MBA Course Accounting and Finance  
Finance

Naam: Rogier Nitschelm

Adres: Noteboom 59

Postcode en woonplaats: 4101 WS Culemborg (Nederland)

Inschrijfnummer: 817397

Modulecode: MAS0450N

Inzendcode: MAS0450NI2

Datum: 9-8-2015

**Question 1. Discuss the concept of relative valuation and explain why it is known as multiples analysis.**

**The relative valuation technique**

The relative valuation is a way of judging an asset’s potential and relative mean of growth. In other words, its attractiveness as an investment. Relative as in comparison to stocks from the same industry (or in other ways comparable) or ‘the market’. Through the use of this technique it is possible to determine whether or not an asset is under- or overvalued in relation to its industry.

The relative valuation technique uses the present value of a firm (including debts) or its equity value and calculates a ratio by dividing the value by a certain financial indicator. These indicators can be either an equity measure or a firm measure. An example of an equity measure is the equity capital-to-earnings (per share) ratio.

It is possible to quickly obtain a large amount of ratio’s to use in determining the best investment available in the industry. That is, as long as the correct multiples are used in regards to the industry’s market.

**Equity measure vs firm measure**

An important part of multiples analysis is the use of the correct measurement. As earnings per share and net income reflect only the benefits of equity, they are best suited for comparison to equity capital, rather than enterprise value. When using enterprise value, one could for example use earnings before interest, taxes, depreciation and amortization. As this translates into a financial result that is independent of the type of capital involved and thus cannot really be compared to simply equity capital to make a good estimation of any sort.

|  |  |
| --- | --- |
| Equity measure | Firm measure |
| Earnings per share | Cash flow |
| Book value of equity | EBITDA\* |
| Net income | Book value of capital |

*\*Earnings before interest taxes, depreciation and amortization*

**Advantages of multiples analysis**

The biggest advantage of using multiples analysis is the fact that it is relatively easy to use as it translates a lot of information into a few series of numbers. One can simply obtain trading information from Reuters, filter all the comparably stocks, use a spreadsheet and note their values. Then translate the values into comparable multiples and decide which companies are attractive in relation to their peers.

Inherent to its ease is the pace in which one can make a comparable analysis between the selected companies. In the blink of an eye one can determine the differences between the businesses.

**The right multiples**

When applying multiples analysis it is important to determine the right multiples. Whereas large retail companies might be perfectly suited to be compared on the price-to-sales ratio. Comparing large real estate companies will not be suited for comparison on sales. In this case using the multiple cash flow would be more suited for an analysis. Another example are banks and life insurance companies. As these companies generate a lot of earnings through leverage of interest received and paid, using EBITDA as a multiple is not recommended.

Also some other multiples do not lend themselves very well in the use of comparison. Using the price/book ratio in a non-financial services industry seems pretty redundant. As the amount of tangible capital consolidated in its balance sheets is relatively minimal. Often due to the presence of good will, reputation and possible patents. But intangibles aren’t the only obstacle.

**Downsides**

There are also a few known complications however. Sometimes accounting rules differ, giving a clouded view of certain companies. Besides, a company cannot be simplified into a number, due to there being more factors involved in the success of a business. Like marketing. A company’s sheets and figures are a reflection of its history but don’t say all that much about its future, its marketing does however. Other influences come from trends, regulation, the market and so on. Although the influence of many of these external factors would apply to the other companies in the industry as well, and therefore are only truly relevant in regards of the entire industry, and not so much for a specific industry.

Another downside is the use of equity capital rather than enterprise value might give a false indication of a positive future of a company, as basing a ratio on equity capital causes a susceptibility to misinterpretations. For one when using equity value in comparison to an indicator, the price/earnings ratio might display a very positive result due to the leverage of a balance sheet with abnormal amounts of debt-funded capital. An investor could perceive a stock as attractive. While the same ratio calculated based on the enterprise value will reflect merely an average or worse result (due to the earnings not all being that ‘wonderful’ in regards of the total balance sheet). Using the enterprise value as a basis rather than equity capital will result in a more ‘total’ picture of the stock.

Another downside of the basic approach is the fact that the measurement doesn’t include possible spikes in say profits. When a certain company has an unusually good year in relation to previous years, it could mean a one-time event having inflated the company’s price/earnings ratio to unlikely levels, resulting in ‘picking’ a stock one normally wouldn’t have chosen based on a comparable analysis. A solution to the latter is to use an average if the valuation, rather than basing it on merely a one-time measurement.

**Steps of multiples analysis**



(1.) One could pick the consumer electronics industry, (2.) determine, for example that EBITDA is a good multiple to use and determine another multiple for use. (3.) Collect data on the companies of this industry, like Philips, Sony and LG. (4.) note them down in a sheet and (5.) determine best opportunity.

*\*I use industry, but it can be read as “a group of stocks with comparable characteristics”*

**Question 2. Describe in great detail the major multiples used in relative valuation.**

I have used the literature to determine the major multiples. The four multiples described are earnings, book value, cash flow and sales (R. Brown p. 446) .

**Major multiple 1: earnings**

The earnings multiple describes the earnings determined per share or per capital depending on the nominator (enterprise or equity value) used in relation to the earnings. The higher the value-to-earnings ratio, the higher the expected growth in earnings that investors expect when investing in the company.

The P/E ratio is determined by the payout ratio, the estimated required rate of return and the expected growth rate of dividends.

To be able to actually determine the growth potency of a share one should determine the value-to-earnings ratio of all comparable companies, in order to determine the best pick.

A downside of this multiple, along with various other multiples, is the susceptibility to accounting manipulations.

Example of an industry to analyze with this ratio: This multiple is relevant when analyzing, for example the car manufacturing industry (cyclical, industrial).

Price/earnings ratio:

Stock price

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Earnings-per-share

**Major multiple 2: book value**

This ratio determines the relation between the price of a share and the book value of its assets. It is favorite among analysts who analyze the banking industry, due to the book value often being equal to the intrinsic value of the assets. A dollar is a dollar.

A low price to book-ratio could indicate that a stock is attractive due to undervaluation. However, when the result is a low book ratio one should be wary. It is possible that the company has a high debt-to-equity ratio, or that undervaluation is justified due to other circumstances.

Example of an industry to analyze with this ratio: This multiple is relevant when analyzing financial companies like banks, as there is a significant correlation between the price-to-book value and the return on equity.

Price/book ratio:

Stock price

-------------------------------------------

Total assets (-/- intangible assets)

**Major multiple 3: cash flow**

The price-to-cash flow ratio is the stock’s price in relation to its cash flows. A low price-to-cash flow ratio would indicate an undervaluation and thus a potential attractive investment. The ratio is calculated based on the operating cash flow (adding depreciation and amortization on top of the cash flow).

A common reason for investors to prefer cash flow is the because it is less subject to manipulation than other multiples. The cash flow ratio is also more stable than the price-earnings ratio (source: [www.cfainstitute.org](http://www.cfainstitute.org)). And last, they are important when executing credit analysis, as it is an indicator of both operational possibilities as well as the likeliness a company is able to pay its interest.

Example of an industry to analyze with this ratio: The pharmaceutical industry is a good example of using price-to-cash flow as a ratio. As other ratio’s like the price-earnings ratio might not be a good idea to use. This due to the fact that this industry is known to require large investments in research before eventually producing results. Earnings will be relatively unstable in comparison to other industries, but a high cash flow means there are a lot of potential resources available for research and development of medicines. Which is a good sign for a pharmaceutical stock.

Price to cash flow: Stock price

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Cash flow per share

**Major multiple 4: sales**

The price-to-sales ratio indicates the relation of its stock price to the revenues it produces. It reflects the value of a stock when looking solely at sales. A low ratio might indicate undervaluation and thus a potential investment opportunity. It is often used to compare companies that reside in the starting/early phases, as revenues are present yet no or barely any profit is generated.

The multiple sales however doesn’t indicate the margins a company makes. When a company operates a very inefficient business, using the price-to-sales ratio alone will not be a rewarding ratio to use.

Price-to-sales ratio:

Price

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Revenues

Example of an industry to analyze with this ratio: An industry in which price-per-sales ratio is useful is the food industry. As food is sold with low margins, a very large amount of revenue in comparison to the value could mean potential undervalue and as such is an indicator for an attractive stock.

**Question 3. Use market-based valuation approach to analyze the top four players in the Indian IT industry with the help of data given in the case study. In your answer you should make a distinction between all possible earning and value multiples!**

As the assignment clearly states “all possible earnings and value multiples”, I will also calculate the multiples that might not be fitting for valuation the industry. This in case the question arises why I added ratio’s that aren’t optimal for use.

First of all I copied the financial data from the assignment, in order to calculate the answers more easily using formulas and references.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| (in millions) | TCS | Infosys | Wipro | HCL Tech |
| Revenues | 278.128,80 | 216.930,00 | 256.995,00 | 98.687,00 |
| Other income | -4.269,90 | 4.730,00 | 2.621,00 | 2.095,00 |
| EBITDA | 67.428,10 | 71.950,00 | 55.730,00 | 21.883,00 |
| EBIT | 61.787,30 | 64.340,00 | 47.596,00 | 17.736,00 |
| Net Income | 52.564,20 | 59.880,00 | 38.999,00 | 10.886,00 |
| Non Cash Charges | 5.640,80 | 7.610,00 | 8.631,00 | 4.146,00 |
| Cash | 26.981,40 | 96.950,00 | 49.117,00 | 19.298,00 |
| Total Assets Net to Intangible | 158.580,10 | 214.370,00 | 220.775,00 | 79.035,00 |
| Current liabilities (< 1 year) | 42.535,80 | 20.040,00 | 67.989,00 | 30.221,75 |
| Non-current liabilities (> 1 year) | 5.632,10 | - | 56.892,00 | 24.092,50 |
| Share Price per Value | 538,55 | 1.323,90 | 245,90 | 102,05 |
| Par Value per Share | 1 | 5 | 2 | 2 |
| Number of Shares | 978.610.498 | 572.490.211 | 1.454.662.502 | 667.935.809 |

I extracted the liabilities and assets in order for me to easier interpret the balance information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Liabilities and equity capital** | TCS | Infosys | Wipro | HCL Tech |
| Total liabilities | 48.168 | 20.040 | 124.881 | 54.314 |
| Total equity capital | 527.031 | 757.920 | 357.702 | 68.163 |
| Total liabilities and equity capital | 575.199 | 777.960 | 482.583 | 122.477 |

The intangible assets can be determined by calculating the difference between total liabilities and equity and the total of the tangible assets. When doing this, one can see that especially TCS and Infosys have a relatively large amount of intangibles.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Assets** |  |  |  |  |
| Total Assets Net to Intangible | 158.580 | 214.370 | 220.775 | 79.035 |
| Total Intangible assets | 416.618 | 563.590 | 261.808 | 43.442 |
| Total assets | 575.199 | 777.960 | 482.583 | 122.477 |

Although not necessary for the assignment I made an extra table displaying cash flow and earnings per share. This to reduce the chance of me making errors in the calculation of the ratio’s.

I determined the cash flow per share (EBITDA + non-cash charges) and dividing by the amount of shares. The reason I add non-cash charges is, like the name suggests, that these are costs that do not lead to expenses.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cash flow** |  |  |  |  |
| Cash flow per share | 59,48 | 117,89 | 32,74 | 22,51 |
|  |  |  |  |  |
| **EPS** |  |  |  |  |
| Earnings per share | 53,71 | 104,60 | 26,81 | 16,30 |
| EBIT per share | 63,14 | 112,39 | 32,72 | 26,55 |
| EBITDA per share | 68,90 | 125,68 | 38,31 | 32,76 |
| Revenu per share | 284,21 | 378,92 | 176,67 | 147,75 |

Now that I categorized all the data I needed I started calculating the ratio’s. Note that some ratio’s might be more appropriate than others. In my opinion EBIT, EBITDA, Sales, more fitting for enterprise value measurement, as those results are generated not only with equity capital. Whereas net income/earnings are more fitted for equity measurement, as interest has already been subtracted from the numbers. However as the assignment clearly states ‘all possible earning and value multiples’, I calculated all of them.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ratio's (per share)** | TCS | Infosys | Wipro | HCL Tech |
| Price-EBIT ratio | 8,53 | 11,78 | 7,52 | 3,84 |
| Price-EBITDA ratio | 7,82 | 10,53 | 6,42 | 3,11 |
| Price-earnings ratio | 10,03 | 12,66 | 9,17 | 6,26 |
| Price-sales ratio | 1,89 | 3,49 | 1,39 | 0,69 |
| Price-book ratio | 0,92 | 0,97 | 0,74 | 0,56 |
| Price-cash flow ratio | 9,05 | 11,23 | 7,51 | 4,53 |
|  |  |  |  |  |
| **Ratio's (total enterprise value)** |  |  |  |  |
| Enterprise value-EBIT ratio | 9,31 | 12,09 | 10,14 | 6,91 |
| Enterprise value-EBITDA ratio | 8,53 | 10,81 | 8,66 | 5,60 |
| Enterprise value-Earnings ratio | 10,94 | 12,99 | 12,37 | 11,25 |
| Enterprise value-Sales | 2,07 | 3,59 | 1,88 | 1,24 |
| Enterprise value-book ratio | 3,63 | 3,63 | 2,19 | 1,55 |
| Enterprise value-cash flow ratio | 7,87 | 9,78 | 7,50 | 4,71 |

*I have marked the possible ‘interesting’ ratios ‘green’ and the least positive ratios ‘red’. Price/firm – book value is the the smallest distance between market value and the value in the sheets.*

*I believe PE-ratio’s should be measured based on equity, whereas cash flow should be measured by total firm value. As cash flow is the result not only of equity capital invested but also of debt capital invested. Whereas the earnings or net income has already had the interest component subtracted.*

When analyzing the ratio’s produced from the sheet, I noted a few things. Infosys clearly manages to produce the best results in terms of EPS, P/E ratios and so on. Its solvency is also vastly superior, due to no presence of long-term debts. Infosys can be considered one of the least risky investments of the group in terms of solvency. When Infosys decides to add long-term debts to its sheets in order to fund its non-current assets, it will cause a leverage which will translate into an even higher earnings per share. HCL Tech has relatively high debt-to-equity in comparison to TCS and Infosys. Wipro also has a relatively large debt-to-equity ratio. So in terms of both assets and earnings, Infosys is the winner.

The only ratio that is an exception in the superiority of Infosys is the price-book ratio. When determining the price-book ratio, HCL Tech’s price-book ratio is lowest of all. This means of all the companies, HCL Tech’s book value is closest to its market value. This could mean all other companies are overpriced, HCL Tech is underpriced, or there is something wrong with HCL Tech. Even though HCL Tech is the smaller company of the four in terms of total assets, it is also the one producing the relatively disappointing results. Relatively in relation to the other companies analyzed.

However, even though the ratios of Infosys are superior, it is also a relatively expensive stock when looking at cash flow per 1 rupee. What happens if we translate the stocks into rupees and then compare it to the generated cash flows? I divided the cash flow per share by the price per share and the results show some interesting results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TCS | Infosys | Wipro | HCL Tech |
| Cash flow per 1 rupee (equity) | 0,11 | 0,09 | 0,13 | 0,22 |
| Cash flow per 1 unit rupee (total) | 0,13 | 0,10 | 0,13 | 0,21 |

For every rupee invested in equity, the cash flow of Infosys is 0,09, whereas for every rupee invested in HCL Tech the cash flow is 0,22 rupee. Considering the low price-to book ratio of HCL Tech and combining it with the high cash flow per rupee, HCL Tech could be a growth stock. It has the relatively largest operating cash flow and will be able to fund more operations than its competitors.

So even though Infosys’ ratios are in numbers superior, its superiority is already factored in the price of its shares. Whereas HCL Tech’s shares could possibly be underpriced in regards of its outlooks. It has the highest cash flow and lowest price-to book ratio. Also HCL Tech is the only company of all four that has a relatively smaller part of its total assets consisting of intangibles. This could mean that HCL Tech ‘just’ has relatively less intangibles but it could also mean its intangible assets are incorrectly valued. Which is hard to determine due to the subjectivity that is part of determining the value of intangibles. But the possibility of present incorrectly intangible assets could be another indicator of hidden value or in other words “an attractive investment”.

**Question 4. Estimate the value for Max Soft with the help of data given in the case study.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Financial data** |  |  |  |  |  |
| (in millions) | TCS | Infosys | Wipro | HCL Tech | Max Soft |
| Revenues | 278.128,80 | 216.930,00 | 256.995,00 | 98.687,00 | 22.105,89 |
| Other income | -4.269,90 | 4.730,00 | 2.621,00 | 2.095,00 | 59,81 |
| EBITDA | 67.428,10 | 71.950,00 | 55.730,00 | 21.883,00 | 3.376,19 |
| EBIT | 61.787,30 | 64.340,00 | 47.596,00 | 17.736,00 | 2.418,19 |
| Net Income | 52.564,20 | 59.880,00 | 38.999,00 | 10.886,00 | 1.636,98 |
| Non Cash Charges | 5.640,80 | 7.610,00 | 8.631,00 | 4.146,00 | 958,00 |
| Cash | 26.981,40 | 96.950,00 | 49.117,00 | 19.298,00 | 3.923,35 |
| Total Assets Net to Intangible | 158.580,10 | 214.370,00 | 220.775,00 | 79.035,00 | 18.950,00 |
| Current liabilities (< 1 year) | 42.535,80 | 20.040,00 | 67.989,00 | 30.221,75 | 8.862,80 |
| Non-current liabilities (> 1 year) | 5.632,10 | - | 56.892,00 | 24.092,50 | 5.150,00 |
| Share Price per Value | 538,55 | 1.323,90 | 245,90 | 102,05 | missing |
| Par Value per Share | 1 | 5 | 2 | 2 | 1,00 |
| Number of Shares | 978.610.498 | 572.490.211 | 1.454.662.502 | 667.935.809 | 208.989.160,00 |

Some information is missing in the financial data. Therefore I attempt to calculate the value of the stock based on the average Price/multiple ratio in the industry. As the book value cannot be calculated in first instance, due to the unknown size of the equity capital (and thus the unknown size of the entire balance), I will first calculate the value in earnings/sales/cash flow etc. I will then calculate the average value of a share of Max Soft, which I can then use to calculate the estimated size of Max Soft’s balance. And in turn, its price/book ratio.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **EPS** | | | TCS | | Infosys | | Wipro | HCL Tech | Max Soft |
| Earnings per share | | | 53,71 | | 104,60 | | 26,81 | 16,30 | 7,83 |
| EBIT per share | | | 63,14 | | 112,39 | | 32,72 | 26,55 | 11,57 |
| EBITDA per share | | | 68,90 | | 125,68 | | 38,31 | 32,76 | 16,15 |
| Revenue per share | | | 284,21 | | 378,92 | | 176,67 | 147,75 | 105,78 |
|  |  | | | Average | |
| Price-EBIT ratio | |  | | 7,92 | |
| Price-EBITDA ratio | | | | 6,97 | |
| Price-earnings ratio | | | | 9,53 | |
| Price-sales ratio | | | | 1,87 | |
| Price-book ratio | | | | 0,80 | |
| Price-cash flow ratio | | | | 8,08 | |

Value share in P/EBIT: 7,92 x 11,57 = 91,63  
Value share in P/EBITDA: 6,97 x 16,15 = 112,57  
Value share in P/Earnings: 9,53 x 7,83 = 74,62  
Value share in P/Sales: 1,87 x 105,78 = 198,81  
Value share in P/Cash flow: 8,08 x 12,42 = 100,35

I used the value of a share based on the price-earnings ratio to calculate Max Soft equity capital.

I added the estimated share price to the financial data in order to estimate the size of the balance of Max Soft and its equity capital.

**Financial data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| (in millions) | TCS | Infosys | Wipro | HCL Tech | Max Soft |
| Revenues | 278.128,80 | 216.930,00 | 256.995,00 | 98.687,00 | 22.105,89 |
| Other income | -4.269,90 | 4.730,00 | 2.621,00 | 2.095,00 | 59,81 |
| EBITDA | 67.428,10 | 71.950,00 | 55.730,00 | 21.883,00 | 3.376,19 |
| EBIT | 61.787,30 | 64.340,00 | 47.596,00 | 17.736,00 | 2.418,19 |
| Net Income | 52.564,20 | 59.880,00 | 38.999,00 | 10.886,00 | 1.636,98 |
| Non Cash Charges | 5.640,80 | 7.610,00 | 8.631,00 | 4.146,00 | 958,00 |
| Cash | 26.981,40 | 96.950,00 | 49.117,00 | 19.298,00 | 3.923,35 |
| Total Assets Net to Intangible | 158.580,10 | 214.370,00 | 220.775,00 | 79.035,00 | 18.950,00 |
| Current liabilities (< 1 year) | 42.535,80 | 20.040,00 | 67.989,00 | 30.221,75 | 8.862,80 |
| Non-current liabilities (> 1 year) | 5.632,10 | - | 56.892,00 | 24.092,50 | 5.150,00 |
| Share Price per Value | 538,55 | 1.323,90 | 245,90 | 102,05 | 74,62 |
| Par Value per Share | 1 | 5 | 2 | 2 | 1,00 |
| Number of Shares | 978.610.498 | 572.490.211 | 1.454.662.502 | 667.935.809 | 208.989.160,00 |

**Financial data including estimated value per share Max Soft**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Liabilities and equity capital | TCS | Infosys | Wipro | HCL Tech | Max Soft |
| Total liabilities | 48.168 | 20.040 | 124.881 | 54.314 | 14.013 |
| Total equity capital | 527.031 | 757.920 | 357.702 | 68.163 | 15.595 |
| Total liabilities and equity capital | 575.199 | 777.960 | 482.583 | 122.477 | 29.608 |

|  |  |  |
| --- | --- | --- |
|  |  | Average |
| Firm-EBIT ratio |  | 9,61 |
| Firm-EBITDA ratio | | 8,40 |
| Firm-Earnings ratio | | 11,89 |
| Firm-Sales |  | 2,19 |
| Firm-book ratio | | 2,75 |
| Firm-cash flow ratio | | 7,46 |

Value in Firm/EBIT ratio 29.608 / 2.418,19 = 12,24  
Value in firm/EBITDA ratio: 29.608 / 3.376,19 = 8,77  
Value in firm/Earnings ratio: 29.608 / 1.636,98 = 18,09  
Value in firm/sales ratio: 29.608 / 22.105,89 = 1,34  
Value in firm/cash flow ratio: 29.608 / (1636,98 + 958) = 11,41

**Summarized**

**Equity values based on P/E**

Based on P/E the value of Max Soft is: 74,62  
Total estimated value of equity capital based on P/E ratio: 15.595  
Total estimated value of the firm based on P/E ratio: 29.608

**Equity values based on average ratios**

Based on average value of all multiples, share value of max soft is: 115,60  
Total estimated value of equity capital based on average ratio: 24.159  
Total estimated value of the firm based on average ratio: 38.172  
 **(total) Asset turnover (based on share value of 74.62)**  
  
On average 12,24 rupee invested in Max Soft should produce 1 rupee EBIT  
On average 8,77 rupee invested in Max Soft should produce 1 rupee EBITDA   
On average 11,89 rupee invested in Max Soft should produce 1 rupee NET INCOME  
On average 1,34 rupee invested in Max Soft should produce 1 rupee in SALES   
On average 11,41 rupee invested in Max Soft should produce 1 rupee in CASH FLOW