Examining the Relationship between Innovation And Company Values of Apple Inc.

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***Abstract*---** The purpose of this study is to estimating the company value and performance of Apple Inc. and also examining the relationship between innovation to stock value and company value of Apple Inc. In estimating the company value, discounted cash flow method and market approach are applied and the author uses profitability ratio to estimate the company's performance. While to find out the relationship between innovation to stock value and company value, the author uses research and development (R&D) for the previous four quarters to eight quarters as the indicator of innovation and also the independent variables, while company value and stock value are defined as the dependent variables. Multiple regression is applied to get the relationship between (R&D) to stock value and company value. The findings provide that both discounted cash flow method and market approach shows that Apple Inc. experiences undervalued share price, that means the issued share price is lower than the intrinsic value. While based on the profitability ratio, the company's performance increased from 2002 to 2012 due to the coming up of new products such as iPad on 2010 and improvements of iPod and iPhone that have been released in the previous years, but on 2013 all of the aspects in profitability ratio were decrease attributed to Apple Inc. delayed the launching of new iPad in the first quarter in 2013 and the increase of competitions. The regression result shows that R&D in the previous eight quarters or two years has significant relationship with both stock value and company value with positive coefficient, that indicates the increase of R&D lead to the increase of stock value and company value in 8 quarters later or 2 years ahead.

***Keywords*—**breakthrough innovation, company value, valuation, discounted cash flow method

I. Introduction

THE primary objective of every company is to maximize the wealth of their shareholder by maximizing the profit. A company should be careful in making decision attributed to the effect that will be faced by the shareholders. Moreover, as a public company,every activity of the company will be watched by the market and represented in stock prices. Therefore, the primary objective of a company should be to maximize the wealth of the owners for whom it is being operated or equivalently to maximize the stock price. To achieve that goal,the company needs to maximize the value.

Valuation means undertaking or activity of defining the value of an industry, industry ownership, security , or intangible asset [1]. The purpose of doing valuation are maintaining litigation, succession and estate planning, for estate and gift tax and to deliver maintenance in litigation that involves loss of earnings [2].

Innovation is a crucial thing for businesses to persist in the competitive environment attributed to the advantages that might be gained and also may increase the cash flows. By doing innovation, it has bigger possibility to create value, create intellectual property [3]. By creating value, it will make the company different from the competitors. That differences will make the company has self – attraction to the customer and stockholders.

As the technology improved, many companies since the last two decades started to make innovation to attract new customers by offering more valuable products. The importance of innovation and innovative companies is especially significant in the light of recent economic turmoil. Therefore, this research is important to be done because a lot of companies do innovation and it is important to understand whether there is any relationship between innovation and company valuation.

In this study, the company that is going to be observed is Apple Inc. since the company is well – known for its innovation. The objectives of this study is to estimating the company value and performance of Apple Inc. and also examining the relationship between innovation to stock value and company value. The author uses the annual report from 1996 to 2013 to find out the company value and performance of Apple Inc. While to examine the relationship between innovation and company value, the author uses quarterly report from 1996 to 2013 that is regressed to the stock prices of Apple Inc.

II. Methodology

Valuation means undertaking or activity of defining the value of an industry, industry ownership, security , or intangible asset [1]. There are 3 tools to determine the corporate valuation, they are asset-based method, market approach and discounted cash flow. In this study, the author will concern on the market approach and discounted cash flow and uses the secondary data of annual report of Apple Inc. from 1996 to 2013.

1. Discounted Cash Flow

   Discounted cash flow is the first step in measuring the value of the assets. Based on Damodaran, this method has its basis in the present value rule,where the value of any asset is the present value of the projected future cash flows.

   The basic formula for discounted cash flow :

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$$\text{Value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t}$$

Where :

n = Life of the asset

CF_t = Cash flow in period t

r = Discount rate or WACC

• Compound Annual Growth Rate (CAGR)

Compound Annual Growth Rate measures the company's growth and performance by provides a constant rate of return over the time period.

$$\text{CAGR}(t_0, t_n) = \left(\frac{V(t_n)}{V(t_0)}\right)^{\frac{1}{t_n - t_0}} - 1$$

Where :

$V(t_n)$ = Ending Value

$V(t_0)$ = Beginning Value

$t_n - t_0$ = number of years

• Free Cash Flow (FCF)

Free cash flow to the firms (FCF) is the amount of the cash flows to all owners in the company, including common stockholders, creditholders and preferred stockholders [4].

FCF = EBIT (1-Tax Rate) + Depreciation – Net Capital Expenditure – Δ Net Working Capital

Where : EBIT = earnings before interest and taxes

• Weighted Average Cost of Capital (WACC)

Weighted average cost of capital is the merged cost of the company's capital structure elements, each weighted by the market value of that capital elements [1].

$$WACC = (W_d \times (R_d \times (1 - T)) + (W_e \times R_e)$$

Where :

WACC = Weighted Average Cost of Capital

R_e = Cost of equity capital

W_e = Percentage of equity in the capital structure, at market value

R_d = Cost of debt

W_d = Percentage of debt in the capital structure, at market value

T = Effective tax rate

• Estimated Share Price

The calculation of the share price of the company will be compared to the current stock price that is issued.

$$\text{Share Price} = \frac{\text{Company Value from DCF} - \text{Long Term Debt}}{\text{Number of Outstanding Common Share}}$$

2. Market Approach

Based on James R. Hitchner in Financial Valuation, market approach is valuing the business by using reference to "reasonably equivalent parameter firms", for the known values. The values are known since the companies have publicly traded or were recently sold. The method in measuring the market approach is Price / Earnings Method. Price Earning (P/E) multiple is the most common used (Damodaran, 2012).

$$\text{P/E Ratio} = \frac{\text{Market price per share}}{\text{Earning per share}}$$

$$\text{Share Price} = \frac{\text{PER X Net Income}}{\text{number of outstanding shares}}$$

While to find out the performance of the company based on profitability ratio, the author uses the annual report of Apple Inc. from 1996 to 2013. Some formulas that are used to find out the profitability ratio are :

• Return on Assets (ROA)

Return on Assets measures the overall effectiveness of management in making profits with its existing assets, where the higher the ROA means the better performance [5].

$$\text{ROA} = \frac{\text{Earnings available for common stockholders}}{\text{Total Assets}}$$

• Return on Equity (ROE)

Return on Equity measures the return received on the common stockholder's investment in a business, where the higher the ROE indicates the better performance [5].

$$\text{ROE} = \frac{\text{Earnings available for common stockholders}}{\text{Common stock equity}}$$

• Gross Profit Margin

Gross Profit Margin measures the percentage of each sales dollar remaining after the firm has funded for its goods, where the higher the gross profit margin, the better performance which means the lower the realtive cost of merchandise sold [5].

$$\text{Gross Proft Margin} = \frac{(\text{sales} - \text{cost of goods sold})}{\text{sales}} \times 100\ \%$$

• Operating Profit Margin

Operating Profit Margin measures the percentage of each sales dollar remaining after all costs and expenses other than interest, taxes, and preferred stock dividends are substracted [5].

$$\text{Operating Profit Margin} = \frac{\text{Operating profits}}{\text{Sales}}$$

• Net Profit Margin

Net Profit Margin measures the percentage of each sales dollar outstanding after all costs and expenses, including

interests, taxes and preferred stock dividends, have been substacted, where the higher the firm's net profit margin , the better [5].

$$\text{Net Profit Margin} = \frac{\text{Earnings available for common stockholders}}{\text{Sales}}$$

The last objective of this study is to find out the relationship between innovation to stock value and company value. The author uses the quarterly report of Apple Inc. from 1996 to 2013 to achieve that goal. The method that is applied is multiple regression. In regression analysis there are two variables to be predicted, they are dependent and independent variable. Dependent variable is the variable that is going to be predicted, while the independent variable is the variable used to make the prediction. Regression analysis is calculated to find out the type of mathematical equation that subsists between a dependent and an independent variable,to count the effect that changes in the independent variable have on the dependent variable and to discover uncommon observations [6]. The dependent variables in this study are company value and stock value, while the independent variables are previous four to eight quarters of research and development (R&D) that is defined as the indicator of innovation.

To get good regression model , classical assumption test is needed. There are 4 tests in classical assumption, they are normality test, heteroscedascity test, multicolinearity test, and autocorrelation test.

Normality test is done to test whether the residual value that has been standardized in the regression model is normally distributed or not [7]. Kolmogorov-Smirnov is the most well – known method is normality test. The residual value is normally distributed if the p-value (Sig.) is higher than significance level (5%) or if the D count is higher than D table. D is the Asymp.Sig (2-tailed) that is obtained from the result of SPSS calculation.

Heteroscedascity means there is variance in variable in the regression model which is unequal ,otherwise, the homoscedascity means there is variable in variable in the regression model which is equal [7]. Bresch – Pagan – Godfrey (BPG) Method is one of the method to find out the heteroscedascity. The calculation in BPG is done by regressed all of the independent variables to the ρ_i.

Multicolinearity test is done to test whether there is high or perfect correlation in the regression model between independent variables [7]. If there is high correlation among independent variable, it means the there is multicolinearity in the regression model. In determining the multicolinearity, the author applies the Pair-Wise Correlation between independent variables. To conduct this method, by comparing the correlation coefficient between independent variables. If the value of correlation coefficient between independent variables is less than 0.7, it means there is no multicolinearity.

Autocorrelation test is done to find out whether there is correlation between the residuals [7]. The author applies Lagrange Multiplier (LM) Test. In conducting the LM Test, first need to calculate the X^2 by multiplying (n-1) to R^2 that is generated from the regression. After that, compare to the X^2 from the table that is obtained from the Chi Square, if the calculation X^2 is less than X^2 table , it means there is no autocorrelation.

After passing the classical assumption test, multiple regression can be applied. Multiple Regression is the estimation of a numerical dependent variable,Y, by using more than one independent variable, X [6].

$$\hat{Y}_i = b_0 + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + ... + b_kX_{ki} + \varepsilon_i$$

Where :

$\hat{Y}_i$ = predicted value of Y for observation i

b_0 = Y intercept

b_1= slope of Y with variable X_1, holding variables X_2, X_3,.., X_k constant

b_2= slope of Y with variable X_2, holding variables X_1, X_3,.., X_k constant

b_3= slope of Y with variable X_3, holding variables X_1, X_2,.., X_k constant

ε_i= random error in Y for observation i

III. Data Analysis

The first of objective of this study is to find out the company value of Apple Inc. by applying discounted cash flow method and market approach.

1. Discounted Cash Flow Method

In conducting the discounted cash flow, the author makes some assumptions. The table below shows the assumptions :

TABLE 1
ASSUMPTIONS IN DISCOUNTED CASH FLOW

Description	Symbols	Value
Risk - Free Rate	Rf	2.71%
Beta	β	1.02
Market Risk Premium	Rm - Rf	8.12%
Cost of Equity	Re	10.99%
Cost of Debt	Rd	3.29%
Tax Rate	t	26.2%
Debt Proportion	Wd	12.07%
Equity Proportion	We	87.93%
Discount Rate	WACC	9.96%
Perpetuity Growth	g	2.39%

After determining the assumptions, the author projects the forecast balance sheet and income statement of Apple Inc. for the next five years started from 2014-2018 through 3 scenarios, they are pessimistic, most-likely and optimistic scenario. Forecasting free cash flow is also needed to get the present value of free cash flow that later calculated using long term debt and number of shares outstanding to get the intrinsic share price of the company for three scenarios. Based on the

calculation, the share price of Apple Inc. is $758.94, while the issued share price of Apple Inc. for September 30th 2013 was $ 476.75, that means the company experiences undervaluation, since the issued share price is lower than the intrinsic value.

2. Market Approach

In conducting the market approach, the author uses P/E Ratio of the industry that amounting 13.90. To get the value, the author multiplies P/E Ratio with net income and result in $ 514,814,300,000.00. After that, to calculate the share price, the value was divided by the number of outstanding shares and resulted in $ 572.52. Based on the market approach calculation, the share price of Apple Inc. experiences undervaluation since the issued share price ($476.75) is lower than the intrinsic value ($572.52).

The second objective of this study is to estimating the company's performance based on the profitability ratio. The author calculates the ROA, ROE, gross profit margin, operating profit margin and net profit margin of Apple Inc. from 1996 to 2013. Based on the calculation, overall the profitability ratio showed a surge trend. ROA, Gross Profit Margin, Operating Profit Margin and Net Profit Margin have increased gradually from 1996 to 2013 , while the ROE rose significantly from 1997 to 1998. The ROA, ROE, Operating Profit Margin and Net Profit Margin of the company reached the lowest point on 1997 due to the decline of the company's net income that was caused by the increase of operating expenses on in-process research and development and termination of license agreement. After that they kept increase, but on 2001 they fell due to the increase of expense on in-process research and development since Apple released new product which is well-known as Ipod Classic First Generation on October 23rd 2001. On the other hand, the Gross Profit Margin of Apple Inc. kept increased from 1996 to 2013 because the gross margin of the company showed an incrased trend, eventhough on 2001 it declined due to the released of new product ,Ipod Classic First Generation but afer that the ratio kept rise. After 2005, overall the profitability ratio of Apple Inc. illustrates an increase trend until 2012 attributable to the coming up of other new products, such as iPad on April 3rd 2010 and other improvements on iPhone and iPod. However, all of the profitability ratios of Apple Inc. fell on 2013, it was not because of the death of Steve Jobs, who was the co-founder, chairman and CEO of Apple Inc, but due to Apple did not launch a new iPad in the first quarter on 2013 and the increased of competitors such as Samsung as written by Sam Gustin in Time magazine.

The last objective of this study is to find out the relationship between innovation to stock value and company value of Apple Inc. To achieve that goal, the author applies multiple regression. To get good model of regression, classical assumption test is needed as the requirement. The first test is normality test that is done by Kolmogorov-Smirnov Test. Based on the calculation, the effect of research and development (R&D) for both company value and stock value shows that the distribution test is normal. The second test is heteroscedascity test by applying Bresch – Pagan – Godfrey (BPG) Method and based on the calculation the X^2 calculation is less than X^2 table, therefore there is no heteroscedascity. The third test is multicolinearity test that applies Pair Wise Correlation Method and the calculation shows that the value of coefficient correlations between independent variables is less than 0.7, it means there is no multicolinearity. The last test autocorrelation test and the method that is applied is Lagrange Multiplier (LM) Test. To test the autocorrelation, X^2 as the result of the calculation must be compared to the chi square of 0.05 confidence level and n=69. Based on the calculation,for the effect of research and developmen to stock value, the X^2 is 66.93, while the chi square is 89.39121, which means the X^2 calculation is less than the chi square, therefore there is no autocorrelation. While for the effect of research and development to the company value, the X^2 is 67.068 that less than 89.39121, which means there is no autocorrelation.

After passed the classical assumption test, the next step is analysis using the multiple regression. The hypothesis is :

1. The effect of research and development to the stock value
   - H_0 : *there is no statistical significant relationship between research and development and stock value*
   - H_1 : *there is statistical significant relationship between research and development and stock value*
2. The effect of research and development to the company value
   - H_0 : *there is no statistical significant relationship between research and development and company value*
   - H_1 : *there is statistical significant relationship between research and development and company value*

TABLE I presents the result of regression analysis, between R&D to stock value and company value. The p-value for the effect of R&D to stock value is 0.000 that is less than 0.05 level of significance with the positive coefficient therefore reject H_0 and the positive coefficient shows that research and development has positive influence to the stock value, which means the increase of R&D may lead to the increase of the stock value in eight quarters later or two years ahead. While the p-value for the effect of R&D to company value is 0.000 that is less than 0.05 level of significance with the positive coefficient therefore reject H_0 and the positive coefficient shows that research and development has positive influence to the company value, which means the increase of R&D may lead to the increase of the company value in eight quarters later or two years ahead.

The adjusted R square for the effect of R&D to stock value is 33.1% that indicates the variation of stock value could be explained by the variation of R&D for 32.1% or R&D affects the stock value for 32.1%. While the adjusted R square for the effect of R&D to company value is 29% that indicates the variation of company value could be explained by the variation of R&D by 29% or R&D affects the company value for 29%.

TABLE I
REGRESSION RESULTS

Variables		Intercept	LagRnD8	R Square
Stock Value	Beta p-value	21.165 0.000	0.216 0.000	0.321
Company Value	Beta p-value	21.599 0.000	0.195 0.000	0.290

IV. CONCLUSION

In estimating the company value, both discounted cash flow method and market approach show that Apple Inc. experiences undervaluation, which means the intrinsic value is higher than the issued share price. This condition may attract more investors to invest their money in Apple Inc. since investors are interested to buy in the low price and sell it when it is in the high price, besides the low price shows that there is possibility for the company's share price to increase in the future.

While for the performance of Apple Inc. overall the profitability ratio of the company had an unstable trend from 1996 to 2001 due to the expense in special charges such as restructuring costs, in process-research and development and termination of license agreement. From 2002 to 2012, the company shows an upward trend due to the coming up of new products, such as iPad on 2010 and the improvement of iPod and iPhone that have been released in 2001 and 2007 respectively. In contrast, on 2013 all of the aspects in profitability ratio shows a downward trend attributed to the company delayed the launching a new iPad in the first quarter of 2013 and the increase of competitions such as Samsung and Nokia that come by offering lower price.

The last is examining the relationship between innovation to stock value and company value. Based on the result of regression, R&D has significant relationship with both stock value and company value with positive coefficient, that indicates the increase of R&D lead to the increase of stock value and company value in 8 quarters later or 2 years ahead. While based on the coefficient of determination, the relationship of R&D to the stock value and company value does not have strong coefficient of determination. The R&D only can represent 32.1% of variation in stock value, and 29% of variation in company value, that means the R&D only represent small percentage in the stock value and company value.

APPENDIX

A. Normality Test

TABLE II
Kolmogorov-Smirnov Test

Data	Asymp.Sig	Result
Stock Value	0.165	Test Distribution is Normal
Company Value	0.146	Test Distribution is Normal

B. Heteroscedascity Test

TABLE III
BRESCH – PAGAN – GODFREY (BPG) METHOD

Data	X^2 Calculation	X^2 Table	Result
Stock Value	4.375	9.488	Homoscedascity
Company Value	4.468	9.488	Homoscedascity

C. Multicolinearity Test

TABLE IV
PAIR WISE CORRELATION METHOD

	LagR&D8	LagR&D4	LagR&D6	LagR&D5	LagR&D7
LagR&D8	1.000	-.002	.003	-.003	-.701

D. Autocorrelation Test

TABLE V
AUTOCORRELATION TEST

Data	X^2 calcuation	Chi Square	Result
Stock Value	66.93	89.39121	No Autocorrelation
Company Value	67.068	89.39121	No Autocorrelation

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