

Perspectives on the Market Value of Apple

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Apple is the company which is possibly most famous for products like the Mac computer, the iPhone, iPad, iPod and for services like iTunes and online stores for music, books and smartphone applications. On 24 Jan 2012, Apple released first quarterly results for the quarter ending 31 Dec 2011. After the end of December season's business, the company posted record quarterly revenue of \$46.33 billion and also a quarterly net profit of \$13.06 billion. Compared to the same quarter a year ago, revenue and gross margin have increased. Shipments of iPhone and iPads are up significantly. Where will the company go from here? Very likely it has a bright future. Still one can be curious about where its market capitalisation will end up. The company has already a high market value of equity. The company has enjoyed high publicity and an increasing share price since several years. Is the company dramatically overvalued, or fairly valued or undervalued? We are also interested in understanding what a drop in gross margin would do to the company's stock price, or what an overall fall in the global stock markets might cause in terms of damage. These are only a few of many questions which can be asked. The answers depend on the kinds of factors taken into account and the kinds of models used to determine them. No single answer will be correct. Still there are various ways to approach these questions.

1. Estimating the market value

The 'true' value of the company can be estimated through a mixture of approaches. We have used the following methods for a quick, nearly back-of-an-envelope calculation.

Model 1: Discounted cash flow analysis based on free cash flow to the firm

The key assumptions used for the *base scenario* model are listed below.

- Valuation done as per 30 Sept 2011, using the full year 2011 data from the annual report.
- Applying a 2-phase model: forecasts for five years from 2012 to 2016, thereafter assumption of constant growth in the so-called terminal phase (which lasts forever).
- Sales growth: 50% for 2012, declining to 10% for 2016. We assume that some saturation in the high-tier smartphone market will happen and that stronger competition will increase business pressure. Historically revenue has grown at a 10-year rate of 40% and five-year rate of 42%. First quarter growth was 73% compared to the same quarter a year ago. Making forecasts is difficult, as sales growth will depend e.g. on i) growth of the smartphone and of the tablet computer market, ii) the economic fate of competitors (e.g. Nokia, RIM) and iii) on the level of innovation happening with Google's Android operating system. Many more risk factors are outlined in Apple's annual report. Based on the historical record, our assumptions for the next 5 years are indeed conservative.
- EBIT margin: We assume 33% for 2012, declining to 21% in 2016 and 18% for the terminal period. We further assume mounting pricing pressure from competitors, increasing costs in R&D and higher expenses for maintaining and expanding the network of global retail shops. Margins in the smartphone industry can change dramatically depending on the success of phone models (see e.g. Nokia and RIM).
- Tax rate: 35%.
- Depreciation: We assume the depreciation/sales ratio rising from 1.8% in 2012 to 3% in 2016. Historical level over the last 10 years was about 1.5%.
- Share-based compensation: assumed at \$1,200m in 2012, modestly rising to \$1,600m in 2016. We include this as it is a substantial amount.
- Non-cash charges: 2011 saw a historically abnormally high increase in non-cash charges driven by an increase in other current and non-current liabilities, increase in deferred revenue, in deferred tax

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liabilities and accrued expenses. We assume those yearly changes to decline to levels seen in 2008 and 2010 and set them to 0 for the terminal period.

- Working capital changes: Our model differentiates between the term working capital used here (accounts receivable + inventory – accounts payable) and various non-cash charges before and after tax. Based on our narrow definition of working capital here, we base forecasts on the ratio of (increase in WC)/sales. Over the last 10 years, the ratio hovered between -5.9% and 1.9%, with a mean of -2.3%. We forecast it as -2.6% for 2012 and reduce it to -1% in 2016 and set it equal to 0 for the terminal period.
- Capital expenditure forecasts are made based on the ratio of capex/sales. We estimate it as 6.5% for 2012 and reduce it to 4.5% in 2016 and 3.4% for the terminal period, thereby setting depreciation to the same level as capital expenditure for the terminal period. The ratio was 6.9% in 2011 based on historically high capex.
- The growth rate for the terminal period is assumed to be conservatively 2.5%. This seems justified in a low interest, low inflation environment and would need to be revised were inflation to pick up.
- Discount rate: As weighted average cost of capital WACC we use 12.98%, based on a risk-free rate of 2% derived from long-term US treasury bonds, a market risk premium of 9% based on a market return (incl. dividends) of 11% of the S&P 500 index over a long time period and a beta of 1.22. Interest-bearing debt is essentially 0.

As a result we find free cash flow to the firm (FCFF) increasing by 35% from 2011 to 2012, but then the growth rate of FCFF is declining until 2016 from where on it is growing at a small percentage rate. This appears to be a conservative assumption.

The base scenario produces an enterprise value of \$365 bn.

The market value of equity is then derived assuming surplus cash of about \$81.57 bn (as per Sept 2011). According to Apple's annual report for 2011, Apple's cash and investment portfolio has a fair market value of \$81.57 bn. These funds are cash or e.g. invested in money market funds, mutual funds, and short-term as well as long-term marketable securities including bonds and corporate securities. These funds are not productive in generating free cash flow, thus they are surplus cash. Though the company has no long-term debt, we conservatively include a market value of debt of \$10.1 bn based on *other long-term liabilities*. This results in an implied market value of equity of \$436.34 bn. In our opinion, this reflects conservative assumptions about the future prospects of Apple.

Sensitivity Analysis

The model output is sensitive to various parameters. Table 1 shows the sensitivity to the discount rate WACC.

WACC	Market value of equity in \$ million
11%	516,516
12%	471,907
13%	435,682
14%	405,659
15%	380,355
16%	358,726

Table 1: Sensitivity of model output to the discount rate.

We see no reason to increase the discount rate for the time being.

Model 2: Discounted cash flow method starting with free cash flow

In this 2-phase model, we simply take the free cash flow which for the FY ending 30 Sept 11 was about \$30 bn (approximated with cash flow from operating activities less capital expenditure) and grow it with certain

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growth rates for 10 years, after which we apply a constant growth rate to the free cash flow. In contrast to Model 1, no detailed derivation of free cash flow from sales and gross profit margins is used for simplicity. Interestingly, free cash flow grew at spectacular rates beyond 80% in 2011, 2010 and 2008, whilst the growth rate was a modest 7% in 2009 and negative in 2006. Such high rates don't seem sustainable in the long-run. We assume growth of 40%, 30%, 20%, and 10% for 2012 to 2015, then a decline by 1% point every year up to 2021. We further use the same terminal growth rate of 2.5% and WACC as in Model 1. Again the market value of equity is lifted up by surplus cash of \$81.57 bn, this time to \$749.6 bn.

Table 2 shows the sensitivity to the discount rate and the growth rate assumed for the terminal period (after 10 years).

First column: discount rate in %. 2nd to 9th column: Terminal growth rate in % and market value of equity in million dollars.

	0%	1%	2%	3%	4%	5%	6%	7%
10.0 %	907,931	956,182	1,016,495	1,094,041	1,197,436	1,342,188	1,559,317	1,921,198
11.0 %	819,783	856,173	900,649	956,245	1,027,725	1,123,033	1,256,462	1,456,607
12.0 %	746,921	774,895	808,463	849,491	900,775	966,712	1,054,629	1,177,712
13.0 %	685,781	707,631	733,454	764,441	802,314	849,656	910,524	991,681
14.0 %	633,817	651,118	671,302	695,157	723,782	758,768	802,500	858,728

Table 2: Sensitivity of market value of equity in million USD to discount rate and growth rate of free cash flow in the terminal period.

Model 3: Single phase model, constant free cash flow

A constant free cash flow from 2012 onwards, with an initial growth from 2011 to 2012 of 40% produces a market value of equity of \$386.7 bn. This assumes the company is in the long run neither growing nor shrinking its business.

Model 4: Single phase model, constant growth of free cash flow

Assuming free cash flow still increases in 2012 over 2011 by 40%, but then grows forever at a low rate of 2.5% produces a market value of equity of \$461.9 bn. This seems a very conservative scenario.

Model 5: A short-cut discounted cash flow analysis

In this model we assume constant EBIT growth starting with EBIT of \$34.205 bn from 2011. The model assumes depreciation equals capital expenditure, change in working capital is zero and other non-cash charges can be ignored. Based on a tax rate of 35%, same WACC as above, same surplus cash and market value of debt and a constant EBIT growth of 6% to infinity produces a market value of equity of \$409 bn. This seems a conservative assumption, given that EBIT has historically grown over the last 5 year period at a mean rate of 65%, over a 10 year period at even higher average annual rate of 120%, distorted upwards by extraordinarily high EBIT growth rates in 2004 and 2005 according to our data sources.

Model 6: Multiples approach, using the PE ratio

We use a short-cut version of this model to produce an estimate of the market value of equity if Apple were compared to other companies in the same or a similar industry in terms of earnings and price/earnings ratio. For the purpose here, we compare Apple with Google, Samsung, Nokia, RIM, Microsoft, Dell, Acer, Toshiba, Amazon and Cisco. Without (otherwise usually required) further effort to determine comparability of those 11 companies in greater detail, we estimate a rough mean PE ratio of 22. If we remove Amazon, it drops to 13.3. This, however, is driven down by currently low PE multiples of RIM and Samsung Electronics.

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Based on Sept 2011 earnings of \$25.9 bn, this provides an estimated market value of equity of \$569.8 and \$344 bn, respectively. The average of both is \$456 bn.

Remarks on above models

Generally all the models used above come with numerous assumptions and limitations. No model will be correct per se. For example, the multiples approach using the PE ratio suffers from various drawbacks. Companies producing the same earnings won't deserve the same market value if they e.g. differ in terms of growth prospects, return on capital employed etc. In our case, the companies are not perfectly comparable. The mean PE ratio is driven up by the one of Amazon which we have included here as Amazon and Apple are both in the business of online stores for books and music. Similarly the PE ratio is currently driven down by the one of Research in Motion, a competitor in the smartphone business. RIM's PE ratio is extremely low given the business problems RIM was facing in 2011. These are only a few of the limitations that apply.

The discounted cash flow models have their own issues. For example they come with high reliance on the enterprise value created from cash flows in the terminal period. Multi-year forecasts for sales, gross profit margins, capital expenditure, changes in working capital etc. are very difficult to produce in practice. The models are moreover sensitive to growth rates, discount rates, margins etc.

Summary of model results

Table 3 summaries the estimated market values of equity and shows an implied share price based on 932 million shares (as per Jan 2012). The estimated mean market capitalisation is \$479 bn. Based on the share price in Jan 2012, the company would be undervalued (market capitalisation about \$415 bn). The last two rows in the table are explained in the next section.

Model	Market value of equity \$ bn	Implied share price in \$ ¹⁾	Assumptions / comments
1	436.3	468	Conservative
2	749.6	804	Relatively optimistic for next 10 years
3	386.7	414	Very conservative
4	461.9	495	Conservative
5	409	438	Simplified, moderately conservative
6a	569.8	611	Biased upwards due to comparison with Amazon
6b	344	369	Biased downwards due to comparison with RIM and low multiple for Samsung
<i>Average 1 to 6b</i>	<i>479</i>	<i>514</i>	
Drop in margin	320	343	
Drop in global markets	393	421	

¹⁾ Assumes 932 million shares

Table 3: Summary of estimated market values of equity of Apple and implied share price.

We use Model 1 to investigate the next questions.

2. Impacts of a drop in gross margin

In the base case scenario used for Model 1, we assumed a certain evolution of EBIT margins, starting with year 2012: 33%, 30%, 27%, 24%, 21%, 18% to infinity.

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The fate of companies in the mobile phone industry can change quickly when companies miss a trend as happened with Nokia and RIM in the past. Take Nokia as an example, a once market leader currently pushed from the throne in the smartphone business: Analysts forecast an EBIT of €1.15 bn for 2012 with sales of €38.14 bn. That's an EBIT margin of 3%. Nokia's sales are expected to drop from 2007 to 2012 from €51 bn to an estimated €38 bn. That would be a decline of 26%. Therefore, ever-green growth is not guaranteed at all as businesses go through their lifecycle (though some successfully manage to reinvent their business and then enter a new lifecycle). The same principle may apply to Apple as well.

Let's assume a worst case scenario, that Apple misses a trend, cannot surprise the market with a new gadget as successful as iPhone or iPad, sales decline and EBIT margin declines as well. What might be the impact on the market capitalisation and share price?

For this scenario we assume the following evolution of parameters, with the hypothetical troubles assumed starting in 2014 and peaking in 2015.

Sales growth from 2012: 50%, 30%, 10%, -15%, 10%, 2.5% growth to infinity.

EBIT margin from 2012: 33%, 25%, 15%, 10%, 15%, 18% to infinity.

All else being equal the market value declines to \$320 bn with an implied share price of \$343 assuming 932 million shares.

3. Impacts of a fall in global stock markets

This might impact the company through multiple transmission channels. A drop in global stock markets could be triggered by a global recession, by sovereign defaults, by another financial crisis, war etc. This would possibly impact sales, put pressure on profit margins, increase the cost of certain supply components, or disrupt supply chain management and lower earnings. Equally, Apple has an exposure to market risk due to its investments in marketable securities. This includes e.g. \$28 bn investment in corporate securities as per Sep 2011, details of which are not further disclosed in the 2011 annual report. For illustration purposes we make some assumptions assuming an adverse event in 2013. However, despite the assumed economic troubles we decrease the company's sales growth rates only mildly, based on the experience from 2008/9 when growth rates held up surprisingly strong due to enormously attractive products.

Sales growth starting with 2012: 50%, 25%, 20%, 15%, 10%, 2.5% to infinity.

EBIT margin: 33%, 25%, 20%, 20%, 21%, 18% to infinity.

We assume that the \$28 bn invested in corporate securities are well diversified and invested in the stock market which we assume to decline by 50%. The portfolio, having a beta of 1, would decline by say \$14 bn. This impacts the surplus cash we consider when finding the market value of equity from the enterprise value. Using Model 1, we find a market capitalisation of \$393 bn or an implied share price of \$421.

A drop in the overall market could however well reduce the share price to a level which then may indicate that the company is undervalued. With a beta of 1.22, returns of the overall market would be amplified also on the way down. A stock market drop of 50% could well turn into a fall of the share price of 61%.

4. Summary

As difficult it is to nail jelly to a wall, as difficult it is to put a price tag on an enterprise. Given that Apple is a very well-known company with excellent products and given that its stock price has risen steadily over multiple years, the possibility exists that the company is now overvalued in the market. Our back-of-an-envelope analysis does not necessarily support the conclusion of an overvalued stock. It might actually be undervalued, assuming a reasonably undisturbed future outlook for its business over the next 5 – 10 years. This would be supported by a PEG ratio of 0.18 (Price/earnings ratio of 15.2 to an earnings growth rate of 82.7% over two years). Mind, different PEG ratios are published depending on PE ratio and average growth rate of earnings.

How does our analysis compare to Yahoo! Finance: 28 Jan 2012, Apple's enterprise value is estimated as \$386b. Based on 932 m shares and same surplus cash and debt assumption as above, we translate this into a market value of equity of \$457 bn or \$491 per share. Our mean estimate of \$479 bn (or \$514 per share) is thus 4.7% higher. Different assumptions and different models, different outcomes. Putting +/- 10% around this mean estimate gives a range for the share price of \$462 - \$565. At the time of writing, the share price was \$447. A 3.4% rise moves it already in the calculated range. Our hypothetical bad-case scenario, however, also tells that

the share price could drop to an inner value of \$343, or if the stock price is taken down by a very violent overall market crash, it could theoretically drop to say a level of \$174, of course based again on a hypothetical scenario nobody wants to ever materialise. Apart from that a strong stock that has good relative strength tends to withstand such rough market declines relatively well. Figure 1 below summarises the different levels of market capitalisation and draws the comparison to the level in Jan 2012.

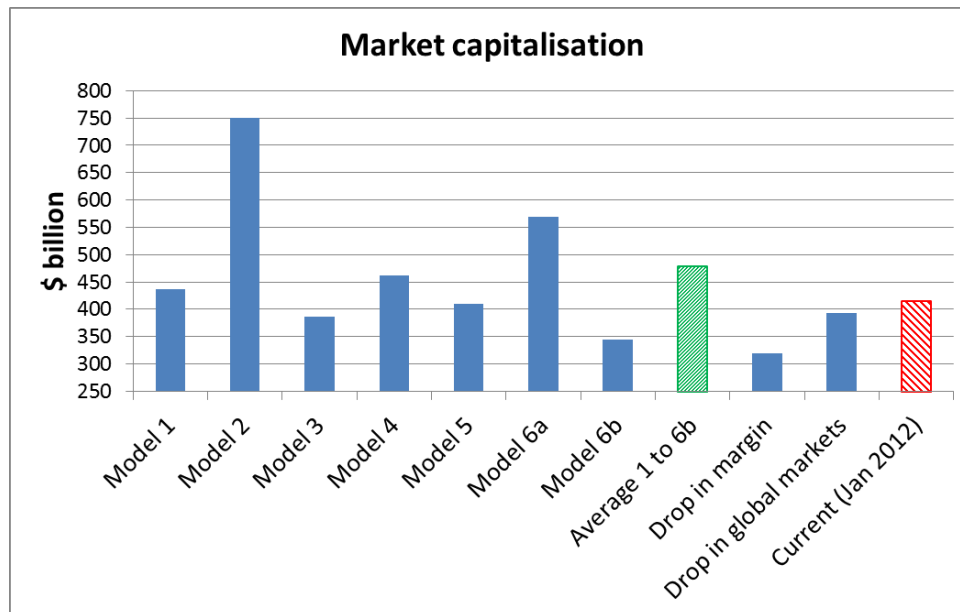


Figure 1: Estimated levels of market capitalisation for Apple.

Disclaimer: This analysis does not provide any financial recommendations. No investment recommendation is made or shall be concluded from this article. The sole purpose of this paper is to illustrate how an estimated market value can be determined for the company identified and how future scenarios can be incorporated into valuation models.

Shares can go up and down in their value. For investment advice, contact your professional adviser. Don't draw any investment conclusion from this paper.