodaran (2010), there are several ways to determine the cost of debt of a firm:

- Bond yield. If a firm has outstanding bond that trades regularly, the yield to maturity of that bond can be used as cost of debt for the calculation of cost of capital.
- Bond rating. If the firm has outstanding bond that do not trade regularly, the default spread associated with its rating is estimated. This default spread is then added to risk free rate to obtain cost of debt.
- Synthetic rating. The last alternative is to synthesize a rating for the firm by using financial ratios. The most used ratio is interest coverage ratio which is EBIT divided by interest expense. It measure how many times the EBIT can cover interest expense. A ratings list is then made by assessing rated firms and its financial characteristics within each ratings class.

As Facebook, Inc. does not have any loan or conventional debt, synthetic rating will be employed to obtain its cost of debt.

2.5 Terminal Value

One of the assumptions when valuing a company is going-concern assumption. It is not possible, however, to project the cash flow infinitely into the future. Thus, a closure is put at the end. This closure captures all value of the firm (or equity) beyond the projection period. The closure is called terminal value. Mathematically (Damodaran, 2002):

$$Terminal\ Value_t = \frac{FCFF_{t+1}}{WACC_{t+1} - Stable\ Growth_t} \quad (2.18)$$

At and beyond terminal phase, the firm grows at stable growth rate and this rate cannot be higher than growth rate of the economy in which the firm generates revenue. The terminal value is then discounted to its present value and is added to the sum of discounted cash flow. WACC at the terminal phase can be higher than current WACC because of additional debt raised by company. It is not uncommon for a firm to increase its debt-to-equity ratio to its optimum level as the firm matures. For Facebook, Inc., the debt-to-equity ratio for scenario 2 and 3 at the terminal phase will be higher than at year 0 because of additional lease (operating and capital) to acquire the necessary network facilities and equipment in order to support new source of revenue. In addition, to maintain consistency, Reinvestment at terminal phase will be equal to stable growth rate divided by return on invested capital at terminal phase.

2.6 Facebook, Inc. Considerations

2.6.1 Life Cycle

Every company is progressing through their life cycle at which the valuation issues and concerns are different. Damodaran (2010) explains them using the following table:

Table 2.1 Valuation Issues through Life Cycle

Issues	Idea or Start Up Companies	Young Growth	Mature Growth	Mature	Decline
Valuation Players/Setting	Owners Angel Finance	Venture Capitalists IPO	Growth Investors Equity Analysts	Value Investors Private Equity Funds	Vulture Investors Break-up Valuations
Revenue/Earnings Issues	1. What is the potential market? 2. Will this product sell & at what price? 3. What are the expected margins?	1. Can the company scale up? (How will revenue growth change as firm gets larger?) 2. How will competition affect margins?	1. As growth declines, how will the firm's reinvestment policy change? 2. Will financing policy change as firm mature?	1. Is there the possibility of the firm being restructured?	Low, as projects dry up
Revenue/Current Operations	Nonexistent or low revenues/negative operating income	Revenues increasing/income still low or negative	Revenues in high growth/operating income also growing	Revenue growth slows/operating income still growing	Revenues and operating income growth drops off
Survival Issues	Will the firm make it?	Will the firm be acquired?		Will the firm be taken private?	Will the firm be liquidated/go bankrupt?
Key Valuation Inputs	Potential market margins Capital investment Key person value?	Revenue growth Target margins	Return on capital Reinvestment rate Length of growth	Current earnings Efficiency growth Changing cost of capital	Asset divestiture Liquidation values
Data Issues	No history No financials	Low revenues Negative earnings Changing margins	Past data reflects smaller company	Numbers can change if management changes	Declining revenues Negative earnings?
Operating History	None	Very limited	Some operating history	Operating history can be used in valuation	Substantial operating history
Comparable Firms	None	Some, but in same stage of growth	More comparable, at different stages	Large number of comparables, at different stages	Declining number of comparables, mostly mature
Source of Value	Entirely future growth	Mostly future growth	Portion from existing assets/future assets still dominates	More from existing assets than future assets	Entirely from existing assets

Source: Damodaran, Aswath. *The Dark Side of Valuation*. 2010 p.vii and p.8 combined

Facebook, Inc. is in transition from young growth to mature growth. Few facts can be observed to confirm this statement. Recently, Facebook, Inc. is preparing its initial public offering and it was backed by venture capitalists such as Accel Partners, Greylock Partners, and MeriTech Capital Partners. After going public,

growth investors will consider to add Facebook, Inc. common stock into their portfolio.

Facebook revenue is still growing albeit there is net margins decrease in the first quarter of 2012. In the last eight quarters, net margins averaged 28.75% (excluding Q1 2012) while in Q1 2012 net margins stood at 19 percent. Over time, competition will squeeze the margins. Facebook, Inc. has been earning positive income since 2009.

Facebook, Inc. acquisition by external party is unlikely because management and current shareholders own a block of Class B common stock which has ten voting rights attached to it. The initial public offering offers Class A common stock which only has one voting rights. Mark Zuckerberg, the founder and CEO of Facebook, Inc. retains more than 50 percent of voting rights.

Revenue growth and target margins are key valuation inputs of Facebook, Inc. at this phase of life cycle. Margins have not stabilized yet as Facebook, Inc. still explores new source of revenue. Mobile application would be the example of this. Facebook, Inc. has some operating history and more comparable firms at different stages. The sources of value of Facebook, Inc. are partially from existing assets and partially from future assets. Needless to say, Facebook, Inc. greatest asset is its website with 901 million MAU.

2.6.2 Research and Development Expense

Companies with significant intangible assets are often being misvalued because the reinvestment they made is not capitalized. Companies like Coca-Cola, Boston Consulting Groups, and Pfizer made their significant investment not in machines and factory but in brand building, human resource development and patent research. In accounting, a firm must record immediately research and development expense at the period it occurs. Facebook, Inc., an internet firm, made its investment through research and development rather than building physical store or factory. For valuation purpose, this has to be modified. R&D expense must be capitalized and amortized accordingly. The value of research asset is formulated as follows:

$$\text{Value of the Research Asset} = \sum_{t=-(n-1)}^{t=0} R\&D_t \frac{(n+t)}{n}$$

(2.19)

For internet company, the estimated life of research asset is three years. It means, three years of research and development expense from previous period must be collected. The operating income of the base year is then adjusted by adding R&D expenses and subtracting amortization of research asset (Damodaran, 2010).

2.6.3 Operating Lease Expense

Operating lease is actually financial lease and therefore should then be converted into debt. This is done by discounting the lease payments on each year using cost of debt. The sum of these is the debt value of operating lease. Interest expense imputed is also added back to operating income to arrive at adjusted operating income used in base year (Damodaran, 2010).

2.6.4 Stock Options Compensation

Many companies used stock-based compensation for their employees for few reasons. The most common one is to align the interest of management to that of stockholders. The agency problem is prevalent in every company and stock-based compensation was one of the solutions that would alleviate it. Stock-based compensation also allows young company with limited cash but promising growth to retain human resources. Lastly, stock-based compensation allows management to window-dress the financial statements with positive earnings as the accounting for options is understating the true cost of options (Damodaran, 2010).

There are several approaches to value employee stock options compensation: fully diluted approach, treasury approach, and modified options pricing models (Damodaran, 2010). Other researchers also made their contributions such as Kutilaka and Marcus model, Hull and White model, and Ammann and Seiz model (2003). FASB also issue guidance in this area in their FASB 123.

These models depend on one component that determines the value of the option the most, that is, the life of the option. The value derived from these models are not much different if expected life of the option (which consider early exercise and vesting chance) is used instead of the stated life of option. Therefore a simpler model should be used as asserted by Ammann and Seiz (2003) in Damodaran (2010).

Employee stock option poses few issues with regard to its valuations. The issues are as follow (Damodaran, 2010):

- Vesting. Before the option can be exercised, the employees need to vest themselves first. That is, the holders stay with the firm until a pre-specified date. The vesting probability depends on how in-the-money the options are and the period left to vest.
- Illiquidity. Employee stock options are not tradable and therefore, employees often exercise it earlier before their maturity. It also made them less valuable than similarly traded options.
- Stock price or stock value. The conventional way of valuing options is to use current market price. Alternatively, equity value per share could also be used but this creates circular problems.
- Dilution. The exercise of employees options are affecting the number of shares outstanding or stock price.
- Tax consequences. There is tax savings when an option is exercised. This tax benefits reduces the drain on value created by having options outstanding.
- Unobservable inputs. For private company or nearly going public, the price of the stock and variance is unobservable.

The model used in this research is modified Black-Scholes by Damodaran (2010).

Few adaptations can be built into the model:

- Build expected dilution into the stock price
- Reduce the life of the option to reflect illiquidity and early exercise
- Adjust the option value for probability of vesting

The Black-Scholes formula for valuing a European call options on a non-dividend-paying stock (as is the case for employees' stock option) is as follows (Hull, 2009):

$$c = S_0 N(d_1) - Ke^{-rT} N(d_2) \quad (2.20)$$

where

$$d_1 = \frac{\ln\left(\frac{S_0}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

$$d_2 = \frac{\ln\left(\frac{S_0}{K}\right) + \left(r - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} = d_1 - \sigma\sqrt{T} \quad (2.21)$$

S_0 = Stock Price

K = Exercise Price

r = Risk free rate

σ = Stock prices standard deviation (the variance is on natural log of the stock prices to allow for normal distribution assumption)

T = Stated maturity in years (half of this is used to allow for early exercise)

$N(x)$ = Normal distribution of x

CHAPTER 3

FUNDAMENTALS

3.1 Global Economy Outlook

3.1.1 World's Growth Prospects

In *World Economic Outlook: Growth Resuming, Dangers Remain as of April 2012*, IMF reported the prospect of world's economy growth. All of the discussion in chapter 3.1.1 is derived from this report. Euro zone debt crisis has spread anxiety among investors across the globe. Several factors are deemed as the causes such as mispriced risk, weak prudential policies and framework, macroeconomic policy misbehavior and European Monetary Union (EMU) flaws. EMU governance, in the form of *The Stability and Growth Pact*, has created interconnecting relation between banks in Europe. Massive cross-border bank lending was prevailing while the monitoring was at national level. There is no regional supervision. This lack of supervision exacerbated imbalances between public and private sector. Also the EMU was not explicitly allowed to be the lender of last resort while market participants assume otherwise. This implicit assumption results in risk mispricing. Few measures have been taken to decelerating risk spreads and spillovers to the rest of Europe. The European Central Bank (ECB) proposed longer-term refinancing operations (LTROs), fiscal consolidation, stabilizing market sentiment, strengthening fiscal compact, structural and reforms. It is expected that in 2012-2013 euro zone is on the path to recovery.

United States is expected to grow modestly and gained traction despite fiscal uncertainty, weak housing market and potential contagion from Europe. Improvement in the Fed communication strategy also can create higher impact of its expansionary policy. On the other hand, Canada's recovery is more advanced than that of America. The policymakers also have flexibility in making decision to respond change in outlook.

In Asia, China with its weaker foreign demand and supple domestic demand is still leading the growth. Asian banks, which adequately capitalized, are ready to buffer spillovers from Europe and its banks' deleveraging. Less impact is expected of Asian financial market in regard to Euro zone debt crisis.

Latin America and Caribbean's outlook is modest but promising. Market participants' risk aversion change triggered by the volatility of global market has resulted in capital outflow. The tightening policy, which is enacted earlier, has made the growth prospect better. In spite of that, inflation is still lurking above its target and credit growth is still eminent.

Commonwealth of Independent States' (CIS) members are susceptible to volatility in commodity prices as their growth is supported mainly by commodity, agricultural and mineral. A fall in global demand of commodity, which is largely due to euro zone crisis spillovers, will slow down the region's growth despite the fact that commodity prices are still high. The outlook is moderate on CIS.

Recently, social unrest has been a challenge for Middle East countries. This has urged policymakers to stabilize the economy and depart from government transfers model of growth. Euro zone spillovers could depress oil prices, the main export of Middle East countries. Meanwhile, North Africa's tourism, trade and remittance with Europe have already depressed by the crisis.

Sub-Saharan Africa outlook was positive, largely due to its limited linkage from with Europe. Trade diversification played its part in lowering the region's exposure to euro zone crisis. The high prices of commodity also spurred the growth in the region.

3.1.2 Facebook, Inc. Stable Growth Rate

At the terminal phase, Facebook will be assumed to continuously grow at a stable growth rate. This stable growth rate is a function of economy growth of its revenue source and it cannot be higher than the growth of economies of its revenue source (Damodaran, 2002). U.S. and Canada still account for half of

Facebook revenue. Asia and the rest of the world account for less than a quarter of the total revenue. Currently, the share of Facebook's revenue is as follows:

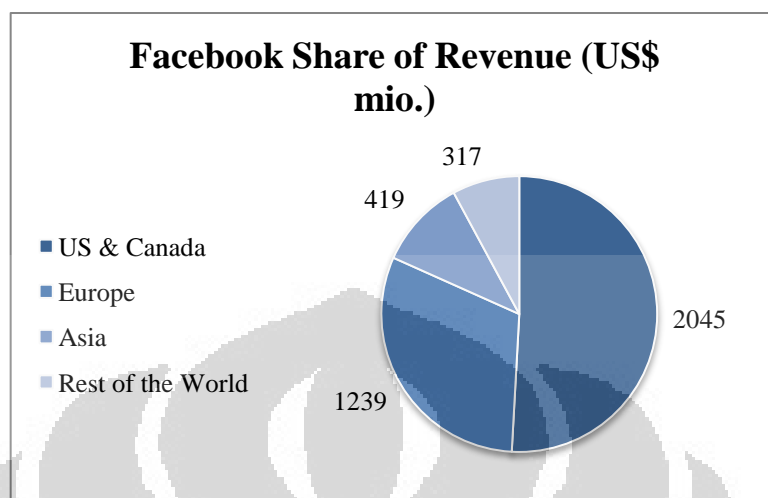


Figure 3.1 Facebook Share of Revenue for 12 Months Ended March 2012

Source: Facebook, Inc. Prospectus

Meanwhile, the share of its users is as follows:

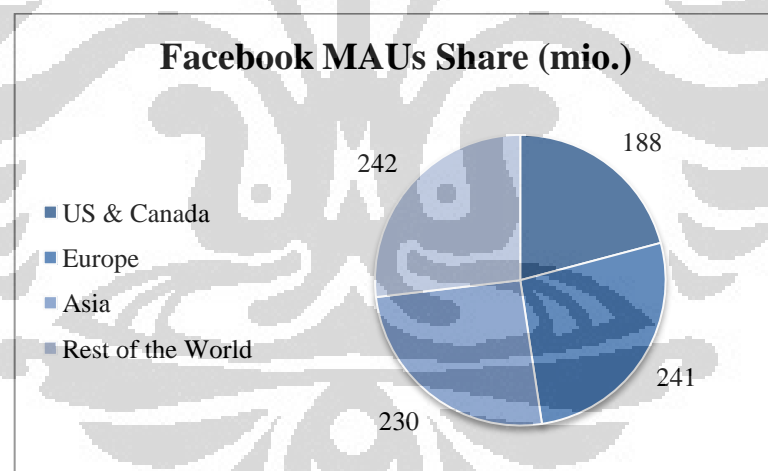


Figure 3.2 Facebook Users Share as of 31 March 2012

Source: Facebook, Inc. Prospectus

In terms of users, Asia and rest of the world account for slightly more than half of all monthly active users. There is still room for revenue growth from these sides of the world. Facebook needs to develop sales teams to sell ad inventory to advertisers in this potential market. Alternatively, it needs to develop new offerings and services that appeal to this market and monetize them.

For the purpose of valuation, the estimate of revenue share at the terminal phase and stable growth rate is as follows:

Table 3.1 Facebook Revenue Share Projection

Area	Currently	Scenario 1	Scenario 2	Scenario 3
U.S. and Canada	51%	47%	45%	40%
Europe	31%	29%	26%	25%
Asia (Excluding China)	10%	13%	16%	20%
Rest of the World	8%	11%	13%	15%
Stable Growth Rate		5.36%	5.44%	5.52%

Source: Self-processed

Under scenario 1, there is not much change to the business model of Facebook. Thus, the change of revenue share is slight. Under scenario 2 and 3, however, the change of revenue share is more noticeable as Facebook would have diversified its revenue sources from traditional online display ad and virtual goods payment. The result is different stable growth rates for each scenario.

The stable growth rate is the product of each area share and the weighted growth of the area. The growth rate used is the estimate growth of GDP in current prices and dollar terms in 2017. The weight is GDP in current prices and dollar terms in 2017. The data is attached in attachment 3.1 Stable Growth Rate Projection. The source of estimate is IMF Database.

3.2 Industry Analysis and Trends

3.2.1 Online Display Advertising

Protalinski (2011) reported, from eMarketer report *Worldwide Social Network Ad Revenues: A \$10 Billion Market by 2013*, that Facebook share of US online ad spending was increasing rapidly. As of 2011, it accounts for 6.4% of all US online ad spending, more than double of its share in 2009.

Facebook Share of Total US Online Ad Spending, 2009-2013
billions and % of total

	2009	2010	2011	2012	2013
Facebook US ad* revenues	\$0.56	\$1.21	\$2.01	\$2.89	\$3.36
Total US online ad spending	\$22.70	\$26.00	\$31.30	\$36.80	\$41.20
Facebook % of total	2.4%	4.7%	6.4%	7.9%	8.2%

Note: *paid advertising only; excludes spending by marketers that goes toward developing or maintaining a Facebook presence
Source: eMarketer, Sep 2011

132439 www.eMarketer.com

Figure 3.3 Facebook Share of Total U.S. Online Ad Spending

Source: eMarketer. (2011)

In 2012, Facebook is expected to harvest 72 percent of all social network advertising revenue and bring in \$5.78 billion in revenue. At that level, Facebook accounts for 6.1 percent of worldwide online ad spending. Further, Facebook is expected to pass Yahoo! in becoming the top website in US display ad revenues with 7.9 percent share of all online ad spending in 2012.

This expectation is confirmed by Meeker (2011), one of Kleiner Perkins Caufield Byers (KPCB) partners. KPCB is one of Facebook investors. Social networking dominates online display ads publishers as of August 2011 with 30 percent share. The next are portals and entertainment. Together, these three publishers account for more than half of all U.S. online display ads publishers. Meanwhile, the CPM (cost per thousand impressions) for social networking as publisher is US\$3.80. At this level, Facebook, Inc.'s current source of revenue can grow at a health rate.

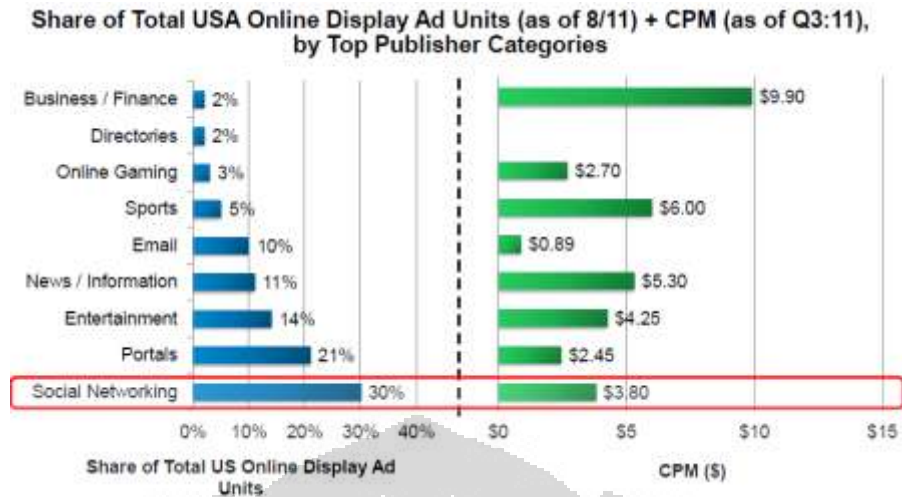


Figure 3.4 Share of Total U.S. Online Display Ad by Publisher Categories

Source: Meeker, M. (2011): p.40

Credit Suisse estimates that in 2010, the total U.S. online ad spending stood at US\$26 billion, US\$9.9 billion of which comes from the display category. The display category grows at 25.31% year-on-year for 2010.

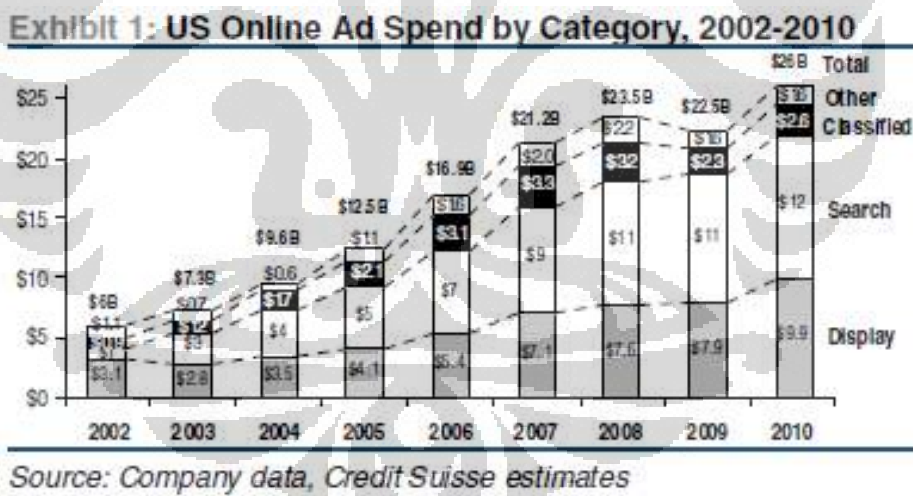


Figure 3.5 U.S. Online Ad Spending by Category

Source: Wang, S., & Prissman, D. (2012): p.4

3.2.2 Mobile Advertising and Apps

The growth of computing is increasing at an unprecedented level. From mainframe computing in 1960, to minicomputer, to personal computer and to desktop internet, the number of devices and users has been growing exponentially. Mobile internet is not limited to cellular phones. It comprises of devices such as iPad, Kindle, MP3, car electronics GPS/ABS/AV, mobile video, games console, and wireless home appliances. Clearly, mobile internet is the future for the next decade, with the estimated units/users/devices of more than 10 billion. The level of integration is also increasing. More and more functions are being pushed into devices.

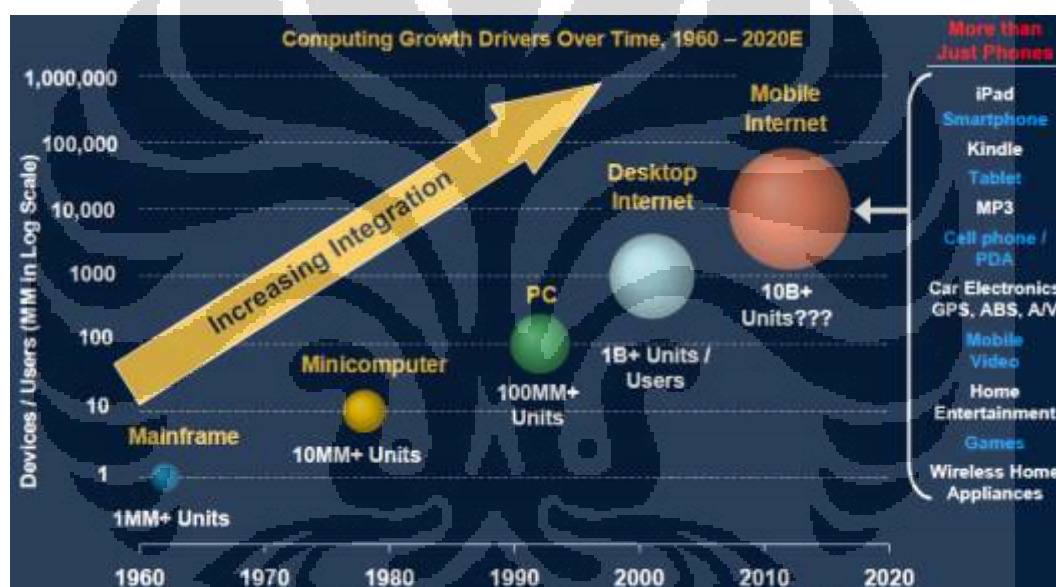


Figure 3.6 Computing Growth Drivers Over Time 1960-2020E

Source: Meeker, M., Devitt, S., Wu, L. (2010): p.18

The use of mobile internet is obviously also growing. It is projected that by the end of 2013, the number of mobile internet users will surpass desktop internet users. At that time, mobile internet users will be just slightly more than 1.6 billion. Also, at that level, the number of desktop internet user would have leveled off and saturated. Furthermore, the number of mobile internet user grows linearly and its growth is steeper than that of desktop internet users.



Figure 3.7 Global Mobile and Desktop Internet Users Projection

Source: Meeker, M., Devitt, S., Wu, L. (2010): p.8

Mobile internet poses several challenges when it comes to advertising. The size of the monitor or display is much less than PC or desktop. Despite that fact, global mobile advertising revenue is growing. However, its growth rate is not as high as the growth rate of mobile apps. Together, mobile apps and mobile advertising global revenue's compound annual growth rate (CAGR) stands at 153 percent.

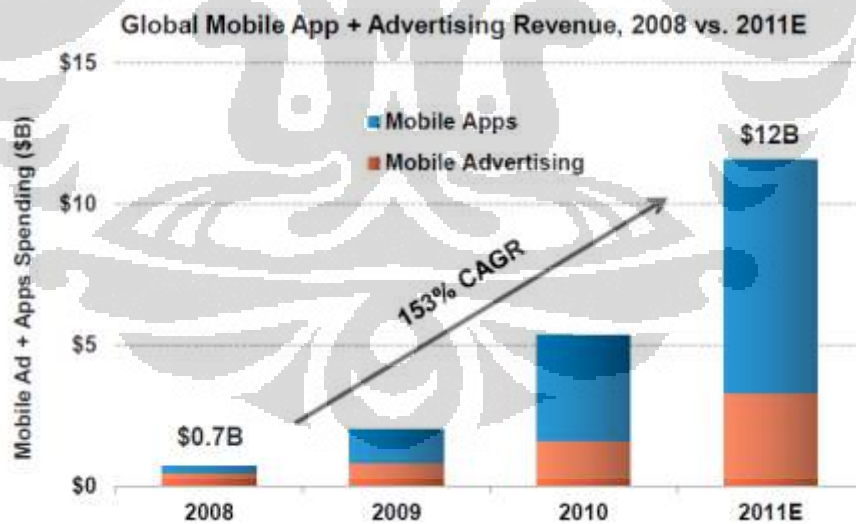


Figure 3.8 Global Mobile Apps and Advertising Revenue

Source: Meeker, M. (2011): p.21

3.2.3 Social Commerce

E-commerce penetration in U.S.A. retail sales grows steadily. The trend is linear and as of the second quarter of 2011, e-commerce's penetration level reaches 8 percent of total retail sales. This level of penetration provides for large room for growth.



Figure 3.9 U.S.A. E-Commerce Percentage Share of Total Retail Sales

Source: Meeker, M. (2011): p.30

Social network has change the way people interact and it creates opportunity. Lots of information is in social network and marketers are eager to make the most of it. One of such information is what does someone “Like”. “Like” button gives Facebook the ability to offers social context to advertisers. Social context is information that highlights a friend’s connections with particular brand or business or other interests. “Like” serves as recommendations for the friends of the person who click it.

However, the future lies further than that. It is expected that people will actually do transaction inside social commerce, rather than just give recommendations or information. Consumers will do what they usually do at retailer’s e-commerce in social network: selecting products, adding them to shopping carts, and paying using credit cards, points, or some other form of virtual currency (Anderson, Sims, Price, & Brusa, 2011). In this way, social commerce emerges.

Hyves, the most popular social networking site in Netherland, provides payments system that allows users to transfers fund to other users when a purchase occurs. In addition, Hyves also develop a consumer-to-consumer platform to enable commerce that resembles Craigslist (Anderson, Sims, Price, & Brusa, 2011). This is where the growth opportunity lies for Facebook by extending Facebook Credits to physical goods purchase.

Exhibit 1

Booz & Company Estimate of Social Commerce Market Size (2010-2015; in US\$ Billions)

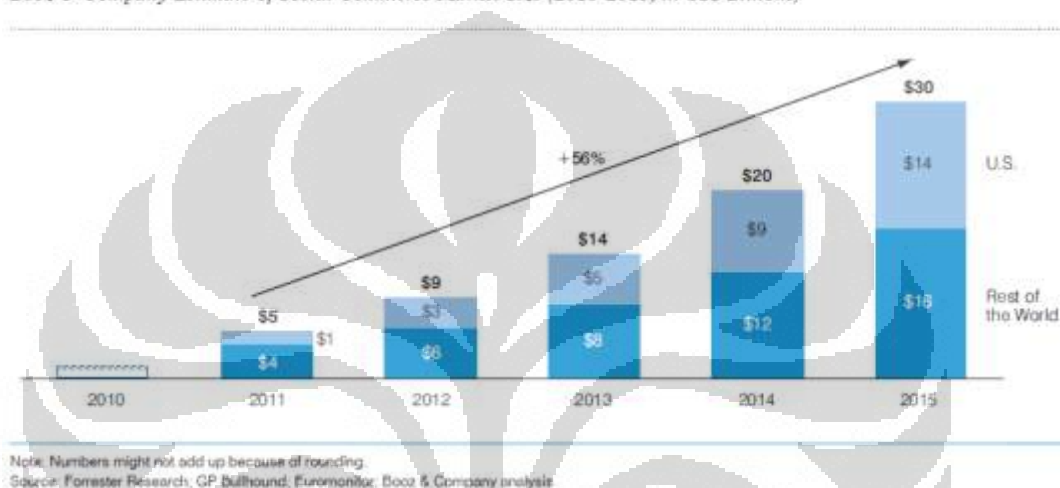


Figure 3.10 Social Commerce Market Size Projections

Source: Anderson, M., Sims, J., Price, J., & Brusa, J. (2011): p.4

Booz and Company, in its survey of consumer who spend at least an hour a month on social networking sites and have bought at least one product online in 2010 found that 27% of respondents would be willing to purchase physical goods through social networking sites. Booz and Company also made projections of social commerce market size. Globally, in 2011, a total transaction of US\$5 billion prevailed. It is estimated that by 2015, the market grows to US\$30 billion of which US\$14 billion of transaction comes from U.S.A.

3.2.4 Porter Five Forces Analysis

Porter (1979) asserts that every company strategy is shaped by five forces in its industry. These forces and its discussion in connection with Facebook, are as follows (Midas LP, 2011):

- Bargaining power of suppliers. Microsoft was the only major Facebook supplier with some leverage. However, Facebook has far more leverage than Microsoft. In addition, for its network facilities and equipment procurement, Facebook uses operating and capital lease. Increasing traffic means increasing needs of equipment to support access by users.
- Intensity of competition. Facebook has many competitors such as Google Plus, Orkut, Twitter, MySpace, Renren, Qzone, Baidu Space, Hi5, vKontakte, Skyworld, Mixi, CyWorld and Friendster.
- Threat of entry. There is a fundamental shift of paradigm in social networking, in that the focus is more on core social tech features. The change of MySpace owner to an entity like Apple can be dangerous. Privacy laws may also pose some problem for Facebook. In China, Facebook faces obstacles in entering the market as the media industry is highly regulated by the government in the form of censorship.
- Threat of substitute products/services. There are few substitutes that compete with Facebook but Facebook chooses to integrate with them rather than trying to beat them.
- Bargaining power of buyers. Facebook business model that provides it with personal preferences of so many people causes marketers to have very limited buying leverage.

3.2.5 Facebook, Inc. Comparables

In obtaining the cost of equity for Facebook, Inc., the Fama/French Three Factors Model will be utilized. Google and Yahoo! are selected as Facebook comparables. Their returns will be regressed against data compiled by Kenneth French. The company profiles below are derived from their S.E.C. filings.

- Google Inc. is a global technology leader focused on improving the ways people connect with information. Google's mission is to organize the world's information and make it universally accessible and useful. Google generate revenue primarily by delivering relevant, cost-effective online advertising. Businesses use Google's AdWords program to promote their products and services with targeted advertising. In addition, the third parties that comprise the Google Network use the company's AdSense program to deliver relevant ads that generate revenue and enhance the user experience. Google Inc.'s key focus areas of business include search, advertising, operating system and platforms, and enterprise.

- Yahoo! Inc. is a premier digital media company. It delivers personalized digital content and experiences, across devices and around the globe, to vast audiences. It provides engaging and innovative canvases for advertisers to connect with their target audiences. It also provides online properties and services to users as well as a range of marketing services designed to reach and connect those users on Yahoo! and through a distribution network of third-party entities. These Affiliates integrate Yahoo! advertising offerings into their Websites or other offerings. Yahoo! generates revenue from the display of graphical advertisements, the display of text-based links to advertisers' websites, and other sources. The company offerings to users on Yahoo! Properties currently fall into three categories: Communications and Communities; Search and Marketplaces; and Media. The majority of the offerings are available in more than 45 languages and in 60 countries, regions, and territories. Yahoo! have properties tailored to users in specific international markets including the Yahoo! Homepage and social networking Websites including *Meme* and *Wretch*.

3.3 Company Profile

All of the company profile furnished in chapter 3.3 is derived from Facebook, Inc.'s prospectus.

3.3.1 History

2004 February. Founded under the name <thefacebook.com> at Harvard

September. The Facebook Wall is introduced with which users can post message to their friends

Facebook began to expand to colleges and universities around the country
Generated \$382,000 in revenue

2005 May. Facebook grew to support more than 800 college networks

September. Facebook added high school networks

October. Facebook added international school networks and introduced Photos

Generated \$9 million in revenue

2006 April. Facebook launched Facebook Mobile

May. Expanded Facebook's availability to workplace networks

August. Rolled out first version of Facebook API

September. Opened registration broadly, introduced News Feed

November. Launched Share feature on over 20 partner sites

Generated \$48 million in revenue

2007 May. Launched the Facebook Platform with 65 developers and 85 application

November. Launched self-service ad platforms and Facebook Pages

Generated \$153 million in revenue

- 2008 April. Introduced Chat for users to instant message with their friends
- December. Launched Facebook Connect, the next iteration of the Facebook Platform
- Expanded to 23 languages offered including French, German and Spanish
- Generated \$272 million in revenue
- 2009 February. Introduced the Like button, which lets users connect with things they care about both on and off Facebook
- May. Launched Facebook Payments
- Generated \$777 million in revenue
- 2010 April. Introduced Graph API, a new programming interface for the Facebook Platform and Social plugins, a set of easy-to-use modules allowing anyone to integrate with the Facebook Platform
- October. Launched Groups, a shared space for users to discuss common interests
- Generated \$1,974 million in revenue
- 2011 September. Introduced Timeline, an enhanced and updated version of the Facebook Profile
- September. Launched the next iteration of Open Graph
- Generated \$3,711 million in revenue

3.3.2 Business Model

Facebook.com is a website that people use to stay connected with friends, family, to discover what is going on in the world around them, and to share and express what matters to them to the people they care about. Facebook creates value for users in such ways as:

- Users are able to stay connected with their friends, family, and colleagues on Facebook.
- Users come to Facebook to discover and learn more about what is going on in the world around them, especially in the lives of their friends and family and with the public figures and organizations that interest them.
- Users can share and publish their opinions, ideas, photos, and activities to audiences ranging from their closest friends to Facebook 845 million users, giving every user a voice within the Facebook community.
- Users can control what they share and with whom they share it. Facebook does this through its privacy and sharing settings.
- Users can interact with their friends while playing games, listening to music, watching movies, reading news, and engaging in other activities through apps and websites built by developers.
- Users can access Facebook using the combination of Facebook mobile sites, smartphone apps, and feature phone products.

Developers use Facebook Platform to build application (apps) and websites that integrate with Facebook to reach the company's global network of users and to build products that are more personalized, social, and engaging. The Facebook Platform is a set of development tools and application programming interfaces (APIs) that enable developers to easily integrate with Facebook to create social apps and websites and reach Facebook users. Platform developers build experiences that allow users to connect and share with friends while engaging in a wide range of activities. Facebook creates value for developers in such ways as:

- Platform developers are able to create products that are social and personalized and that offer new ways for users to engage with friends and share experiences across the web and on mobile devices. For example, a Facebook user can visit the Pandora website and immediately begin to a personalized radio station that is customized based on the bands the user likes on Facebook.
- Platform developers are able to reach the company's global user base and use its social distribution channels to increase traffic to their apps and websites.

- Platform developers are able to use an online payments infrastructure, provided by Facebook, to receive payments from users in an easy-to-use, trusted, and secure environment.

Advertisers use Facebook as a way to engage with its more than 800 million monthly active users (MAUs) or subset of users based on information the users have chosen to share with Facebook such as age, location, gender, or interests. Facebook offers advertisers a unique combination of reach, relevance, social context, and engagement to enhance the value of their ads. Facebook creates value for advertisers and marketers in such ways as:

- Facebook offers the ability to reach a vast consumer audience of over 800 million MAUs with a single advertising purchase.
- Advertisers can specify which users or subset of users to which their ads is shown based on demographic factors and specific interests that the users have chosen to share with Facebook or by using the Like button around the web. Facebook allows advertisers to select relevant and appropriate audiences for their ad, ranging from millions of users in the case of global brands to hundreds of users in the case of smaller, local business.
- Facebook offers the ability to include social context to advertisers. Social context is information that highlights a friend's connections with a particular brand or business. For example, one person Liked a product or checked in at a restaurant. This information is shown in his Facebook profile. This works as the recommendations of friends and have a powerful influence on consumer interest and purchase decisions.
- Facebook offers Facebook Pages in which a business or brand can simulate an ongoing dialog with users. The shift to a more social web creates new opportunities for businesses to engage with interested customers.

3.3.3 Mission and Strategy

Facebook mission is to make the world more open and connected.

Facebook key elements of strategy are as follows:

- Expand global user community. Facebook continues to focus on growing user base across all geographies, including relatively less-penetrated, large markets such as Brazil, Germany, India, Japan, Russia, and South Korea. Facebook intends to grow the user base by continuing marketing and user acquisition efforts and enhancing the products, including mobile apps, in order to make Facebook more accessible and useful.
- Build great social products to increase engagement. Facebook prioritize product development investments that will create engaging interactions between users, developers, and advertisers on Facebook, across the web, and on mobile devices. Facebook continues to invest significantly in improving core products such as News Feed, Photos, and Groups, developing new products such as Timeline and Ticker, and enabling new Platform apps and web integrations.
- Provide users with the most compelling experience. Facebook users are sharing and receiving more information across a broader range of devices. To provide the most compelling user experience, Facebook continues to develop product and technologies focused on optimizing social distribution channels to deliver the most useful content to each user by analyzing and organizing vast amounts of information in real time.
- Build engaging mobile experiences. Facebook is devoting substantial resources to developing engaging mobile products and experience for a wide range of platform, including smartphones and feature phones. In addition, Facebook is working across the mobile industry with operators, hardware manufacturers, operating system providers, and developers to improve Facebook experience on mobile devices and make Facebook available to more people around the world.
- Enable developers to build great social products using the Facebook Platform. The success of Facebook Platform developers and the vibrancy

of the Platform ecosystem are key to increasing user engagement. Facebook continues to invest in tools and APIs that enhance the ability of Platform developers to deliver products that are more social and personalized and better engage users on Facebook, across the web, and on mobile devices. In addition, Facebook plans to invest in enhancing the Payments offering and in making the Payments experience on Facebook as convenient as possible for users and Platform developers.

- Improve ad products for advertisers and users. Facebook plans to continue to improve ad products in order to create more value for advertisers and enhance their ability to make their advertising more social and relevant for users. The advertising strategy centers on the belief that ad products that are social, relevant, and well-integrated with other content on Facebook can enhance the user experience while providing an attractive return for advertisers. Facebook intends to invest in additional products for the advertisers and marketers while continuing to balance monetization objectives with commitment to optimizing the user experience.

3.3.4 Products

1. Products for Users

- Timeline. Timeline was launched in September 2011 as an enhanced and updated version of the Facebook Profile to add structure and organization to the growing quantities of each user's activities and social content. Timeline allow users to organize and display the events and activities that matter most to them, enabling them to curate their memories in a searchable personal narrative that is organized chronologically. Users choose what information to share on their Timeline, such as their interests, photos, education, work history, relationship status, and contact information, and users can control with whom each piece of content is shared on their Timeline.
- News Feed. The Facebook News Feed is the core feature of a user's homepage and is a regularly updating list of stories from friends, Pages, and other entities to which a user is connected on Facebook. It includes

posts, photos, event updates, group memberships, app updates, and other activities. Each user's News Feed is personalized based on his or her interests and the sharing activity of the user's friends. Stories in a user's News Feed are prioritized based on several factors, including how many friends have Liked or Commented on a certain piece of content, who posted the content, and what type of content it is. News Feed is a key component of Facebook social distribution capability.

- Photos and Videos. Facebook is the most popular photo uploading service on the web. On average, more than 250 million photos per day were uploaded to Facebook in the three months ended December 31, 2011. Users can upload an unlimited number of high resolution photos, create photo albums, and share them with their friends or any audience they choose. Users can also upload and share videos, making them visible to everyone, or only to certain friends. Users can easily arrange their photos, add captions, and 'tag' people in a photo or video. Tagging allows users to identify a person in a photo or video as one of their friends.
- Messages. The messaging products include email, chat, and text messaging. The delivery of messages is optimized for the device through which the user is accessing Facebook. For example, users on their mobile phones will receive messages via text of Facebook mobile messenger, while the conversation is also stored in their Facebook message inbox.
- Groups. Groups are shared Facebook pages for groups of users to discuss common interests. For example, members of a soccer team can plan the season's schedule together and share photos with each other. Users are able to customize the privacy settings for each Group they create.
- Lists. Lists allow users to organize their friends in order to filter the stories shown in their News Feeds and reach or exclude specific people when they share on Facebook. For example, users can see News Feed posts from a List of just their closest friends or announce a garage sale to a List of friends who reside in the user's current city. Users are able to customize the privacy settings for each List they create.

- Events. Through Events, users can organize gatherings, manage invitations, and send event notifications and reminders to their friends. From the Events page, users can create a new event, check out upcoming events of interest to them and their friends, and view previous events. For example, users can use Events to invite their friends to a dinner party or organize a run in the Race for the Cure to raise awareness for breast cancer. There are currently more than 16 million events created on Facebook each month.
- Places. Through Places, users can share their location and see where their friends are. They are able to see if any of their friends are nearby and connect with them easily. Users can also check in to Places to tell their friends where they are, tag their friends in the Places they visit, or view Comments their friends have made about the Places they visit.
- Subscribe. Using Subscribe, users can sign up to receive public posts in their News Feeds from other Facebook users of interest such as celebrities, thought leaders, and other public figures.
- Ticker. Ticker is a live stream of the real-time activities of a user's friends and the Pages and other entities to which the user is connected.
- Notifications. On the top of each Facebook page, a highlighted icon is displayed to users when there is relevant and new information available to them, such as a new friend request, a new message from a friend, or an alert that the user has been tagged in a photo posted by a friend. We believe that Notifications are an important part of Facebook's distribution capability.
- Facebook Pages. A Facebook Page is a public profile that allows anyone including artists, public figures, businesses, brands, organizations, and charities to create a presence on Facebook and engage with the Facebook community. A Page owner can connect with interested users in order to provide updates, answer questions, receive feedback, or otherwise stimulate interest in the owner's messages, products, and services. When a Facebook user Likes a Page, the Page owner has the opportunity to publish stories to the user's News Feed on an ongoing basis. In addition, when a Facebook user Likes or Comments on a post by a Page owner, that user's

action may be shared with the user's friends via News Feed to drive awareness to a wider circle of users, increasing the Page's exposure, recognition, and engagement.

2. Products for Developers

The Facebook Platform is a set of tools and APIs that developers can use to build social apps on Facebook or to integrate their websites with Facebook. As of December 31, 2011, more than seven million apps and websites were integrated with Facebook. The goal is to make it easy for Platform developers to integrate with Facebook and build valuable products and businesses. Key elements of the Facebook Platform include:

- Open Graph. Facebook Open Graph is a set of APIs that developers can use to build apps and websites that enable users to share their activities with friends on Facebook. For example, a user who is listening to music through a developer's app or website can publish his or her music selections to Facebook where the music can be shared with friends.
- Social Plugins. Social plugins are social features that developers can easily integrate with their websites by incorporating a single line of HTML code. For example, a developer can put a box on its website that shows Facebook users what their friends have Liked and recommended on the site. Social plugins also allow users to easily share interesting content back to Facebook that can be distributed to their friends through News Feed, Timeline, and Ticker. The following features are examples of functionality provided through social plugins:
 - Like Button. Allow users to share content from a third-party website to Facebook and their friends with one click.
 - Recommendations. Allows a website to display to Facebook users what their friends have recommended.
 - Single sign-on registration and log-in. Allow users to easily sign up for access to third-party websites with their Facebook accounts, eliminating the need for users to create another username and password.

- Comments. Allows users to post their views, questions, and critiques on any piece of content on a website.
- Payments. Facebook provides an online payments infrastructure that enables developers to receive payments from users through an efficient and secure system. Developers can focus on creating engaging apps and content rather than spending time and resources to build payment processing and fraud management capabilities. Users can store their payment credentials with Facebook in a trusted and safe environment, facilitating easy and fast purchases across the Facebook Platform rather than having to re-authenticate and re-enter payment information for each developer. Facebook designed the Payments infrastructure to streamline the buying process between users and developers. Facebook Payments system enables users to purchase virtual or digital goods from developers and third-party websites by using debit and credit cards, PayPal, mobile phone payments, gift cards or other methods. Payments infrastructure is also extended to support mobile web apps on certain mobile platforms.

Developers have used the Facebook Platform to build a variety of user experiences, including apps on Facebook, desktop apps, mobile apps, and Platform-integrated websites, each of which can take advantage of the capabilities of the Facebook Platform. These are types of application built using Platform:

- Apps on Facebook. Apps on Facebook run within the Facebook website. Social games are currently the most successful apps on Facebook. The Facebook Platform has also enabled new types of social apps on Facebook beyond games to facilitate social sharing and discovery of music, news, television programming, and everyday interests such as cooking, fitness, and travel. For example, *The Washington Post Social Reader* is an app on Facebook that offers a personalized news reading experience in which each user sees a unique set of stories tailored to the user's interests and based on what his or her friends are reading. Assuming the user has given the app permission; stories read by a user are instantly shared with friends, creating a socially powered newswire of relevant articles. Apps on

Facebook generally have Facebook ads visible on the right side of the page and can integrate with Facebook Payments.

- Desktop apps. Developers can also build desktop apps that run on the operating system of a personal computer and offer experiences that are integrated with the Facebook Platform. For example, Spotify, an online music service, provides a desktop app integrated with Facebook that offers a social listening experience by giving users the ability to share their playlists, listen to songs with friends, and explore new music through their friends.
- Mobile apps. The Facebook Platform for mobile has enabled developers to create engaging mobile apps that integrate with Facebook's social and personalization capabilities.
- Platform-integrated websites. Websites can integrate with Facebook using simple social plugins such as the Like button or design more deeply integrated social experiences built around users and their friends. For example, by tapping into our rich social data, TripAdvisor connects users to their friends and shares relevant content about where their friends have traveled and where they would like to visit in the future. While on the TripAdvisor website, friends can discuss their travel plans and recommendations and build out personal profiles of places they have been.

3. Products for Advertisers and Marketers

Facebook offers products that enable advertisers and marketers to leverage Facebook unique combination of reach, relevance, social context, and engagement. Customers can purchase advertising inventory through Facebook self-service ad platform or through a contract-based process from the company global sales force. Advertisers using Facebook self-service ad platform launch and manage their advertising campaigns online. Contract-based customers work with the company global sales force, which is focused on attracting and retaining advertisers and providing support to them throughout the stages of the advertising campaign cycle. Advertising purchased through either sales mechanism is served through the Facebook ad system described below.

- Facebook ads. When creating a Facebook ad, advertisers can specify a title, content, image, and destination web page or Facebook Page to which a user is directed if he or she clicks on the ad. Because there is a standard format for Facebook ads, users benefit from a consistent ad experience, and the advertisers are able to deploy and adjust campaigns rapidly. Advertisers can further engage their intended audiences by incorporating social context with their marketing messages. Social context includes actions a user's friends have taken, such as Liking the advertiser's Facebook Page. Ads with social context are shown only to a user's friends, and the user's privacy settings apply to social ads. We offer a range of ads with social context, from an ad with a single Like button to our Premium Ad paired with social context, which allows advertisers to highlight the interactions of a user's friends with a brand or product.
- Sponsored stories. Sponsored stories enable marketers to promote the stories they publish from their Facebook Page to users who have connected with the Page or to amplify the distribution of stories users are already sharing that are relevant to their marketing efforts. For example, when a user Likes Red Bull, Red Bull can pay to amplify the reach, frequency of distribution, and prominence with which the story is shown to friends of that user.
- Facebook ad system. When advertisers create an ad campaign with Facebook, they specify the types of users they would like to reach based on information that users chose to share about their age, location, gender, relationship status, educational history, workplace, and interests. For example, a self-storage company ran a campaign to reach students on college campuses prior to summer break. Additionally, advertisers indicate the maximum price they are willing to pay for their ad and their maximum budget. Advertisers choose to pay for their ads based on either cost per thousand impressions (CPM) on a fixed or bid basis or cost per click (CPC) on a bid basis. The system also supports guaranteed delivery of a fixed number of ad impressions for a fixed price. Facebook's ad serving technology dynamically determines the best available ad to show each user

based on the combination of the user's unique attributes and the real-time comparison of bids from eligible ads.

- Ad analytics and Facebook Insight. Advertisers can use Facebook analytics platform to track and optimize the performance of their campaigns in real time. Facebook ad analytics enable advertisers to gain insights into which ads were displayed and clicked on. These analytics help advertisers make modifications to their ad campaigns in order to maximize results. For advertisers with Facebook Pages, Facebook Insights also provides real-time information about the performance of their Page and related posts whether through paid or organic channels. The data include the number of users who Liked and Commented on the Page as well as a metric, "People Talking About This", which shows how many stories about the advertiser's brand are being created and shared.

3.3.5 Risk Factors

These are risk factors laid out by Facebook, Inc. in their prospectus that relates to its business and industry:

1. Facebook may fail to retain existing users or add new users, or if the users decrease their level of engagement, the revenue, financial results and business may be significantly harmed. Active user growth is instrumental in sustaining Facebook attractiveness to developers and advertisers. Other social networking companies have seen their user's degree of engagement deteriorate albeit early popularity.
2. Facebook generates a substantial amount of revenue from advertising. The loss of advertisers or reduction in spending by advertisers with Facebook, could seriously harm its business. In 2011, advertising accounted for 85% of Facebook revenue. In general, Facebook doesn't have long-term advertising commitment with its advertisers. In addition, many of the advertisers spend only a relatively small portion of their overall advertising budget with Facebook.
3. The growing use of Facebook through mobile products as a substitute for use on personal computer, where Facebook ability to monetize is unproven, could negatively affect the revenue and financial results. Currently there

are 488 million Monthly Active Users who used Facebook mobile products in March 2012. It is anticipated that the growth rate in mobile usage will exceed the growth rate in personal computer usage. This is partly due to Facebook focus on developing mobile products to encourage mobile usage of Facebook. Historically, ads are not shown to users accessing Facebook through mobile apps or mobile website.

4. Facebook user growth and engagement on mobile devices depend upon effective operation with mobile operating systems, networks, and standard that is not controllable by Facebook. There is a chance that popular mobile devices will not continue to feature Facebook. Interoperability of Facebook with popular mobile operating systems, such as Android and iOS, is important. Any changes in these systems that degrade Facebook products' functionality or give preferential treatment to competitive product could negatively affect Facebook usage on mobile devices.
5. Facebook may not be successful in its efforts to grow and further monetize the Facebook Platform. The company has made and is continuing to make major investments to enable developers to build applications (apps) and websites that integrate with the Facebook Platform. Existing and prospective Platform developers may not be successful in building apps or websites that create and maintain user engagement. Currently, the company monetize the Facebook Platform in several ways, including ads on pages generated by apps on Facebook, direct advertising on Facebook purchased by Platform developers to drive traffic to their apps and websites, and fees from Facebook Platform developers' use of Payments infrastructure to sell virtual and digital goods to users. Apps built by developers of social games, particularly Zynga, are currently responsible for substantially all of the company revenue derived from Payments.
6. The business is highly competitive. Competition presents an ongoing threat to the success of our business. Facebook face significant competition from companies such as Google, Microsoft, and Twitter which offer a variety of Internet products, services, content, and online advertising offerings, as well as from mobile companies and smaller

Internet companies that offer products and services that may compete with specific Facebook features. Facebook also faces competition from traditional and online media businesses for advertising budgets. The company compete broadly with Google's social networking offerings, including Google+, and also with other, largely regional, social networks that have strong positions in particular countries, including Cyworld in Korea, Mixi in Japan, Orkut (owned by Google) in Brazil and India, and vKontakte in Russia. The company would also face competition from companies in China such as Renren, Sina, and Tencent in the event that Facebook is able to access the market in China in the future.

7. Action by governments to restrict access to Facebook in their countries could substantially harm the company's business and financial results. Access to Facebook has been or is currently restricted in whole or in part in China, Iran, North Korea, and Syria. In addition, governments in other countries may seek to restrict access to Facebook if they consider the company to be in violation of their laws.
8. The company efforts to expand the Facebook Platform may result in users increasingly engaging with Platform developers' Facebook-integrated websites instead of engaging on Facebook, which may negatively affect our advertising revenue and harm the business.
9. Facebook new product and changes to existing products could fail to attract or retain users or generate revenue.
10. Facebook culture emphasizes rapid innovation and prioritizes user engagement over short-term financial results. As the business grows and becomes more complex, the company cultural emphasis on moving quickly may result in unintended outcomes or decisions that are poorly received by users, developers, or advertisers.
11. Facebook may fail to maintain and enhance its brand, or if events damage the reputation and the brand, Facebook ability to expand the base of users, developers, and advertisers may be impaired, and the business and financial results may be harmed.

12. Improper access to or disclosure of Facebook users' information, or violation of the terms of service or policies, could harm Facebook reputation and adversely affect the business.
13. Unfavorable media coverage could harm the business. Unfavorable publicity regarding, for example, Facebook privacy practices, product changes, product quality, litigation or regulatory activity, or the actions of the Platform developers or Facebook users, could adversely affect reputation. Such negative publicity also could have an adverse effect on the size, engagement, and loyalty of Facebook user base and result in decreased revenue, which could adversely affect the business and financial results.
14. Facebook financial results will fluctuate from quarter to quarter, which makes them difficult to predict. Facebook have a limited operating history with the current scale of business, which makes it difficult to forecast Facebook future results.
15. Facebook currently generate significant revenue as a result of its relationship with Zynga, and, if the company is unable to successfully maintain this relationship, financial results could be harmed. In 2011, Zynga accounted for approximately 12% of Facebook revenue, which amount was comprised of revenue derived from payments processing fees related to Zynga's sales of virtual goods and from direct advertising purchased by Zynga. Zynga may choose to try to migrate users from existing Facebook-integrated games to other websites or platforms. The company may fail to maintain good relations with Zynga or Zynga may decide to reduce or cease its investments in games on the Facebook Platform. If the use of Zynga games on Facebook Platform declines for these or other reasons, the financial results may be adversely affected.
16. Facebook expect the company rates of growth will decline in the future. The annual revenue grew 154% from 2009 to 2010 and 88% from 2010 to 2011. Historically, user growth has been a primary driver of growth in the company revenue. The company expects that user growth and revenue

growth rates will decline as the size of active user base increases and as the company achieves higher market penetration rates.

17. The company's business is subject to complex and evolving U.S. and foreign laws and regulations regarding privacy, data protection, and other matters. Many of these laws and regulations are subject to change and uncertain interpretation, and could result in claims, changes to business practices, increased cost of operations, or declines in user growth or engagement, or otherwise harm the business.
18. The company has been subject to regulatory investigations and settlements and it is expected to continue to be subject to such proceedings in the future, which could cause the company to incur substantial costs or require the company to change its business practices in a manner materially adverse to the business.
19. Facebook may fail to protect its intellectual property. If such event happens, the value of the brand and other intangible assets may be diminished and the business may be adversely affected. Facebook expects to continue to rely on a combination of confidentiality and license agreements with the employees, consultants, and third parties with whom the company have relationships, as well as trademark, copyright, patent, trade secret, and domain name protection laws, to protect the proprietary rights. In the United States and internationally, the company have filed various applications for protection of certain aspects of the intellectual property, and the company currently hold a number of issued patents in multiple jurisdictions. However, third parties may knowingly or unknowingly infringe the proprietary rights, third parties may challenge proprietary rights held by Facebook, and pending and future trademark and patent applications may not be approved.
20. Facebook is currently, and expects to be in the future, party to patent lawsuits and other intellectual property rights claims that are expensive and time consuming, and, if resolved adversely, could have a significant impact on the business, financial condition, or results of operations.

21. Facebook, Inc. is involved in numerous class action lawsuits and other litigation matters that are expensive and time consuming, and, if resolved adversely, could harm the business, financial condition, or results of operations.
22. Facebook's CEO has control over key decision making as a result of his control of a majority of the voting stock. Mr. Zuckerberg has the ability to control the outcome of matters submitted to the stockholders for approval, including the election of directors and any merger, consolidation, or sale of all or substantially all of Facebook assets. This concentrated control could delay, defer, or prevent a change of control, merger, consolidation, or sale of all or substantially all of Facebook assets that other stockholders support, or conversely this concentrated control could result in the consummation of such a transaction that other stockholders do not support. This concentrated control could also discourage a potential investor from acquiring Facebook Class A common stock due to the limited voting power of such stock relative to the Class B common stock and might harm the market price of Class A common stock. In addition, Mr. Zuckerberg has the ability to control the management and major strategic investments of the company as a result of his position as CEO and his ability to control the election or replacement of Facebook directors.
23. It is anticipated that the company will expend substantial funds in connection with the tax liabilities that arise upon the initial settlement of RSUs following the initial public offering and the manner in which the company fund that expenditure may have an adverse effect on financial condition.
24. The company cannot be certain that additional financing will be available on reasonable terms when required, or at all.
25. The costs may grow more quickly than the revenue, harming the business and profitability.
26. The business is dependent on Facebook ability to maintain and scale the technical infrastructure, and any significant disruption in service could

- damage Facebook reputation, result in a potential loss of users and engagement, and adversely affect financial results.
27. The company began to own and build key portions of technical infrastructure, and, because of the company limited experience in this area, the company could experience unforeseen difficulties.
 28. Facebook's software is highly technical, and if it contains undetected errors, business could be adversely affected.
 29. Certain of user metrics are subject to inherent challenges in measurement, and real or perceived inaccuracies in such metrics may harm reputation and negatively affect the business.
 30. The company cannot guarantee that it can effectively manage growth. Facebook's employee headcount and the scope and complexity of business have increased significantly, with the number of full-time employees increasing from 2,127 as of December 31, 2010, to 3,200 as of December 31, 2011, and we expect headcount growth to continue for the foreseeable future. The growth and expansion of business and products create significant challenges for management, operational, and financial resources, including managing multiple relations with users, advertisers, Platform developers, and other third parties. In the event of continued growth of operations or in the number of third-party relationships, Facebook information technology systems or its internal controls and procedures may not be adequate to support operations. In addition, some members of Facebook management do not have significant experience managing a large global business operation, so the management may not be able to manage such growth effectively.
 31. The loss of one or more of Facebook, Inc. key personnel, or failure to attract and retain other highly qualified personnel in the future, could harm the business. The company currently depends on the continued services and performance of key personnel, including Mark Zuckerberg and Sheryl K. Sandberg. Although the company has entered into employment agreements with Mr. Zuckerberg and Ms. Sandberg, the agreements have no specific duration and constitute at-will employment. In addition, many

of Facebook key technologies and systems are custom-made for the business by the company personnel. The loss of key personnel, including members of management as well as key engineering, product development, marketing, and sales personnel, could disrupt the operations and have an adverse effect on the business.

32. The company may incur liability as a result of information retrieved from or transmitted over the Internet or posted to Facebook and claims related to products.
33. Computer malware, viruses, hacking and phishing attacks, and spamming could harm the business and results of operations.
34. Payment transactions on the Facebook Platform may subject the company to additional regulatory requirements and other risks that could be costly and difficult to comply with or that could harm the business.
35. The company plans to continue expanding operations abroad where it has limited operating experience and may be subject to increased business and economic risks that could affect financial results. Currently Facebook is available in 70 languages and has offices or data centers in more than 20 countries. Facebook may enter new international markets where it has limited experiences in marketing, selling, and deploying the products. China has been a major target for international expansion target. However, its substantial legal and regulatory complexities that prevented Facebook from entering it. Several inherent risks in international expansion include political, social and economy instability, risk related to legal and regulatory environment in foreign jurisdiction, potential damage to the company brand due to compliance with local laws, fluctuations in currency exchange rates, higher levels of credit risk and payment fraud, enhanced difficulties of integrating any foreign acquisitions, burdens of complying with a variety of foreign laws, reduced protection for intellectual property rights in some countries, difficulties in staffing and managing global operations, compliance with U.S. Foreign Corrupt Practices Act or similar laws in other jurisdictions, compliance with statutory equity requirements and management of tax consequences.

36. The company plans to continue to make acquisitions, which could require significant management attention, disrupt the business, result in dilution to the stockholders, and adversely affect financial results.
37. If the company defaults on leasing and credit obligations, the operations may be interrupted and the business and financial results could be adversely affected.
38. The company may have exposure to greater than anticipated tax liabilities.
39. The enactment of legislation implementing changes in the U.S. taxation of international business activities or the adoption of other tax reform policies could materially affect financial position and results of operations.

Moreover, these are risk factors laid out by Facebook, Inc. in their prospectus that relates to its initial public offering and ownership of Class A common stock:

1. The market price of Facebook Class A common stock may be volatile or may decline regardless of operating performance, and owners may not be able to resell their shares at or above the initial public offering price.
2. Substantial blocks of the company total outstanding shares may be sold into the market when “lock-up” or “market standoff” periods end. If there are substantial sales of shares of company common stock, the price of Class A common stock could decline.
3. In making investment decision, potential buyer should not rely on information in public media that is published by third parties. Potential buyer should rely only on statements made in this prospectus in determining whether to purchase Facebook shares.
4. The company has broad discretion in the use of the net proceeds from initial public offering and may not use them effectively.
5. If securities or industry analysts publish inaccurate or unfavorable research about Facebook business, the stock price could decline.
6. The company does not intend to pay dividends for the foreseeable future.
7. If the company is unable to implement and maintain effective internal control over financial reporting in the future, investors may lose confidence in the accuracy and completeness of financial reports and the

market price of Facebook Class A common stock may be negatively affected.

8. The requirements of being a public company may strain the company resources and divert management's attention.
9. Purchasers of the company's Class A common stock in initial public offering will experience immediate and substantial dilution. The dilution is in the form of decreasing net tangible book value per share to \$32.31 as of March 31, 2012 from the initial public offering price of \$38.00 per share. This dilution is due to the fact that Facebook earlier investors paid substantially less than the initial public offering price when they purchase their share of company stock. Furthermore, additional dilution will be experienced by new investor upon exercise of options to purchase common stock under the company equity incentive plans, upon vesting of Restricted Stock Units, upon restricted stock issuance to the employees under equity incentive plans or upon issuance of additional shares of the company common stock.
10. The dual class structure of the company common stock and the voting agreements among certain stockholders have the effect of concentrating voting control with the CEO, and also with employees and directors and their affiliates; this will limit or preclude new stockholders ability to influence corporate matters.
11. The company has elected to take advantage of the "controlled company" exemption to the corporate governance rules for NASDAQ-listed companies, which could make Facebook Class A common stock less attractive to some investors or otherwise harm the stock price.
12. Delaware law and provisions in the company restated certificate of incorporation and bylaws that will be in effect at the closing of initial public offering could make a merger, tender offer, or proxy contest difficult, thereby depressing the trading price of Facebook Class A common stock.

3.3.6 Board of Directors

Provided in the table below is the list of Facebook, Inc.'s board of directors:

Table 3.2 List of Facebook, Inc. Board of Directors

Name	Position(s)
Mark Zuckerberg	Chairman and Chief Executive Officer
Sheryl K. Sandberg	Chief Operating Officer
David A. Ebersman	Chief Financial Officer
David B. Fischer	Vice President, Marketing and Business Partnership
Mike Schroepfer	Vice President of Engineering
Theodore W. Ullyot	Vice President, General Counsel, and Secretary
Marc L. Andreessen	Director
Erskine B. Bowles	Director
James W. Breyer	Director
Donald E. Graham	Director
Reed Hastings	Director
Peter A. Thiel	Director

Source: Facebook, Inc. Prospectus

Mark Zuckerberg is Facebook, Inc.'s founder and largest controlling shareholder. He has served as CEO and member of board of directors since July 2004. He served as Chairman since January 2012. He attended Harvard University majoring in computer science.

Sheryl K. Sandberg has been serving as Chief Operating Officer since March 2008. Previously, she was Vice President, Global Online Sales & Operations of Google Inc. She is also former Chief of Staff of the U.S. Treasury Department. She is also member of the boards of directors of Starbucks Corporation and Walt Disney Company. She has elected not to stand for re-election at Starbucks' annual meeting. She holds an A.B. in economics from Harvard University and an M.B.A. from Harvard Business School.

David A. Ebersman has been serving as Chief Financial Officer since September 2009. Previously, he held various positions at Genentech, Inc. such as Chief Financial Officer and Executive Vice President from January 2006 until April 2009. Before joining Genentech, he was a research analyst at Oppenheimer & Company, Inc., an investment company. Currently, he is also a member of the board of directors of Ironwood Pharmaceuticals, Inc. He holds an A.B. in economics and international relations from Brown University.

David B. Fischer has been serving as Vice President, Marketing and Business Partnership since April 2010. Before that, he was Vice President, Global Online Sales & Operations of Google, Inc. He was also Deputy Chief of Staff of the U.S. Treasury Department and was an associate editor at the U.S. News World Report, L.P. previously. He holds a B.A. in government from Cornell University and an M.B.A. from the Stanford University Graduate School of Business.

Mike Schroepfer has, since September 2008, served as Vice President of Engineering of Facebook, Inc. Prior that, he was Vice President of Engineering at Mozilla Corporation from December 2005 to August 2008. He was also Chief Technology Officer of Sun Microsystems, Inc., previously. Currently, he is also member of board of directors of Ancestry.com Inc. since January 2011. He holds a B.S. and an M.S. in computer science from Stanford University.

Theodore W. Ulyot has been serving as Vice President, General Counsel, and Secretary of Facebook, Inc. since October 2008. He was a partner at Kirkland & Ellis LLP, a law firm, from May 2008 to October 2008. Prior to that, he holds Executive Vice President and General Counsel of ESL Investments, Inc. He served in the federal executive branch under President George W. Bush, including as Chief of Staff at the U.S. Justice Department and as a Deputy Assistant to the President. He holds an A.B. in History from Harvard University and a J. D. from the University of Chicago.

Marc L. Andreessen has been serving as member of board of directors of Facebook, Inc. since June 2008. He is a co-founder and General Partner of Andreessen Horowitz, a venture capital firm. Formerly, he co-founded and served

as the Chairman of the board of directors of Opsware, Inc., a software company. He also served as Chief Technology Officer of America Online, Inc. He was a co-founder of Netscape Communications Corporation. In this company, he holds Chief Technology Officer and Executive Vice President of Products. He currently serves as member of board of directors of Hewlett Packard Company and eBay, Inc. in addition to serving Facebook, Inc. board of directors. He holds a B.S. in computer science from the University of Illinois at Urbana-Champaign.

Erskine B. Bowles has been member of board of directors of Facebook, Inc. since September 2011. He has been Senior Advisor of BDT Capital Partners, LLC, a private investment firm, since January 2012. He served as Co-Chair of the National Commission of Fiscal Responsibility and Reform from February 2010 to December 2010. He was Senior Advisor and Managing Director of Carousel Capital LLC from 1999 to 2001. He was also a partner of Forstmann Little & Co. from 1999 to 2001. He helped found Bowles Hollowell Connor & Co., an investment bank, and served as Chief Executive Officer. He also found Kitty Hawk Capital. From 1996 to 1998, he served as White House Chief of Staff; from 1994 to 1995, he served as Deputy White House Chief of Staff. Currently, he also serves as member of the board of directors of Morgan Stanley, Belk, Inc., Norfolk Southern Corporation and Cousins Properties Incorporated. He holds a B.S. in business from the University of North Carolina at Chapel Hill and an M.B.A. from Columbia University Graduate School of Business.

James W. Breyer has served as member of board of directors of Facebook, Inc. since April 2005. He has been a Partner of Accel Partners, a venture capital firm, since 1987. He also founded Breyer Capital, an investment firm and holds Chief Executive Officer. He is also a co-founder and has been co-lead on the strategic investment committee of the IDG-Accel China Funds. Currently, he serves as member of the board of directors of Brightcove, Inc., Dell, Inc., News Corporation, Prosper Marketplace, Inc., and Wal-Mart Stores, Inc. in addition of serving as the member of the board of directors of Facebook, Inc. Formerly, he served as member of the board of directors of Marvel Entertainment, Inc. from June 2006 to December 2009 and RealNetworks, Inc. from October 1995 to June

2008. He holds a B.S. in interdisciplinary studies from Stanford University and an M.B.A. from Harvard University.

Donald E. Graham has, since March 2009, served as member of the board of directors of Facebook, Inc. He served as Chief Technology Officer of The Washington Post Company since 1991 and as Chairman of its board of directors since 1993, previously. He holds an A.B. in English history and literature from Harvard University.

Reed Hastings has served as a member of Facebook, Inc. board of directors since June 2011. He has served as the Chief Executive Officer and Chairman of the board of directors of Netflix, Inc., a provider of an internet subscription service for movies and television shows, since 1999. He also, formerly, served as Chief Executive Officer of Technology Network, a political service organization for technology for the technology industry. He served as Chief Executive Officer of Pure Atria Software, a maker of software development tools, from 1991 until it was acquired by Rational Software Corporation, a software company, in 1997. Currently, he also serves as a member of the board of directors of Microsoft Corporation, in addition to serving for Facebook, Inc. He holds a B.A. in mathematics from Bowdoin College and an M.S.C.S. in computer science from Stanford University.

Peter A. Thiel has been serving as a member of the board of directors of Facebook Inc. since April 2005. He is a Partner of Founders Fund, a venture capital firm, since 2005. He also served as President of Clarium Capital Management, LLC, since 2002. He co-founded PayPal, Inc. in 1998 and served as Chief Executive Officer, Chairman of the board of directors, and President from 2000 until it is being acquired by eBay, Inc. in 2002. He holds a B.A. in Philosophy from Stanford University and a J.D. from Stanford Law School.

3.3.7 Capitalization

Facebook, Inc.'s structure of common stock is as follows:

Table 3.3 Facebook, Inc. Common Stock

Common Stock	Actual	Pro Forma	Pro Forma As Adjusted
Class A			
Authorized	4,141,000,000	5,000,000,000	5,000,000,000
Issued and Outstanding	117,549,393	117,549,393	633,492,418
Class B			
Authorized	4,141,000,000	4,141,000,000	4,141,000,000
Issued and Outstanding	1,235,134,201	1,780,535,644	1,504,592,619
Total Issued and Outstanding	1,352,683,594	1,898,085,037	2,138,085,037

Source: Facebook, Inc. Prospectus

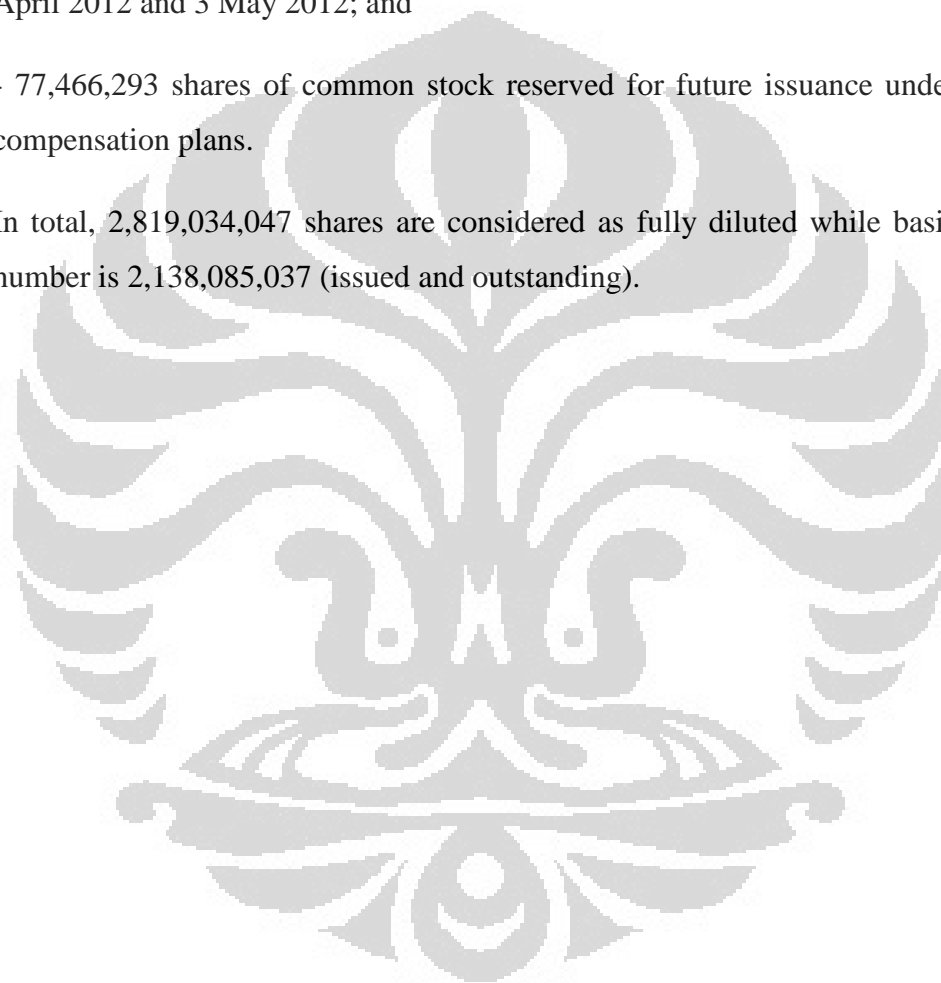
The actual figures are as of 31 March 2012. Pro Forma figures, as of 31 March 2012, incorporate the amendment of Facebook, Inc.'s Class A common stock authorized share up to 5 billion shares. The additional Class B common stock of 545,401,443 shares is due to automatic conversion of convertible preferred stock of Facebook, Inc. resulting in a total of 1,780,535,644 shares of Class B common stock issued and outstanding. In the Pro Forma As Adjusted figures, as of 31 March 2012, Class A common stock increased by 515,943,025 shares. This increase was due to the issuance of new shares by Facebook, Inc. of 180,000,000 shares, the automatic conversion of 181,638,768 shares of Class B common stock held by the selling stockholders into equivalent number of Class A common stock, and the conversion by certain existing stockholders of 154,304,257 shares of Class B common stock into equivalent number of Class A common stock.

In addition, below are shares excluded from the Table 3.3 above:

- 116,756,442 shares of Class B common stock issuable upon the exercise of options outstanding as of 31 March 2012 under 2005 Stock Plan;
- 60,000,000 shares of Class B common stock issuable upon exercise of the remaining option held by Mr. Zuckerberg;

- 378,429,048 shares of Class B common stock subject to RSUs outstanding as of 31 March 2012 under 2005 Stock Plan;
- 22,999,412 shares of common stock issuable upon completion of Instagram, Inc. acquisition;
- 25,257,815 shares of Class B common stock subject to RSUs granted under 2005 Stock Plan and 40,000 shares of Class A common stock issued between 1 April 2012 and 3 May 2012; and
- 77,466,293 shares of common stock reserved for future issuance under equity compensation plans.

In total, 2,819,034,047 shares are considered as fully diluted while basic shares number is 2,138,085,037 (issued and outstanding).



CHAPTER 4

ANALYSIS

4.1 User Growth and Revenue Projection

4.1.1 User Growth

Equation 2.8 will be used to project user growth. Constants K , P_0 , and r need to be obtained first. Initial growth rate r and K are obtained from regressing $y = R_i^d$ (dependent variable) to $x = P_i$ (independent variable). The equation from regression is (the regression output is attached in Attachment 4.1):

$$R_i^d = 1.1679 - 1.1140 * 10^{-9} * P_i \quad \text{Adj. } R^2 = 0.838 \quad (4.1)$$

From this equation, K , carrying capacity is 1,048,197,738 and r , initial growth rate, is 1.1679 per year. Using these two numbers and Equation 2.12, the average initial population is 509,847.6 (Attachment 4.2). Having K , r , and P_0 , Facebook users $P(t)$ at time period t can be projected using the following equation:

$$P(t) = \frac{534,421,099,222,878e^{1.1679t}}{1,048,197,738 + 509,847.6(e^{1.1679t} - 1)} \quad (4.2)$$

The actual users of Facebook each year (represented by dashed line) and its projection (represented by dotted line) are depicted on the next page. The first year of the time series is the year 2004, the year Facebook started operation. The quarter decimal on time period represent the standpoint of projection at end of March. Year 1 in the projection ended at March 2013 with time period (t) of 9.25. The chart shows that at $t = 11.25$, Facebook users started to level off.

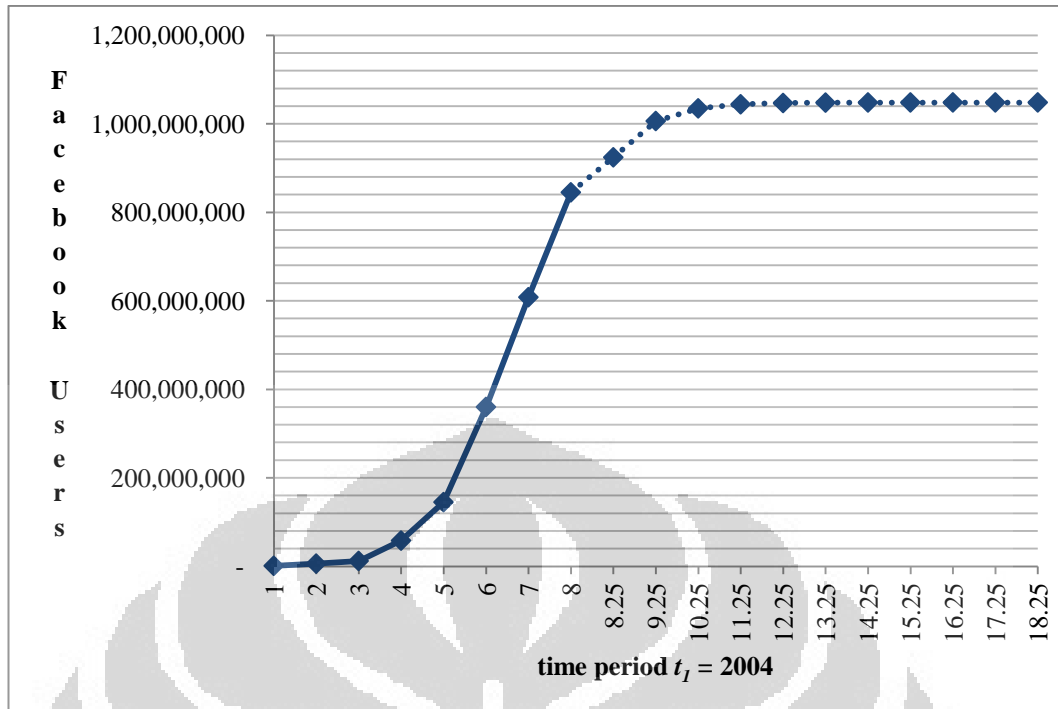


Figure 4.1 Facebook Actual Users and Projected Users

Source: Self-processed

4.1.2 Revenue per User

Actual revenue per MAU will be regressed to (t) time period. Data in Attachment 2.2 is used. The regression equation is (the regression output is attached in Attachment 4.3):

$$\text{Revenue per User}_t = 0.1865 + 0.4511 * t \quad \text{Adj. } R^2 = 0.77$$

(4.3)

The obtained revenue per user at t is then multiplied with number of users at t to arrive at revenue at t . The revenue per user is applicable to online display ad and virtual goods payment revenue. At terminal phase, the operating margin will be 35 percent. Facebook revenue projection using user growth estimation and revenue per user estimation for scenario 1 is as follows:

Table 4.1 Facebook Revenue Projection for Scenario 1

Year	Users	Revenue per User (US\$)	Revenue (US\$)
0	924,123,912	3.91	3,611,743,276
1	1,006,185,623	4.36	4,386,384,763
2	1,034,761,332	4.81	4,977,770,229
3	1,043,981,915	5.26	5,493,097,951
4	1,046,883,016	5.71	5,980,643,041
5	1,047,788,519	6.16	6,458,504,937
6	1,048,070,441	6.62	6,933,058,798
7	1,048,158,146	7.07	7,406,494,657
8	1,048,185,425	7.52	7,879,555,398
9	1,048,193,909	7.97	8,352,490,985
10	1,048,196,547	8.42	8,825,385,012

Source: Self-processed

4.1.3 Mobile Advertising and Apps Revenue

Mobil ad and apps revenue will be estimated from their market size growth. These two different markets will be separated because they grow from different point of time and have different characteristic. Mobile ad data in Attachment 2.3 is regressed using Equation 2.11. The carrying capacity resulted from the regression is -4.31 with R^2 of 0.86. Thus, the logistic function is not applicable to mobile ad market because negative carrying capacity is not possible. Consequently, the mobile ad market data is regressed against time period (t) linearly. The year 2000 is deemed as the first year of mobile advertising market. The equation of the regression is (the regression output is attached in Attachment 4.4):

$$\text{Mobile Ad Market}_t = -7.5357 + 0.9510 * t \quad \text{Adj. } R^2 = 0.80 \quad (4.4)$$

The graphical representation of global market mobile ad projection is as follows (dashed line represents actual figures, dotted line represents projected figures):

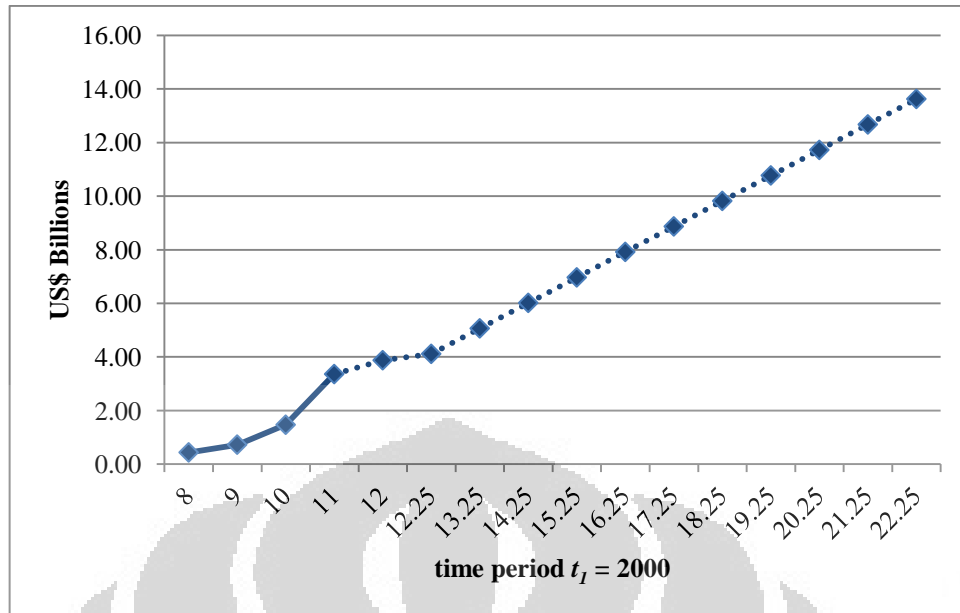


Figure 4.2 Global Market Mobile Ad Projection

Source: Self-processed

Likewise, market apps data is tested using Equation 2.11 to check whether it fits into logistic function. The year of 2002 is deemed as the first year of mobile application market. The equation of the regression is (the regression output is attached in Attachment 4.5):

$$R_i^d = 1.5580 - 0.0871 * P_i \quad \text{Adj. } R^2 = 0.57 \quad (4.5)$$

From this equation the carrying capacity is 17.88 and initial growth rate is 1.558. Using Equation 2.12, the average initial population is $1.988 * 10^{-5}$. Having carrying capacity, initial growth rate, and initial population, global market mobile apps $P(t)$ at time period t can be projected using the following equation:

$$P(t) = \frac{3.56 * 10^{-4} * e^{1.558t}}{17.8790 + 1.9984 * 10^{-5}(e^{1.558t} - 1)} \quad (4.6)$$

The graphical representation of global market mobile apps projection is as follows (dashed line represents actual figures, dotted line represents projected figures):

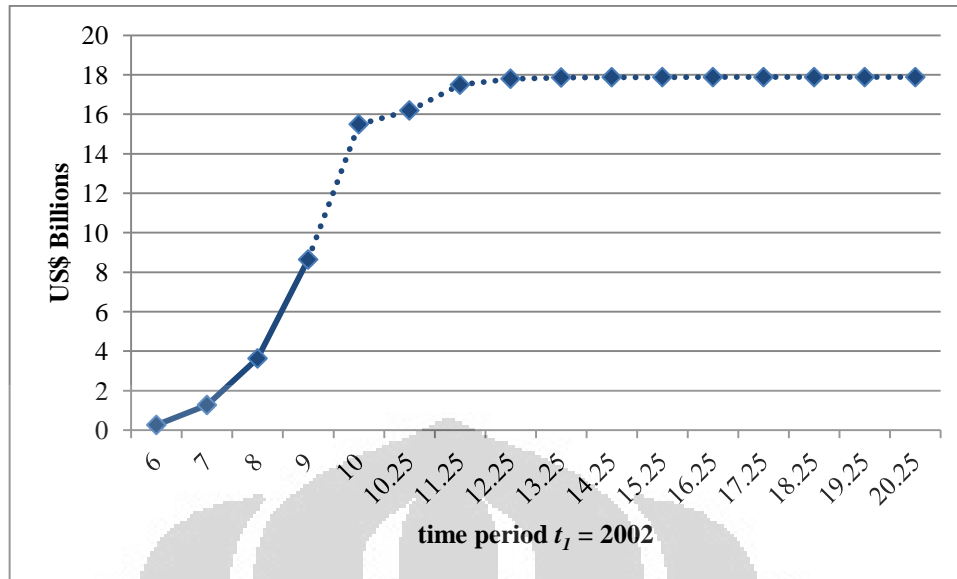


Figure 4.3 Global Market Mobile Apps Projection

Source: Self-processed

Facebook's share of revenue of global market mobile ad projection is as follows (differences are due to rounding):

Table 4.2 Facebook Share of Global Mobile Ad and Revenue Projection

Year	Global Mobile Ad Market Size (US\$ Billions)	Facebook Share	Facebook Revenue (US\$)
0	4.1138		
1	5.0647	1.30%	65,841,238
2	6.0157	2.00%	120,313,650
3	6.9667	2.50%	174,166,359
4	7.9176	3.30%	261,281,666
5	8.8686	4.20%	372,481,122
6	9.8196	5.10%	500,798,071
7	10.7705	6.40%	689,314,681
8	11.7215	7.70%	902,556,560
9	12.6725	9.00%	1,140,523,709
10	13.6235	10.20%	1,389,592,668

Source: Self-processed

Meanwhile, Facebook's share of revenue of global market mobile apps projection is as follows (differences are due to rounding):

Table 4.3 Facebook Share of Global Mobile Apps and Revenue Projection

Year	Global Mobile App Market Size (US\$ Billions)	Facebook Share	Facebook Revenue (US\$)
0	16.1906		
1	17.4949	1.10%	192,443,937
2	17.7968	1.80%	320,341,739
3	17.8617	2.70%	482,264,604
4	17.8754	3.80%	679,264,236
5	17.8783	5.00%	893,913,330
6	17.8789	6.40%	1,144,248,040
7	17.8790	8.20%	1,466,078,316
8	17.8790	10.20%	1,823,661,147
9	17.8790	12.50%	2,234,879,568
10	17.8790	15.00%	2,681,855,661

Source: Self-processed

These two sources of revenue are combined and then are added to total revenue under scenario 1 to arrive at total revenue under scenario two. At terminal phase, operating margin will be 33 percent. This decrease is due to higher operating expense to support additional sources of revenue and competition.

4.1.4 Social Commerce Revenue

Data in Attachment 2.4 is tested using Equation 2.11. The year 2008 is deemed as the first year of social commerce market. The equation of the regression is (the regression output is attached in Attachment 4.6):

$$R_i^d = 0.5916 - 7.87 * 10^{-3} * P_i \quad \text{Adj. } R^2 = 0.26 \quad (4.7)$$

The carrying capacity is 75.16 and initial growth is 0.5915. Using Equation 2.12, the initial population is 0.86. Using Equation 2.8, social commerce market can be projected using the following equation:

$$P(t) = \frac{64.64e^{0.5915t}}{75.1604 + 0.86(e^{0.5915t} - 1)}$$

(4.8)

The graphical representation of social commerce market projection is as follows (all is projected figures, dotted line represents years of projection in valuation):

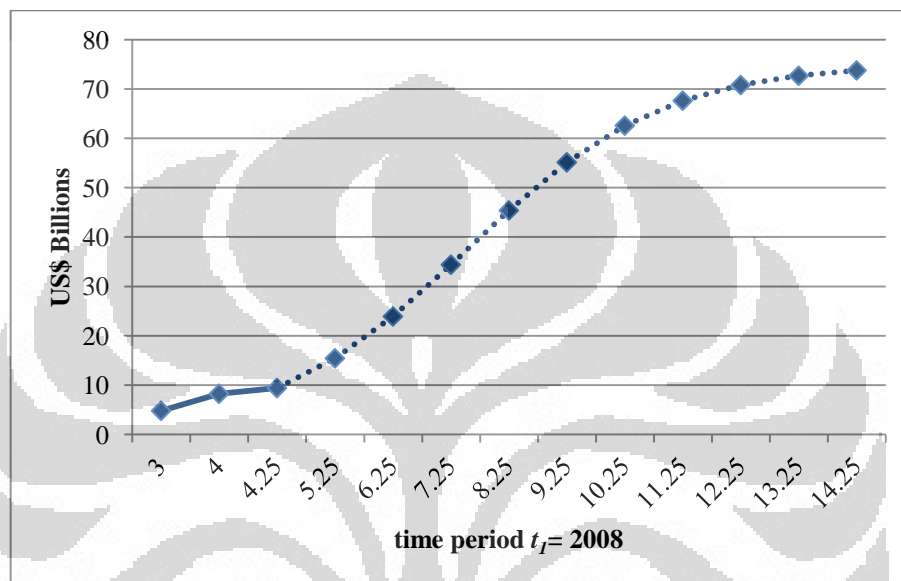


Figure 4.4 Global Market Social Commerce Projection

Source: Self-processed

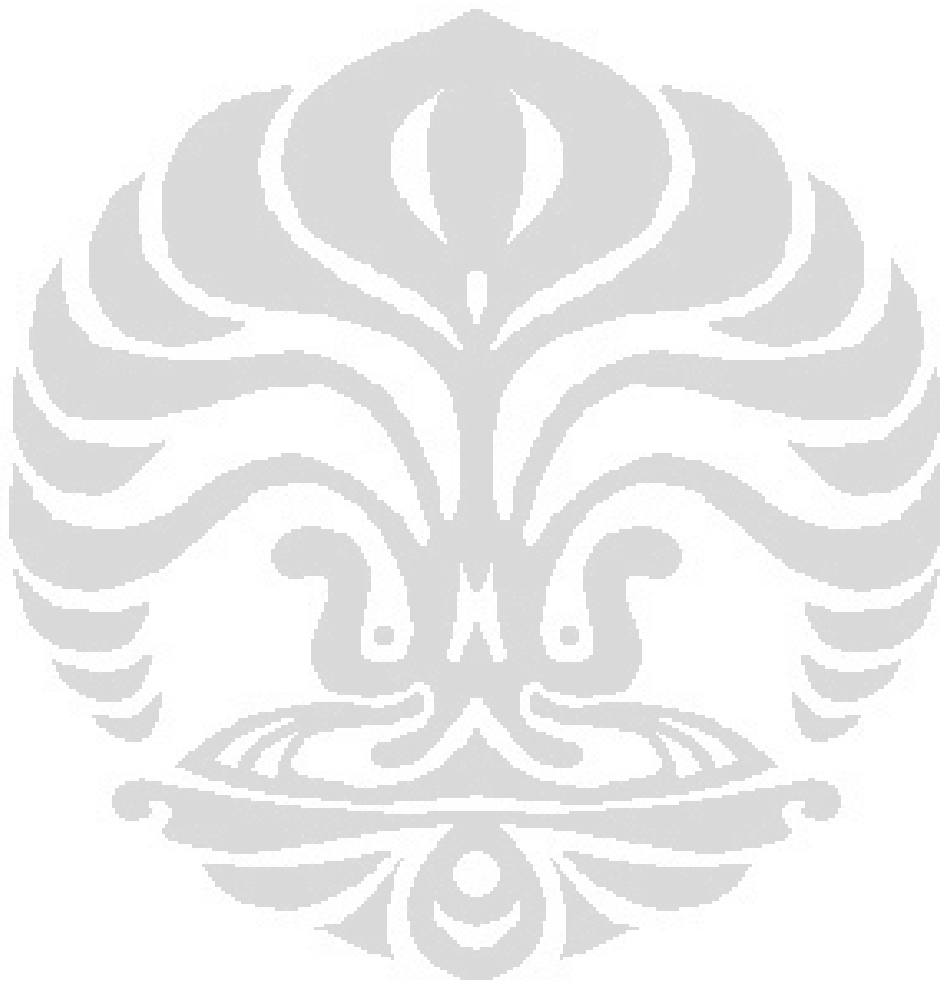
Furthermore, Facebook share of social commerce market projection is as follows:

Table 4.4 Facebook Share of Social Commerce Market Projection

Year	Global Social Commerce Market (US\$ Billions)	Facebook Share	Facebook Revenue (US\$)
0	9.4050		
1	15.4350	1.00%	154,350,243
2	23.9246	1.40%	334,944,067
3	34.3945	1.90%	653,496,033
4	45.3875	2.50%	1,134,687,038
5	55.1414	3.80%	2,095,374,839
6	62.5853	4.50%	2,816,336,010
7	67.6387	5.30%	3,584,852,003
8	70.8028	6.80%	4,814,589,564
9	72.6846	8.00%	5,814,766,147
10	73.7697	9.00%	6,639,272,420

Source: Self-processed

Differences are due to rounding. Facebook share of revenue is estimated. The revenue is then added to total revenue under scenario 2 to arrive at total revenue under scenario three. At terminal phase, operating margin will stand at 30 percent. This decrease is due to higher operating expense to support additional sources of revenue and competition.



4.2 Cost of Capital

The capital of Facebook, Inc. consists of equity and debt. Facebook, Inc.'s debt is in the form of capital and operating lease.

4.2.1 Cost of Equity

Google, Inc. and Yahoo! Inc. annual return is regressed using Equation 2.15. The result is as follows (differences are due to rounding):

Table 4.5 Fama/French Three Factor Model Regression Result

Company	b_i	s_i	h_i	Adj. R^2	Std. Error
GOOG	1.7232	-2.0264	1.9632	0.4270	35.2201
YHOO	0.9893	0.0996	-0.6773	0.0541	31.0854
Average	1.3562	-0.9634	0.6430		

Source: Self-processed

This is the result of regressing each company's annual stock return to market risk premium, size premium and book-to-market ratio premium annual research factor compiled by Kenneth French. Google's adjusted R^2 is much higher than that of Yahoo!'s. The average of b_i , s_i , and h_i is used in equation 2.9. The Fama/French research factors for 12 months ended March 2012 of market risk premium, size premium, and book-to-market ratio premium are 4.97%, -6.97%, and -10.62%, respectively. Using 10 year Treasury bond rate as of 30 March 2012 of 2.23% as the risk free rate, the cost of equity for Facebook, Inc. is 8.68 percent.

4.2.2 Cost of Debt

As of end of March 2012, Facebook, Inc. does not have outstanding bond or any conventional debt. Therefore, synthetic ratings will be used to estimate Facebook cost of debt.

Interest expense for 12 months ended March 2012 totaled \$48 million. Operating income for 12 months ended March 2012 totaled \$1,750 million. Therefore, the interest coverage ratio is 36.46. It means every \$1 of interest expense is covered by \$36.46 operating income. Using table in Attachment 4.10 taken from Damodaran website, the spread for Facebook is 0.5 percent. The rate of 10 year

Treasury bond as of end of March 2012 is 2.23 percent. Therefore, the cost of debt for Facebook is 2.73 percent.

4.2.3 Market Value Weight

Cost of Capital calculation uses market value as the weight. The market value of equity for Facebook, Inc. is calculated using offering price \$38.00 and Pro Forma As Adjusted shares number (issued and outstanding) of 2,138,085,037 shares. The total market value of equity is \$81,247,231,406.

Facebook, Inc. does not have any loan or conventional debt. It does, however, have lease commitment, capital and operational. Total capital lease as of 31 March 2012 is \$706 million. On the other hand, the total capitalized operating lease is \$846.46 million. Therefore its total debt is \$1,552.46 million.

Using these market debt value and market equity value, the weight for the equity is 98.12% while the weight for the debt is 1.87 percent. The debt-to-equity ratio is 0.0191. The stable debt-to-equity ratio is 0.017, 0.021, and 0.023 for scenario 1, 2, and 3 respectively. This higher debt-to-equity ratio at terminal phase is due to the higher cost of equipment and network facilities acquired to support new sources of revenue.

Using Equation 2.7 and the inputs: equity weight of 98.12%, debt weight of 1.87%, cost of equity of 8.68%, cost of debt of 2.73%, and marginal tax rate of 35 percent, the cost of capital for Facebook, Inc. is 8.55 percent.

4.3 Research and Development Expense

Facebook, Inc. is an internet company. It is estimated that for internet company, the life of capitalized research and development expense is three years. Therefore, up to four years data of research and development expense is collected. Facebook, Inc.'s research and development expense for 12 months ended March 2012 is as follows:

Table 4.6 Capitalized Research and Development Expense (US\$ million)

Year	R& D Expenses	Unamortized portion		Amortization this year
Current	484	1	484	0
-1	175	0.67	116.67	58.33
-2	94.6	0.33	31.53	31.53
-3	55	0	0	18.33
			632.2	108.2

Source: Self-processed

Total value of research asset is \$632.2 million. The (capital) expenditure on research asset in current year is \$484 million while amortization for current year is \$108.2 million. The net capital expenditure of research asset is \$375.8 million which will be added to operating income. Operating income for 12 months ended March 2012 is \$1,750 million. Therefore, the adjusted operating income is \$2,125.8 million.

4.4 Operating Lease Expense

Facebook, Inc. only debt is leases. Total capital lease is \$706 million while capitalized operating lease is as follows:

Table 4.7 Capitalized Operating Lease (US\$ million)

Year	Commitment	Present Value
1	180	175.22
2	130	123.18
3	113	104.23
4	102	91.58
5	95	83.03
6 and beyond	108.33	269.22
Debt Value of Leases		846.46
Interest Expense Imputed		23.11

Source: Self-processed

The commitment for sixth year is originally \$325 million. Dividing this number with the average commitments in the previous five years produces number of years embedded in sixth year estimate, which is three in this case. The commitment in sixth year and beyond is the lump sum of \$325 divided by three,

which is \$108.33 million. This amount is then converted into an annuity for ten years (Damodaran, 2002). Total debt value of operating lease is \$846.46 million and interest expense imputed is \$23.11 million (using cost of debt of 2.73 percent).

This interest expense imputed is added to adjusted operating income of \$2,125.80. The result is \$2,148.91 million, the operating income adjusted for research asset and operating lease debt. This adjusted operating income is used in base year for each scenario.

4.5 Stock Options Compensation

The method used to value employee stock option in this research is modified Black-Scholes formula. Below are options outstanding and assumedly exercisable as of 31 March 2012:

- 116,756,442 shares of Class B common stock issuable upon the exercise of the options under 2005 Stock Plan, with weighted-average exercise price of approximately \$0.94 per share; and
- 60,000,000 shares of Class B common stock issuable upon the exercise of the option held by Mark Zuckerberg with an exercise price of \$0.06 per share.

The variables needed as inputs into Black-Scholes Equation are as follows:

Table 4.8 Inputs for Modified Black-Scholes Formula

Expiration in Years (Half of Stated Maturity)	2.5
Standard Deviation in Stock Price	117.09%
Annualized Dividend Yield on Stock	0%
Treasury Bond Rate	2.23%

Source: Self-processed

The expiration is half of stated maturity to allow for early exercise. This is the case for employee stock option as it is non-tradable. Standard deviation is taken from Damodaran web site. It is the average of standard deviation of all internet

company stock in U.S. stock market. The risk free rate is 10 year Treasury bond rate as of end of March 2012.

The first stock price for the input is US\$38.00, the offer price. Using this as the input yield estimated value per share for each scenario. This value per share is then become the new stock price in the second iteration. This results in a new value per share under each scenario which then becomes the next input as stock prices. The process is continued until the value per share is not changing any more. The value of the options after the iteration is as follows:

Table 4.9 Value of the Options

Scenario	After-tax option value in US\$ (iterated)
Scenario 1	1,574,094,378
Scenario 2	2,123,205,517
Scenario 3	2,806,059,888

Source: Self-processed

Value of the option under scenario 3 is the highest because income is higher and thus its value per share.

4.6 Scenario 1

Scenario 1 assumes that Facebook, Inc. only depends on its current sources of revenues into the future. The current sources of revenue are online display ad and virtual goods payment. The user growth is projected using logistic function. Revenue per user is also estimated to arrive at revenue.

The operating margin is assumed to be 35% at terminal phase. The revenue-to-capital ratio is assumed to be 1.5 at terminal phase. Debt-to-equity ratio is assumed to be 0.017 at terminal phase. Thus, the cost of capital at terminal phase is 8.56 percent. Return on invested capital is 23% at terminal phase and stable growth rate of 5.36 percent. The summary of scenario 1 is as follows:

Table 4.10 Scenario 1 Summary

PV(Terminal value)	22,259,266,321
PV (CF over next 10 years)	9,658,701,216
Sum of PV	31,917,967,537
Value of operating assets =	31,917,967,537
Debt	1,174,460,000
Cash	1,282,000,000
Value of equity	32,025,507,537
- Value of options	1,574,094,378
Value of equity in common stock	30,451,413,159
Number of shares	2,138,085,037
Estimated value /share	\$ 14.24

Source: Self-processed

The estimated value per share of \$14.24 is well below the offer price of \$38.00. It is a 63% difference. This low price is due to saturation in Facebook user. There is not much growth to expect from these sources. Facebook needs to start monetizing its mobile presence This is also will be the case if Facebook fail in its endeavor of building new sources of revenue. The schedule of cash flow for scenario1 is attached in Attachment 4.7.

4.7 Scenario 2

Scenario 2 assumes that Facebook, Inc. adds new sources of revenue. In addition to online display ad and virtual goods payment, Facebook, Inc. offers mobile ad and apps. Already, the number of users accessing their Facebook profile from mobile devices is growing. Monetization of its presence in mobile is the next logical step in its strategy.

The global market of mobile ad is linear as it does not fit as a logistic function. It is expected that at year 10 the global market of ad is \$13 billion. On the other hand, global mobile apps market fits into logistic function even though it is very near to its carrying capacity of \$17.87 billion.

The operating margin is assumed to be 33% at terminal phase. The revenue-to-capital ratio is assumed to be 1.5 at terminal phase. Debt-to-equity ratio is assumed to be 0.021 at terminal phase. Thus, the cost of capital at terminal phase is 8.54 percent. Return on invested capital is 25% at terminal phase and stable growth rate of 5.44 percent. The summary of scenario 2 is as follows:

Table 4.11 Scenario 2 Summary

PV(Terminal value)	32,467,658,955
PV (CF over next 10 years)	10,260,986,847
Sum of PV	42,728,645,802
Value of operating assets =	42,728,645,802
Debt	1,174,460,000
Cash	1,282,000,000
Value of equity	42,836,185,802
- Value of options	2,123,205,517
Value of equity in common stock	40,712,980,285
Number of shares	2,138,085,037
Estimated value /share	\$ 19.04

Source: Self-processed

The estimated value per share of \$19.04 is also well below the offer price of \$38.00. The cash flow schedule for scenario 2 is attached in Attachment 4.8.

4.8 Scenario 3

Scenario 3 assumes that Facebook, Inc. adds new source of revenue, social commerce, in addition to online display ad, virtual goods payment, mobile ad, and mobile apps. Social commerce revenue includes listing fee and payment using some form of modified Facebook Credit (which now is used for virtual goods payment).

The global market of social commerce fits into logistic function. It also still in its nascent stage with its size of \$9.4 billion. It is expected at year 10, the global market of social commerce is \$73 billion.

The operating margin is assumed to be 30% at terminal phase. The revenue-to-capital ratio is assumed to be 1.5 at terminal phase. Debt-to-equity ratio is assumed to be 0.023 at terminal phase. Thus, the cost of capital at terminal phase is 8.52 percent. Return on invested capital is 24% at terminal phase and stable growth rate of 5.52 percent. The summary of scenario 3 is as follows:

Table 4.12 Scenario 3 Summary

PV(Terminal value)	45,457,219,719
PV (CF over next 10 years)	10,703,863,096
Sum of PV	56,161,082,815
Value of operating assets =	56,161,082,815
Debt	1,174,460,000
Cash	1,282,000,000
Value of equity	56,268,622,815
- Value of options	2,806,059,888
Value of equity in common stock	53,462,562,928
Number of shares	2,138,085,037
Estimated value /share	\$ 25.00

Source: Self-processed

The estimated value per share of \$25.00 is well below the offer price of \$38.00. It is the closest estimate among three scenarios to Facebook stock price as of 7 June 2012 of \$26.31 (Facebook, Inc., 2012). The cash flow schedule for scenario 3 is attached in Attachment 4.9.

4.9 Stock Price Analysis



Figure 4.5 Facebook Stock Price Chart

Source: Facebook, Inc. (2012) Investor Relation Web page

Facebook, Inc. stock has performed poorly after the IPO. At the end of May, the price drops 24 percent to \$28.84. This drop is due to overpriced IPO offer price. As this research try to examine, the offer price of \$38.00 is too expensive. Under scenario 3, the value per share is just \$25.00. The stock price hit \$25.52 as its 52-week low. The price closed at \$31.10 at June 29th, still lower than its IPO level. Apparently, investors have weighed in several factors such as the nonexistent monetization of Facebook mobile presence. More and more users access their Facebook profile from mobile devices. The decrease of user engagement through PC could make advertisers think twice before they buy ads in Facebook. In addition, the number of users' growth has slows down. China's market with its huge population is impossible to penetrate as the government heavily controls the dissemination of information.

The offer price of \$38.00 is determined by the lead underwriters for Facebook: Morgan Stanley, Goldman Sachs & Co., and J.P. Morgan. Zielenziger (2012) reported that one day before the IPO, the underwriters of Facebook (there are 33

firms of them) increase the number of shares they sold by 25 percent and price the share at \$38.00 each. This is valuing the deal to the tune of US\$19 billion.

There are few explanations of why the underwriters did this (Zielenziger, 2012). Firstly, they simply raise the price because there are people who want to buy at that raised price. Investment bankers reported that Facebook IPO is oversubscribed in Asia. Knowing this information, Accel Partners, one of Facebook investors, boosts the number of shares it sells. They might be wanted to cash out, knowing that many people want to pay higher than the fair price. Secondly, they want to take advantage of strong market. At May 16th, NASDAQ's gain is a modest 10.5 percent. Thirdly, Facebook is one of the last 'products' from PC era. It needs to adapt to mobile devices era and that adaptation needs investments. Fourthly, the underwriters simply want to make money from the fees. The higher the stock price they sold, they higher fees they receive.

The first day of trading doesn't go smoothly. There is roughly 30 minutes delay. McCrank (2012) reported that NASDAQ OMX Group Inc., the operator of NASDAQ, will offer US\$40 million in cash and rebates to clients affected negatively in the delay. NYSE Euronext, NASDAQ's main competitor, strongly against this decision. They assert that such plan would force brokers to trade at NASDAQ, taking their market share.

There are four top market makers that lost in first day trading: UBS, Citigroup, Knight Capital and Citadel Securities. Together, they lost US\$150 million. The technical delay caused this problem. It prevented them from knowing whether the orders have been accepted by the system. Under the US\$40 million plan, investors who tried to buy the shares at US\$42.00 or less but whose orders were not executed, is eligible for the compensation.

4.10 Price per Earnings Ratio Comparison

Price per Earnings Ratio (PER) of peer companies of Facebook, Inc. were furnished here for comparison purpose. The figures below are as of 31 December 2011. Baidu, NetEase and Yandex are foreign issuers that list their depository receipt. It shows that Yahoo! and Google trade at similar ratio. The priciest company is LinkedIn and the cheapest company is Baidu.

Table 4.13 PER Comparison for Internet Company

Company	Price per Share (US\$)	Basic EPS (US\$)	PER
Yahoo! Inc.	16.13	0.82	19.6707
Google Inc.	645.9	30.17	21.4087
LinkedIn Corp.	63.01	0.15	420.0670
AOL Inc.	15.1	0.13	116.1540
Amazon.com, Inc.	173.1	1.39	124.5320
eBay, Inc.	30.33	2.5	12.1320
Netflix, Inc.	69.29	4.28	16.1893
Baidu, Inc.	116.47	30.23	3.8528
Sohu.com, Inc.	50	4.26	11.7371
NetEase, Inc.	44.85	0.16	280.3130
Yandex N.V.	19.7	0.57	34.5614
		Mean	96.4198
		Median	21.4087
		Std Dev	135.7820

Source: nasdaq.com and S.E.C. filings

Facebook net income for 12 months ended March 2012 is \$974 million and the number of outstanding shares is 2,138,085,037. Thus, the EPS for Facebook is \$0.46 per share. Using the offer price of \$38.00, PER of Facebook, Inc. is 82.6. Using the price as of 12 June 2012 of \$27.40, PER of Facebook, Inc. is 59.56 (Facebook, Inc., 2012). At the 12 June 2012 close price, Facebook is traded well below the average but well above the median of PERs.

CHAPTER 5

CONCLUSIONS AND SUGGESTIONS

5.1 Conclusions

This research has reached the following conclusions:

- The carrying capacity of Facebook user growth is 1,048,197,738 computed using logistic functions.
- The cost of equity was computed using Fama/French Three Factors model. Yahoo! and Google are selected as comparables of Facebook. The cost of equity for Facebook using the model is 8.68 percent.
- The value per share under each of three scenarios is as follows:
 - a. Under scenario 1, in which Facebook stays in its current source of revenue of online display advertising and virtual goods payments, the value per share is \$14.24.
 - b. Under scenario 2, in which Facebook is assumed to exploit its mobile presence along with its current sources of revenue, the value per share is \$19.04.
 - c. Under scenario 3, in which Facebook is assumed to capitalize on social commerce along with its sources of revenues under scenario 2, the value per share is \$25.00.
- The estimate value per share under scenario 3 is the closest to Facebook stock price as of 7 June 2012 (\$26.31). Clearly, the offer price of \$38.00 is overpriced and the market has adjusted itself accordingly.

5.2 Suggestions

Suggestions will be addressed for investors, regulators, analysts, and scholars as follows:

- For investors, they need to look into company's fundamentals before invest in it. They also need to make reasonable assumption regarding the fundamentals. The application of logistic function ensures the reasonableness of the fundamentals. The author makes no recommendations whatsoever regarding investing or not investing in Facebook, Inc. Such action would have legal consequences. The purpose of this master thesis is solely for study and research and not soliciting an offer to buy or to sell any securities. The author disclaims any damage caused by investing or not investing in Facebook, Inc. Investors should seek professional service to advice on this matter before making any investment decision.
- For regulators, they need to enforce the rule that underwriters must update the public with any material information in connection to initial public offering.
- For analysts, the projection of mobile ad and app market were using a little amount of data. It is believed that more data, for example quarterly, will result in better projection into the future. The logistic regression of Facebook user growth used quarterly data and it shows higher adjusted R square than logistic regression of global mobile apps market and global social commerce market. Furthermore, other source of revenue could also be added. No one would have thought also back in Google's IPO in 2004 that it will make program for driverless car or make goggles. Technology is rapidly changing and innovators around the world are keen to disrupt every aspect of human lives.
- For scholars, more peer company could also be added to compute cost of equity using Fama/French Three Factors model. Few companies, like Baidu, SINA Corp, NetEase, Renren, and Yandex, are foreign company listed in U.S. stock exchange in the form of depositary receipt. Others are listed in other exchange such as Mail.Ru Group (LSE) and Tencent Holdings (HKSE). Even though they are all in the similar business with Facebook, the comparability of these companies in computing cost of equity still need further study. This is a potential area of research in the future.

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ATTACHMENT

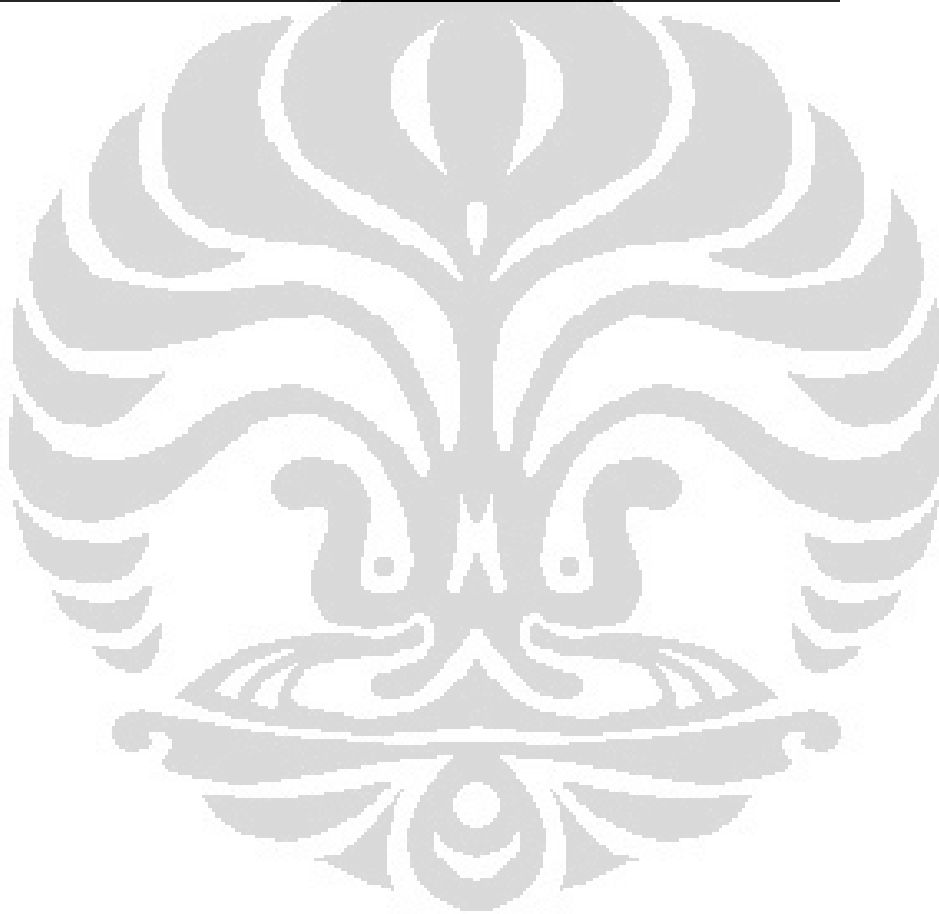
Attachment 2.1 Quarterly MAU

Date	User	Δt	t	R^d	P_i
08-Feb-04		0	0		
31-Dec-08	145,000,000	1.00274	4.89863014	0.91379	145,000,000
31-Mar-09	197,000,000	0.24658	5.14520548	1.24291	197,000,000
30-Jun-09	242,000,000	0.24932	5.39452055	0.8252	242,000,000
30-Sep-09	305,000,000	0.25205	5.64657534	0.91795	305,000,000
31-Dec-09	360,000,000	0.25205	5.89863014	0.65776	360,000,000
31-Mar-10	431,000,000	0.24658	6.14520548	0.73002	431,000,000
30-Jun-10	482,000,000	0.24932	6.39452055	0.44857	482,000,000
30-Sep-10	550,000,000	0.25205	6.64657534	0.52359	550,000,000
31-Dec-10	608,000,000	0.25205	6.89863014	0.39776	608,000,000
31-Mar-11	680,000,000	0.24658	7.14520548	0.45389	680,000,000
30-Jun-11	739,000,000	0.24932	7.39452055	0.33373	739,000,000
30-Sep-11	800,000,000	0.25205	7.64657534	0.31467	800,000,000
31-Dec-11	845,000,000	0.25205	7.89863014	0.21712	845,000,000
31-Mar-12	901,000,000	0.24932	8.14794521	0.25738	901,000,000



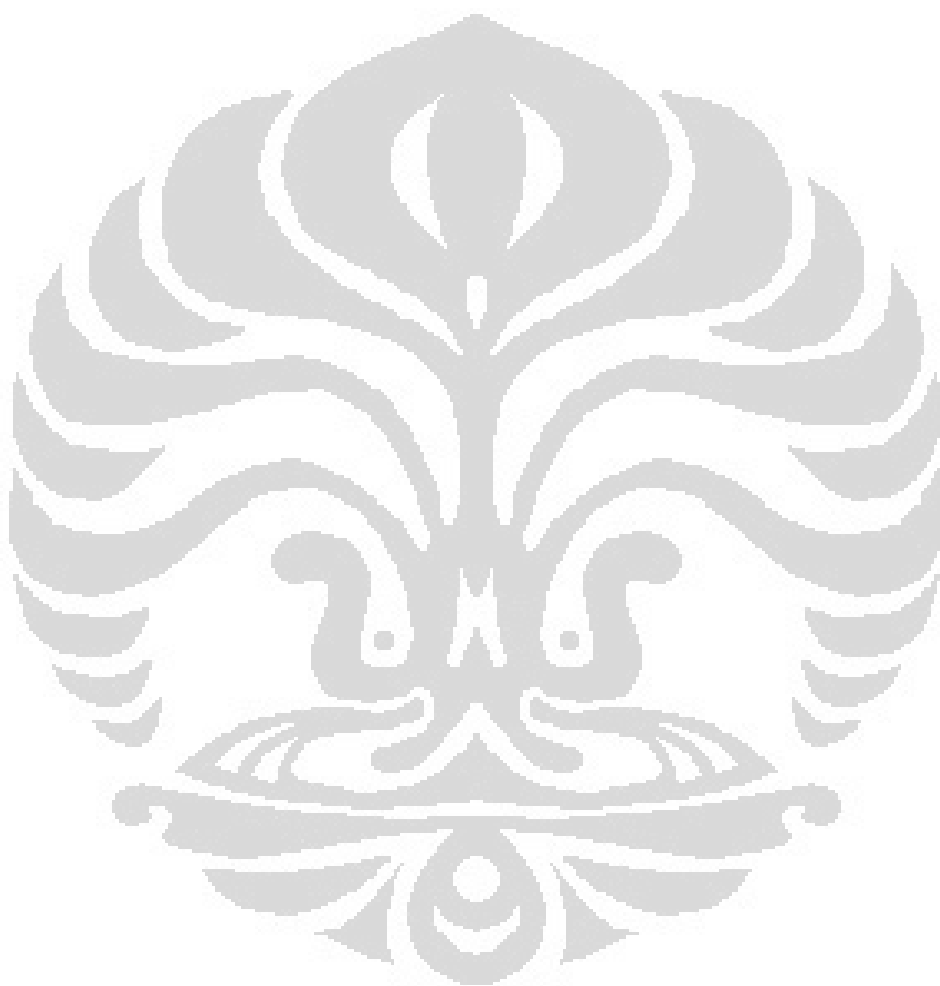
Attachment 2.2 Revenue per User

Year	t	Revenue (US\$)	MAUs	Revenue per User
2004	1	382,000	1,000,000	0.382
2005	2	9,000,000	6,000,000	1.5
2006	3	48,000,000	12,000,000	4
2007	4	153,000,000	58,000,000	2.637931034
2008	5	272,000,000	145,000,000	1.875862069
2009	6	777,000,000	360,000,000	2.158333333
2010	7	1,974,000,000	608,000,000	3.246710526
2011	8	3,711,000,000	845,000,000	4.391715976



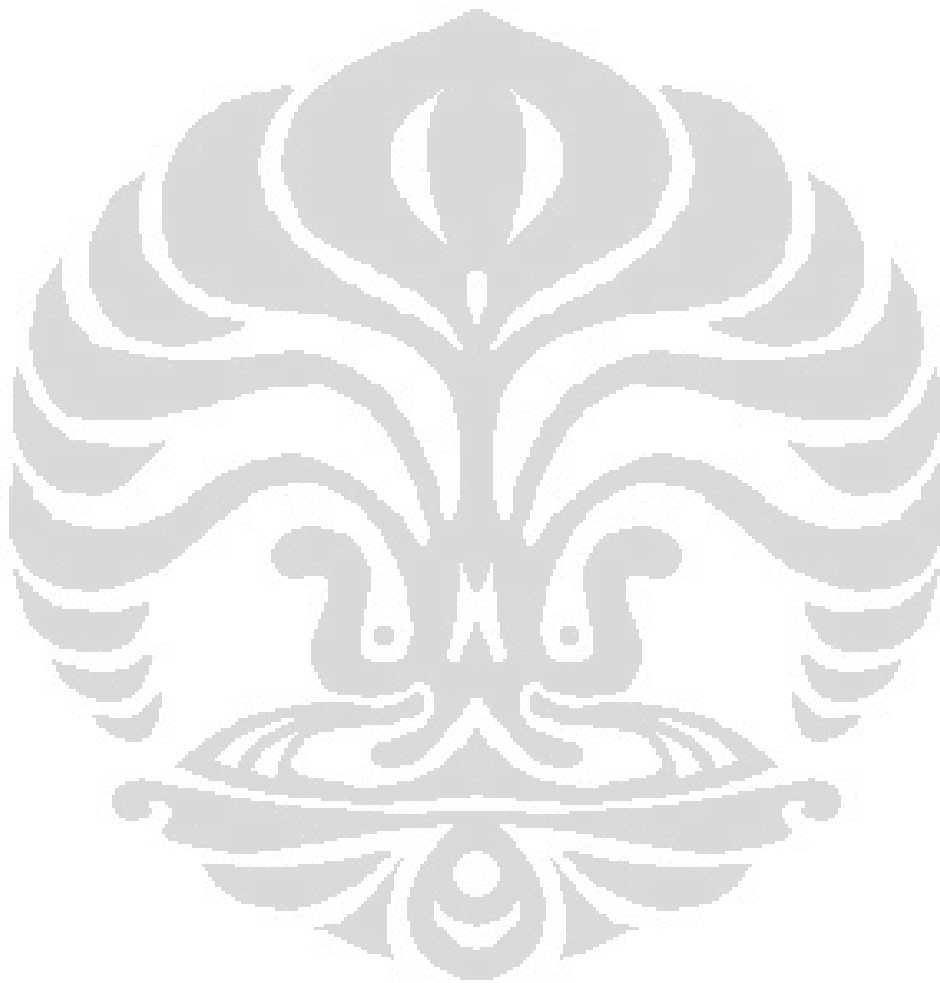
Attachment 2.3 Global Mobile Ad and Apps Revenue (US\$ Billions)

Year	Ad	App
2008	0.44	0.26
2009	0.73	1.27
2010	1.47	3.63
2011E	3.36	8.64



Attachment 2.4 Global Social Commerce Revenue Estimate (US\$ Billions)

Year	U.S.	Rest of the World	Total
2011	1	4	5
2012	3	6	9
2013	5	9	14
2014	9	11	20
2015	14	16	30



Attachment 3.1 Stable Growth Rate Projection

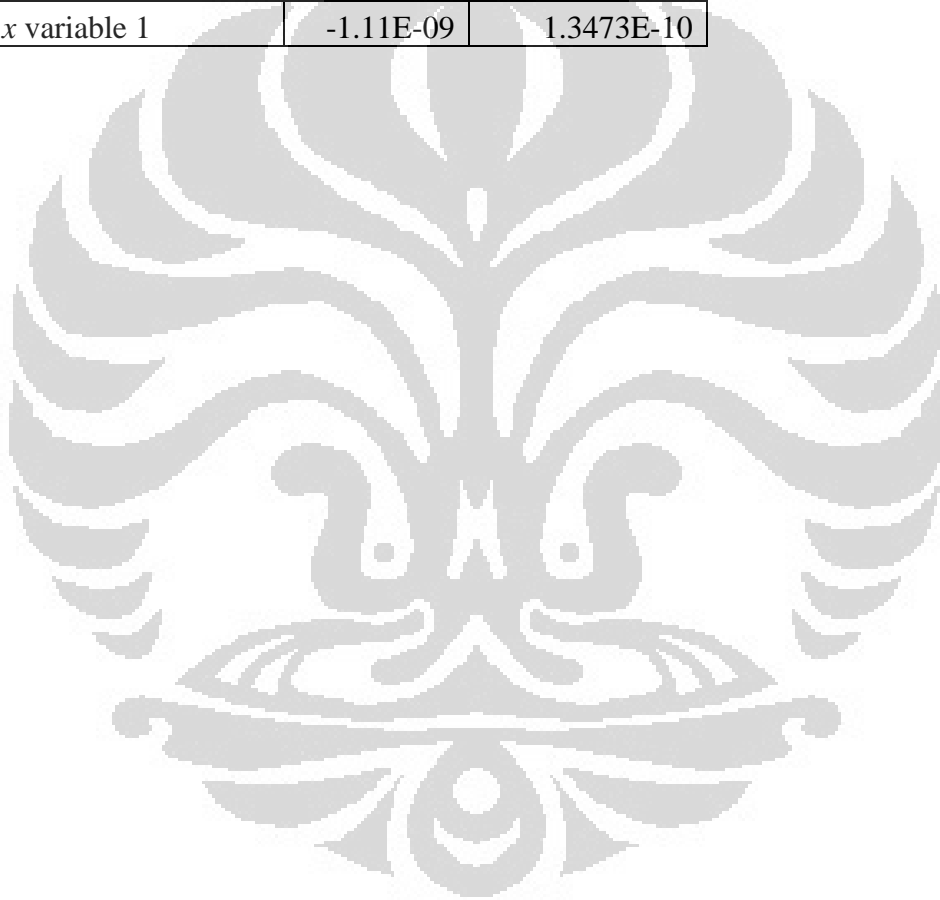
Area	Growth 2017E	GDP 2017E (US\$ Billions)
U.S.	5.34%	19,704.59
Canada	3.42%	2,140.62
E.U.	3.44%	20,095.25
Central and Eastern Europe	7.87%	2,759.85
U.K.	5.55%	3,167.53
C.I.E. (including Russia)	8.75%	4,169.07
Japan	2.52%	6,695.69
India	10.56%	2,906.49
ASEAN 5	10.67%	3,313.48
Latin America And Caribbean	6.09%	7,606.79
MENA	6.28%	3,818.22
Sub-Sahara	8.52%	1,828.75

Area	Weighted Growth
U.S. and Canada	5.16%
Europe	4.80%
Asia (excluding China)	6.42%
Rest of the World	6.48%

Attachment 4.1 Facebook Users Logistic Regression Output

Regression Statistics	Value
Multiple R	0.9223607
R ²	0.8507492
Adjusted R ²	0.8383116
Standard Error	0.1216171
Observations	14

	Coefficients	Standard Error
Intercept	1.1679944	0.077275972
<i>x</i> variable 1	-1.11E-09	1.3473E-10



Attachment 4.2 Initial Population (P_0) Facebook Users Projection

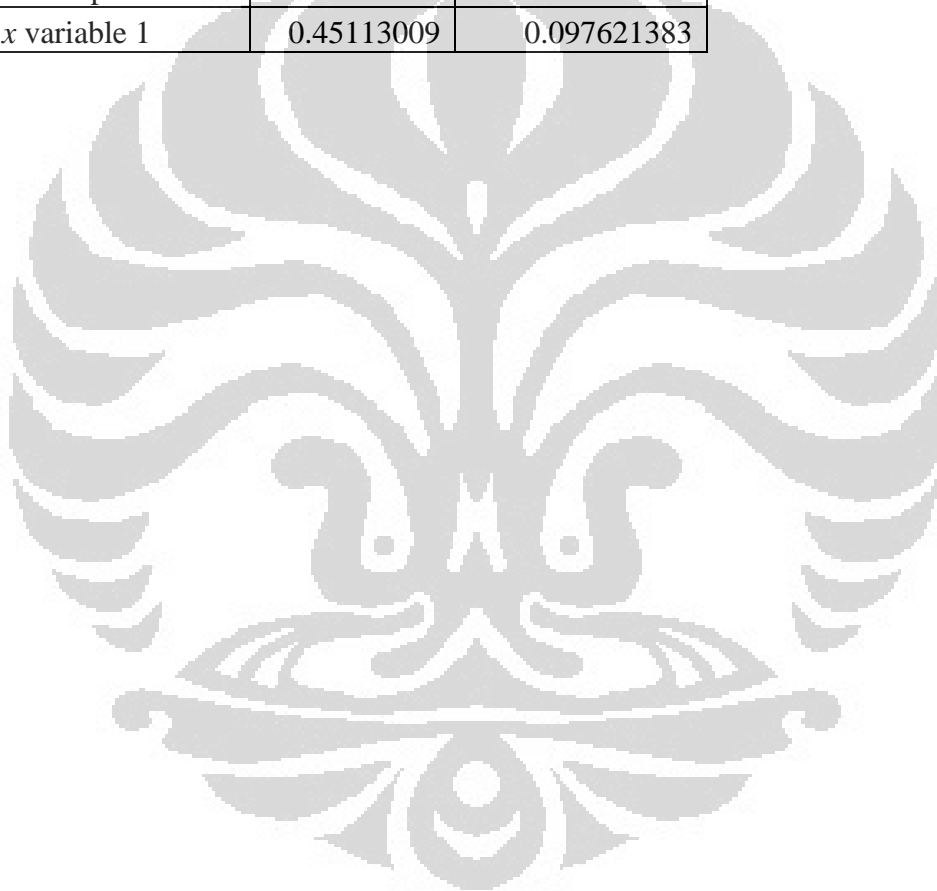
K 1,048,197,738
 r 1,167994405

Date	MAUs	Δt	t	P_0
08-Feb-04				
31-Dec-08	145,000,000	1.00274	4.89863	550,747.74
31-Mar-09	197,000,000	0.24658	5.14521	595,262.69
30-Jun-09	242,000,000	0.24932	5.39452	577,016.60
30-Sep-09	305,000,000	0.25205	5.64658	587,692.12
31-Dec-09	360,000,000	0.25205	5.89863	558,084.88
31-Mar-10	431,000,000	0.24658	6.14521	558,582.76
30-Jun-10	482,000,000	0.24932	6.39452	508,941.80
30-Sep-10	550,000,000	0.25205	6.64658	491,701.59
31-Dec-10	608,000,000	0.25205	6.89863	458,305.01
31-Mar-11	680,000,000	0.24658	7.14521	459,462.36
30-Jun-11	739,000,000	0.24932	7.39452	444,396.44
30-Sep-11	800,000,000	0.25205	7.64658	446,475.95
31-Dec-11	845,000,000	0.25205	7.89863	429,136.29
31-Mar-12	901,000,000	0.24932	8.14795	472,060.13
Average				509,847.60

Attachment 4.3 Revenue per User Linear Regression Output

Regression Statistics	Value
Multiple R	0.900159802
R ²	0.810287669
Adjusted R ²	0.772345203
Standard Error	0.612985892
Observations	7

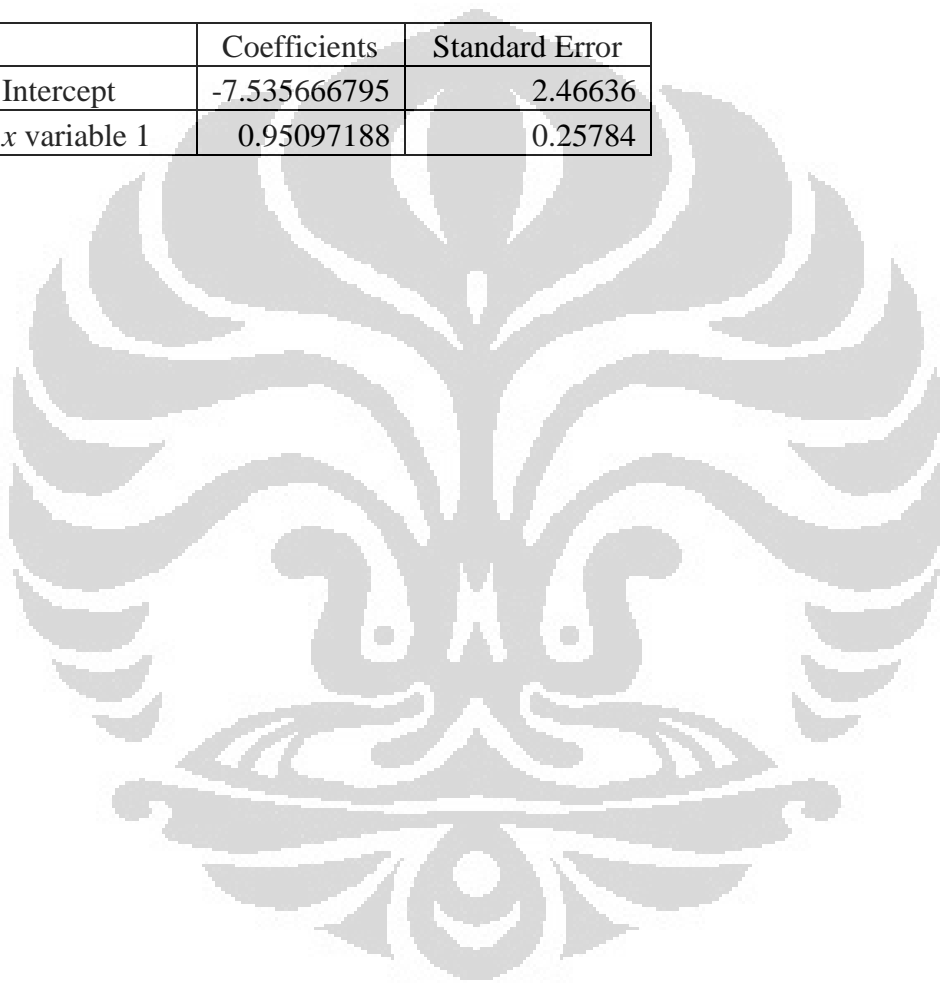
	Coefficients	Standard Error
Intercept	0.18646571	0.515244357
<i>x</i> variable 1	0.45113009	0.097621383



Attachment 4.4 Mobile Ad Global Market Linear Regression Output

Regression Statistics	Value
Multiple R	0.933714212
R ²	0.87182223
Adjusted R ²	0.807733345
Standard Error	0.576540827
Observations	4

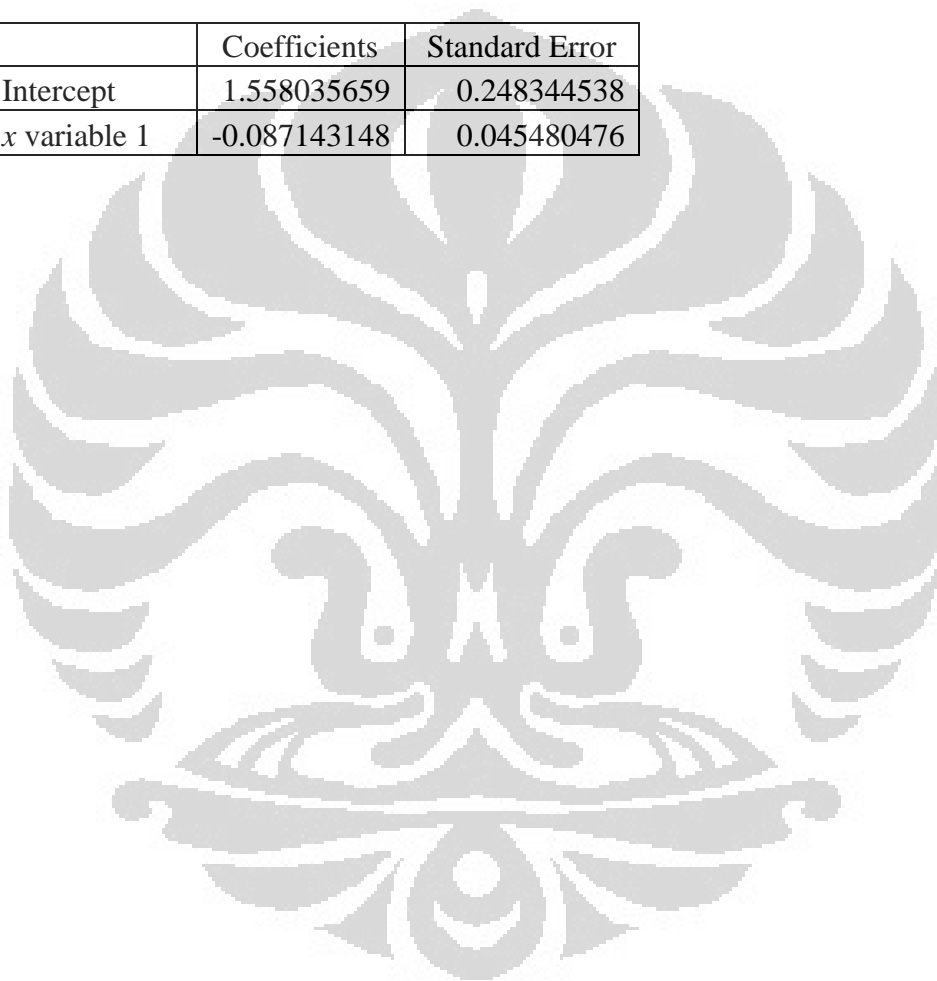
	Coefficients	Standard Error
Intercept	-7.535666795	2.46636
<i>x</i> variable 1	0.95097188	0.25784



Attachment 4.5 Mobile Apps Global Market Logistic Regression Output

Regression Statistics	Value
Multiple R	0.88652
R ²	0.78593
Adjusted R ²	0.57185
Standard Error	0.24199
Observations	3

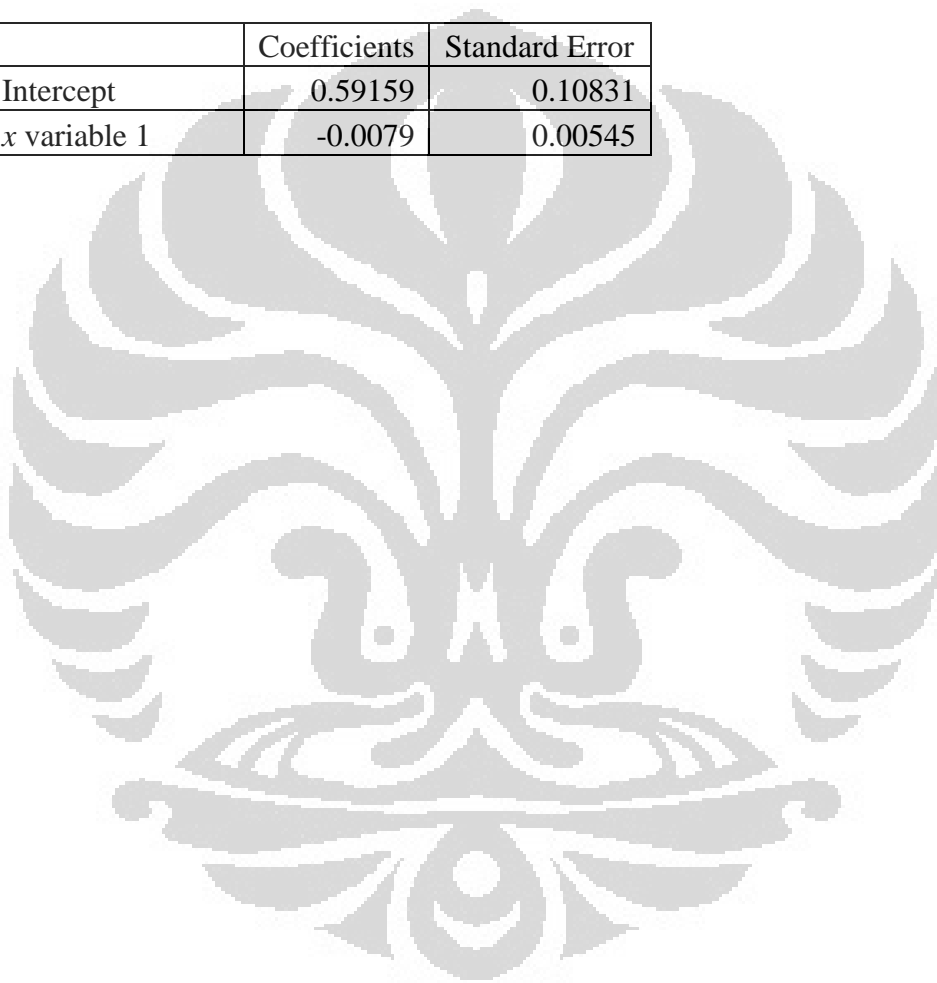
	Coefficients	Standard Error
Intercept	1.558035659	0.248344538
<i>x</i> variable 1	-0.087143148	0.045480476



Attachment 4.6 Global Market Social Commerce Logistic Regression Output

Regression Statistics	Value
Multiple R	0.71418
R ²	0.51005
Adjusted R ²	0.26508
Standard Error	0.08534
Observations	4

	Coefficients	Standard Error
Intercept	0.59159	0.10831
<i>x</i> variable 1	-0.0079	0.00545



Attachment 4.7 Scenario 1 Cash Flow Schedule

	0	1	2	3	4	5
Users	924,123,912	1,006,185,623	1,034,761,332	1,043,981,915	1,046,883,016	1,047,788,519
Revenue Per User Scenario 1	3.908288952	4.359419042	4.810549132	5.261679222	5.712809312	6.163939402
Online Display Ad & Virtual Goods Payments	4,038,000,000	4,386,384,763	4,977,770,229	5,493,097,951	5,980,643,041	6,458,504,937
Mobile Ad and App Revenue						
Social Commerce Revenue						
Total Revenue	4,038,000,000	4,386,384,763	4,977,770,229	5,493,097,951	5,980,643,041	6,458,504,937
EBIT (Operating Income) Margin	53.22%	51.40%	49.57%	47.75%	45.93%	44.11%
EBIT	2,148,910,000	2,254,402,980	2,467,667,338	2,623,065,820	2,746,928,011	2,848,755,680
EBIT(1-t)	1,396,791,500	1,465,361,937	1,603,983,770	1,704,992,783	1,785,503,207	1,851,691,192
-Reinvestment		220,072,675	375,765,069	329,369,197	313,460,691	309,068,545
FCFF		1,245,289,262	1,228,218,701	1,375,623,586	1,472,042,516	1,542,622,646
WACC		8.55%	8.55%	8.55%	8.56%	8.56%
Discount Factor		0.921217706	0.848620216	0.781723709	0.720082078	0.663283998
PV FCFF		1,147,182,517	1,042,291,220	1,075,357,572	1,059,991,434	1,023,196,917
Revenue to Capital Ratio	1.59	1.58	1.57	1.56	1.56	1.55
Invested Capital	5,162,000,000	5,382,072,675	5,757,837,743	6,087,206,941	6,400,667,632	6,709,736,177
ROIC	27.06%	27.23%	27.86%	28.01%	27.90%	27.60%

	6	7	8	9	10	Terminal
Users	1,048,070,441	1,048,158,146	1,048,185,425	1,048,193,909	1,048,196,547	
Revenue Per User Scenario 1	6.615069492	7.066199583	7.517329673	7.968459763	8.419589853	
Online Display Ad & Virtual Goods Payments	6,933,058,798	7,406,494,657	7,879,555,398	8,352,490,985	8,825,385,012	9,298,425,648
Mobile Ad and App Revenue						
Social Commerce Revenue						
Total Revenue	6,933,058,798	7,406,494,657	7,879,555,398	8,352,490,985	8,825,385,012	9,298,425,648
EBIT (Operating Income) Margin	42.29%	40.47%	38.64%	36.82%	35.00%	35.00%
EBIT	2,931,773,886	2,997,049,618	3,044,931,053	3,075,530,733	3,088,884,754	3,254,448,977
EBIT(1-t)	1,905,653,026	1,948,082,252	1,979,205,185	1,999,094,976	2,007,775,090	2,115,391,835
-Reinvestment	308,771,704	309,904,842	311,540,989	313,362,765	315,262,684	492,978,271
FCFF	1,596,881,322	1,638,177,410	1,667,664,196	1,685,732,211	1,692,512,406	1,622,413,564
WACC	8.56%	8.56%	8.56%	8.56%	8.56%	
Discount Factor	0.610950229	0.562731117	0.518304297	0.477372572	0.439661949	
PV FCFF	975,615,009	921,853,404	864,357,519	804,722,320	744,133,304	
Revenue to Capital Ratio	1.54	1.53	1.52	1.51	1.50	1.5
Invested Capital	7,018,507,881	7,328,412,723	7,639,953,712	7,953,316,477	8,268,579,161	
ROIC	27.15%	26.58%	25.91%	25.14%	24.28%	23.00%

Attachment 4.8 Scenario 2 Cash Flow Schedule

	0	1	2	3	4	5
Users	924,123,912	1,006,185,623	1,034,761,332	1,043,981,915	1,046,883,016	1,047,788,519
Revenue Per User Scenario 1	3,908,288,952	4,359,419,042	4,810,549,132	5,261,679,222	5,712,809,312	6,163,939,402
Online Display Ad & Virtual Goods Payments	4,038,000,000	4,386,384,763	4,977,770,229	5,493,097,951	5,980,643,041	6,458,504,937
Mobile Ad and App Revenue		258,285,175	440,655,389	656,430,963	940,545,902	1,266,394,451
Social Commerce Revenue						
Total Revenue	4,038,000,000	4,644,669,938	5,418,425,618	6,149,528,914	6,921,188,943	7,724,899,388
EBIT (Operating Income) Margin	53.22%	51.20%	49.17%	47.15%	45.13%	43.11%
EBIT	2,148,910,000	2,377,860,514	2,664,443,034	2,899,627,762	3,123,554,167	3,330,095,465
EBIT(1-c)	1,396,791,500	1,545,609,334	1,731,887,972	1,884,758,045	2,030,310,208	2,164,562,052
-Reinvestment		383,229,952	491,642,715	467,281,103	496,128,647	519,818,844
FCFF		1,162,379,383	1,240,245,257	1,417,476,943	1,534,181,562	1,644,743,208
WACC		8.55%	8.55%	8.55%	8.55%	8.54%
Discount Factor		0.921240277	0.848703392	0.781896118	0.720364442	0.663690445
PV FCFF		1,070,830,705	1,052,600,357	1,108,319,718	1,105,169,845	1,091,600,352
Revenue to Capital Ratio	1.59	1.58	1.57	1.56	1.56	1.55
Invested Capital	5,162,000,000	5,545,229,952	6,036,872,667	6,504,153,769	7,000,282,416	7,520,101,260
ROIC	27.66%	27.87%	28.69%	28.98%	29.00%	28.78%
	6	7	8	9	10	Terminal
Users	1,048,070,441	1,048,158,146	1,048,185,425	1,048,193,909	1,048,196,547	
Revenue Per User Scenario 1	6,615,069,492	7,066,199,883	7,517,929,673	7,968,459,763	8,419,589,853	
Online Display Ad & Virtual Goods Payments	6,933,058,798	7,406,494,657	7,879,555,398	8,352,490,985	8,825,385,012	9,305,485,956
Mobile Ad and App Revenue	1,645,046,110	2,145,392,997	2,726,217,708	3,375,403,276	4,071,448,329	4,292,935,118
Social Commerce Revenue						
Total Revenue	8,578,104,908	9,551,887,654	10,605,773,106	11,727,894,262	12,896,833,341	13,598,421,074
EBIT (Operating Income) Margin	41.09%	39.07%	37.04%	35.02%	33.00%	33.00%
EBIT	3,524,475,215	3,735,366,330	3,928,742,916	4,107,310,135	4,255,955,002	4,487,478,955
EBIT(1-c)	2,290,908,889	2,427,988,115	2,553,682,895	2,669,751,587	2,766,370,752	2,916,861,320
-Reinvestment	555,143,986	643,971,154	687,465,853	743,507,146	779,292,719	634,709,023
FCFF	1,735,764,904	1,784,016,961	1,866,217,042	1,926,244,442	1,987,078,032	2,282,152,297
WACC	8.54%	8.54%	8.54%	8.54%	8.54%	
Discount Factor	0.611489416	0.563407209	0.519117805	0.478321074	0.440740709	
PV FCFF	1,061,401,867	1,005,128,016	968,786,495	921,363,310	875,786,181	
Revenue to Capital Ratio	1.54	1.53	1.52	1.51	1.50	1.5
Invested Capital	8,075,245,246	8,719,216,400	9,406,682,252	10,150,189,398	10,929,482,118	
ROIC	28.37%	27.85%	27.15%	26.30%	25.31%	25%

Attachment 4.9 Scenario 3 Cash Flow Schedule

	0	1	2	3	4	5
Users	924,123,912	1,006,185,623	1,034,761,332	1,043,981,915	1,046,883,016	1,047,788,519
Revenue Per User Scenario 1	3,908,288,952	4,359,419,042	4,810,549,132	5,261,679,222	5,712,809,312	6,163,939,402
Online Display Ad & Virtual Goods Payments	4,038,000,000	4,386,384,763	4,977,770,229	5,493,097,951	5,980,643,041	6,458,504,937
Mobile Ad and App Revenue		258,285,175	440,655,389	656,430,963	940,545,902	1,266,394,451
Social Commerce Revenue		154,350,243	334,944,067	653,496,033	1,134,687,038	2,095,374,839
Total Revenue	4,038,000,000	4,799,020,181	5,753,369,685	6,803,024,947	8,055,875,982	9,820,274,227
EBIT (Operating Income) Margin	53.22%	50.90%	48.57%	46.25%	43.93%	41.61%
EBIT	2,148,910,000	2,442,483,783	2,794,627,372	3,146,537,187	3,538,971,456	4,086,077,970
EBIT(1-t)	1,396,791,500	1,587,614,459	1,816,507,792	2,045,249,172	2,300,331,446	2,655,950,681
-Reinvestment		480,732,123	606,391,647	670,882,036	805,504,063	1,141,166,526
FCFF		1,106,882,337	1,210,116,144	1,374,367,136	1,494,827,384	1,514,784,154
WACC		8.55%	8.55%	8.54%	8.54%	8.54%
Discount Factor		0.921251557	0.848744936	0.781982189	0.720505344	0.663893183
PV FCFF		1,019,717,076	1,027,079,950	1,074,730,621	1,077,031,119	1,005,654,874
Revenue to Capital Ratio	1.59	1.58	1.57	1.56	1.56	1.55
Invested Capital	5,162,000,000	5,642,732,123	6,249,123,770	6,920,005,806	7,725,509,869	8,866,676,395
ROIC	27.06%	28.14%	29.07%	29.56%	29.78%	29.95%

	6	7	8	9	10	Terminal
Users	1,048,070,441	1,048,158,146	1,048,185,425	1,048,193,909	1,048,196,547	
Revenue Per User Scenario 1	6,615,069,492	7,066,199,583	7,517,329,673	7,968,459,763	8,419,589,853	
Online Display Ad & Virtual Goods Payments	6,933,058,798	7,406,494,657	7,879,555,398	8,352,490,985	8,825,385,012	9,312,546,264
Mobile Ad and App Revenue	1,645,046,110	2,155,392,997	2,726,217,708	3,375,403,276	4,071,448,329	4,296,192,277
Social Commerce Revenue	2,816,336,010	3,584,852,003	4,814,589,564	5,814,766,147	6,639,272,420	7,005,760,257
Total Revenue	11,394,440,918	13,146,739,657	15,420,362,670	17,542,660,408	19,536,105,760	20,614,498,798
EBIT (Operating Income) Margin	39.29%	36.97%	34.64%	32.32%	30.00%	30.00%
EBIT	4,476,519,725	4,859,712,826	5,342,143,680	5,670,089,345	5,860,831,728	6,184,349,639
EBIT(1-t)	2,909,737,821	3,158,813,337	3,472,393,392	3,685,558,074	3,809,540,623	4,019,827,266
-Reinvestment	1,024,242,285	1,147,031,542	1,497,327,298	1,406,214,941	1,328,963,568	924,560,271
FCFF	1,885,495,536	2,011,781,794	1,975,066,094	2,279,343,133	2,480,577,055	3,095,266,995
WACC	8.54%	8.53%	8.53%	8.53%	8.52%	
Discount Factor	0.611758266	0.563744211	0.519523185	0.478793601	0.441278008	
PV FCFF	1,153,467,481	1,134,130,341	1,026,092,627	1,091,334,906	1,094,624,102	45457219719
Revenue to Capital Ratio	1.54	1.53	1.52	1.51	1.50	1.5
Invested Capital	9,890,918,680	11,037,950,222	12,535,277,821	13,941,492,461	15,270,456,029	
ROIC	29.42%	28.62%	27.70%	26.44%	24.95%	24%

Attachment 4.10 Synthetic Ratings

If interest coverage ratio is greater than	≤ to	Rating is	Spread is
-100000	0.499999	D	15.00%
0.5	0.799999	C	12.00%
0.8	1.249999	CC	10.00%
1.25	1.499999	CCC	8.00%
1.5	1.999999	B-	5.25%
2	2.499999	B	5.00%
2.5	2.999999	B+	3.75%
3	3.499999	BB	3.35%
3.5	3.999999	BB+	3.00%
4	4.499999	BBB	1.60%
4.5	5.999999	A-	1.10%
6	7.499999	A	1.00%
7.5	9.499999	A+	0.85%
9.5	12.499999	AA	0.65%
12.5	100000	AAA	0.50%