Multiple Differences: Selecting Appropriate Value Driver for Multiple based Valuation in FTSEALL index

Nauman J. Amin

Abstract

Multiple based valuation is a valuation technique whose use is much frequent in many situations when it comes to equity valuation. According to Damodaran (2006) though Multiple based valuation method of valuing stocks has got very little theoretical evidence, but still it is the most popular in industry. It has even been likened to "an art form" (Bhojraj, 2002). Reason of its widespread use could be attributed to its ease of use, but does this method provide a good valuation tool and if yes, what sort of value drivers are most useful in predicting equity value? To answer this question, FTSEALL index was considered as it represents more than 98% of the UK market in terms of capitalization. Valuation for each company in FTSEALL index was carried out on 8 separate value drivers, which included both historical and forward looking drivers, resulting in a set of 9 separate valuations or 'Predicted Values' for each company. These valuations were then compared with closing prices to compute the valuation errors, on which detailed statistical analysis was performed to observe which value drivers resulted in least amount of valuation error, indicating its robustness as a value driver.

Keywords: *Multiple Based Valuation, Value Drivers, Security Valuation*.

1. Introduction

Background of the Study

In literature equity valuation techniques have broadly been characterized into following groups:

1.1 Fundamental Analysis Techniques

Relative or Multiple Analysis Techniques

Of the two evaluation techniques much has been written about Fundamental Analysis. Recently, however, within last 8-10 years there has been much interest in multiple based Valuation techniques, especially as books written after 2000 have detailed approach towards using multiples as dependable valuation technique, for example 'Investment Valuation by A Damodaran'.

Nauman J. Amin is Assistant Professor, Economics & Finance Department, IBA, Karachi, namin@iba.edu.pk

Most commonly used fundamental techniques are as follows (Penman, 2006):

1. DCF (Discounted Cash Flow)

a. Operating Cash Flow

b. Free Cash Flow

2. DDM (Dividend Discount Method)

3. RE (Residual Earnings Model)

4. AEG (Abnormal Earnings Growth Model)

Fundamental analysis technique generally uses discounting on forecasted dividend or cash flows to arrive at a value for a particular stock. Using information taken not only from financial statements of the company but also intangible information about company and market conditions. All this information is processed to arrive at realistic growth rates. In other words there are lot of assumptions made by the analyst and often valuation derived from the same fundamental methods can differ from one analyst to the next owing to differing opinions about company growth.

However, in relative or multiple analysis techniques no amount of extensive forecasting is required, rather valuation from market's current levels is taken. According to S. Pratt (2000) time horizon considered for a typical relative analysis used are "Latest 12 months, Latest Fiscal Year, Estimates for the forthcoming year, simple or weighted average of past years". Which demonstrates that multiple analysis requires only rudimentary financial data.

As Damodaran (2006) has aptly put that there is "significant philosophical difference" between the two approaches as in relative valuation we only make one assumption that "while markets make mistakes on individual stocks, they are correct on average". According to Palepu et al, (2003), major assumption made is that other analysts have already priced most companies in industry considering "long and short term prospects for company growth and profitability" and hence same could be applicable more or less for other company in the same industry. However the real job is in selecting comparable firms. As true comparable firms with exact variables are hard to find in an industry, obvious solution is to take average for whole industry so that extremes "cancel out" each other and value for a "typical" company in industry is obtained. Another issue is that price multiples could be affected by "transitory" shocks or going through a phase of poor performance. For such companies author suggests using forecasted or "leading" multiples rather than using historical or "trailing" multiples, which base company's valuation on its potential rather on past data.

In short, relative valuation begins with one major assumption and choices about comparable firms and multiple used. Aswath Damodaran (2003) in his book Investment Philosophies has categorized multiples used as follows:

1. Earnings
2. Cash Flows
3. Book Value
4. Revenue Multiples

Few papers have been written on multiple based valuations, especially regarding choice of the multiples. Many studies have been done now regarding multiple based valuations as interest in this area has been growing. According to Damodaran (2002), 90% of equity and 50% of acquisition valuation is done using some sort of relative valuation as "valuations use some combination of multiples and comparable companies and are thus relative valuations". However quite often relative valuation is used in conjunction with other valuation approach to justify or check the valuation result.

To conclude, it can be observed from various sources of literature that although multiple based valuations is quite commonly used for equity valuation in the market by investors and investment companies alike, not much research was done. Although recently there has been some interest generated in this subject area of valuation as detailed discussion regarding application of this valuation technique is appearing in textbooks and new research is being carried out. In the research, there is some consensus that 'Harmonic mean' is by far the best way to calculate multiple. Plus, it is better to use industry based classification to come up with comparables with at least 5 companies in an industry group for a reliable multiple to be calculated, as sample of study is only limited to FTSEALL companies. Forecasted Earnings and book value based multiples generally predict valuation with least errors. There were some differences observed in various industries regarding value drivers used in calculating multiples which would have least valuation error. However further research is necessitated in this direction, as body of knowledge is limited.

1.2 Research Methodology

As gathered from literature review, more research is required in Multiple based Valuation regarding suitability of different value drivers for different industries. Main query that is addressed here is which is the best value driver for calculating value driver for various Industries among FTSEALL companies? Seven multiples with following value drivers would be calculated for each industry and their valuation errors would be calculated.

1. Book Value
2. Operating Cash Flow
3. Free Cash Flow

4. EBITDA

5. EPS (Historical)

6. EPS (Forecasted)

7. DPS

8. Revenue

Due to limited time and availability of data, scope is limited to UK companies in FTSEALL.

Research methodology followed here is based on the research method followed by Liu et al (2006). Stepwise summary of analysis is as follows:

First industry group multiples are calculated through harmonic mean for all available value drivers. This process is repeated for all industries in FTSEALL.

Based on relevant industrial multiple forecasted values are calculated for each company, in this case each company would have 9 separate values. These Valuations would then be compared by actual market prices for that company and valuation errors will be calculated in percentage terms.

Detailed statistical analysis (including Histograms) on valuation errors would be done to observe which multiple has the least error in valuation.

1.3 Sample/ Data Study

Keeping in view the research question i.e. Selecting Appropriate Value Driver for Multiple based Valuation of various UK industries, sample of companies had to be drawn from various industries in UK.

Given the time scale of study, it would have been impractical to attempt multiple based valuation on the whole population, but still sample had to be representative enough for the results to be valid and financial data for each sampled company to be easily available.

In order to overcome these issues, initially companies in FTSE-350 index were taken as sample. However later sample size was expanded to include all companies listed in "FTSE All-share index" as it would "represent 98-99% of the UK market capitalization" (*FTSE: The Index Company)*. Therefore sample size would be a fairly representative of the population in term of market capitalization and the end result would be much more reliable. Required financial data for selected sample was obtained from Thomson One Banker Database. The database offers all the financial fundamentals including earnings forecast, which were necessary to answer the research question. The financial information available is cross-sectional in nature as far as time horizon is concerned and pertains to financial figures available from last fiscal year. Therefore this research also has a cross-sectional time horizon, due to limited time and nature of data available at Thomson One Banker.

Data from Thomson One Banker database was extracted after building a "custom tabular report" in comparables menu. The custom tabular report contains field as per Table 1 in accordance to the multiple to be calculated from the 9 value drivers initially mentioned. It should be noted that all financial figures were downloaded in GBP currency.

Table 1

Data Field	Short Description (Ref Thomson One Database)
Entity Name	Name of the Company
Common Shares Outstanding(Mil)	Common Shares Outstanding in Millions
Industry Name	Industry Classification
Quote Symbol	Quoted Symbol in LSE
Price Close	Last closing Price recorded
Book Value Per Share	proportioned common equity divided by outstanding shares
EPSAs Reported	Per share earnings amount reported by the company prior to any adjustments or recalculations.
EPSMean Curr FYR1 EPSMean Curr FYR2 EPSMean Curr FYR3	The arithmetic average of EPS estimates for the current fiscal period indicated. FYR1: Fiscal year 1 forecast period. FYR2: Fiscal year 2 forecast period. FYR3: Fiscal year 3 forecast period.
Dividends Per Share (DPS)	represents the total dividends per share declared during the calendar year
Sales	Represent gross sales and other operating revenue less discounts, returns and allowances.
Earnings Before Int Taxes And Depr (EBITDA)	Represent the earnings of a company before interest expense, income taxes and depreciation.
Net Cash Flow Operating CFStmt	Represent the net cash receipts and disbursements resulting from the operations of the company.

1.4 Study of FTSEALL Industry groups

Data for Total number of 654 companies were downloaded according to FTSEALL portfolio in Thomson One Banker database. These companies were classified in 47 industry groups, except for 35 companies. These 35 companies had to be dropped out of the sample as their industry group was not available in the database. As a result of this relevant sample size came out be 619 companies in the FTSE All share index. There were also instances when relevant Value Drivers were not available in the database, for example there were quite a few companies for which no earnings forecast were available in the Thomson One Banker Database. Plus in other instances there were companies which either had negative cash flows or had negative earnings, as negative figure have little meaning and can distort the averages being calculated. These companies also had to be filtered out the calculation of Harmonic mean. This fact also affected the sample size further for different value drivers. Final sample used for calculating different drivers after taking abovementioned facts into consideration is presented in Table 2 as follows:

Table 2

Value Driver	Final Sample Size Number of Companies
Book Value Per Share	591
EPSAs Reported	546
EPSMean Curr FYR1	463
EPSMean Curr FYR2	469
EPSMean Curr FYR3	448
Dividends Per Share (DPS)	601
Sales	608
Earnings Before Int Taxes And Depr	571
Net Cash Flow Operating CFStmt	530

1.5 Calculation Procedure of Multiple based analysis

The required data set was downloaded as explained in previous section from Thomson One Banker Database and it was checked for missing data fields and data sorted accordingly. Then data was arranged separately according to each value driver and further divided into separate industry groupings, as calculation is done according to each industry grouping.

Value driver is calculated in terms of per outstanding share by dividing the 'relevant value driver' with 'number of outstanding share', except for Value drivers which are readily available on per share basis for example Book Value per share, Dividend per share, Earnings per Share Reported and forecasted figures. It should be noted that both these figures should pertain from the same day.

Next 'price ratio' is calculated between value driver per share calculated earlier and market price per share. As mentioned earlier in the literature review, Industry Harmonic mean would be applied instead of simple arithmetic mean. The Procedure for calculating Harmonic mean for each individual industry grouping is exactly the one followed by Jing Liu et al (2006). Harmonic mean was calculated separately for each company in industry grouping by excluding the Price ratio calculated for which Harmonic mean is being calculated. It is important to do so as not to contaminate the industry's harmonic average with company's own price ratio.

'Predicted Value' was arrived at by multiplying the calculated 'Industry harmonic mean' by corresponding 'value driver per share' for that specific company. 'Valuation error' for the predicted value was calculated by subtracting 'Predicted Value' as calculated previously from 'Close Price' (i.e. from Market Price). In order to compare values more meaningfully valuation error in percentage terms is calculated by dividing valuation error with 'Close Price'.

2.1 Value Driver Analysis: Descriptive Statistics

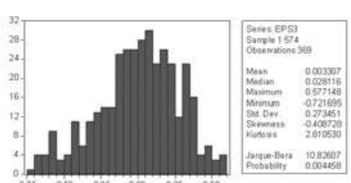
After Valuation errors were calculated for each value driver, E-views statistical package was used to produce the descriptive statistics parameters. The Standard Deviation on Valuation Error is taken as the prime measure of dispersion. This measure of dispersion was taken by Liu et al., (2002, 2006). Hence value drivers with least dispersion or with least Standard Deviation (SD) value are discussed first and continued in ascending order.

2.1.1 Earnings per Share Forecasted for Year 3 Value Driver

As mentioned earlier, SD calculated on Valuation errors has been selected as a measure of dispersion for estimated valuation error for each Value driver. In our case, Forecasted Earnings per share for 3rd financial year (hereinafter referred to as EPS3) has the lowest Standard Deviation of 27.3% (See Figure 1). This SD was calculated after top and bottom 5% of outliers were purged, including Industry groupings with less than five companies.

Even when outliers were considered for this value driver, it still had the lowest SD i.e. 38.34% which strengthens the result even further.

Figure 1 Earnings Per Share forecasted for year 03 (EPS3)



The mean of valuation error is 0.31% and median is 2.73%, as the two values are not markedly very different. This essentially means that the average is representative of population. However both these values are higher as compared to mode and median values of EPS2 valuation error. Effect of this would be discussed in the proceeding section. Plus, maximum and minimum values are 57.71% and -72.17% (i.e. with a range of 129.88%), which is almost same as that of EPS2. Skewness value of -0.41 shows that data is negatively skewed. Excess kurtosis value of 0.16 suggests that data is normally distributed.

2.1.2 Earnings per Share Forecasted for Year 02

As per Figure 2 SD of EPS2 is 27.93% which is only 0.8% greater than EPS3 Valuation Error SD. However the difference between their SD was much higher before 5% when outliers were not purged. After outliers were removed the difference is minimal. In other words it can be said that SD for EPS forecasted for year 2 and 3 is almost the same.

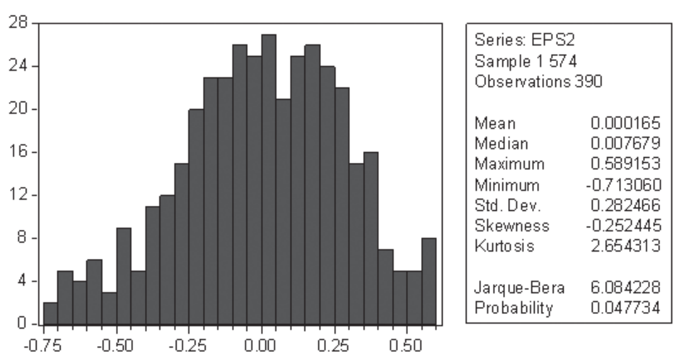


Figure 2 Earnings Per Share forecasted for year 02 (EPS2)

The mean value of EPS2 is 0.015%, which is far less than that for EPS3, but still within the same range. EPS2 median of 0.73% is close to its arithmetic mean, which shows that mean is indicative of the valuation error of EPS2. Range of values for EPS2 is 130.2% which is almost the same for EPS3.

Therefore, considering the above facts, it can be concluded that after removal of the outliers Earnings per Share forecasted for year 2 and 3 are almost equally good at forecasting values of securities. Considering the value of skewness and excess kurtosis of -0.25 and 0.3, it can be concluded that EPS2 Valuation error data is slightly less negatively skewed than that for EPS3.

Overall looking at the descriptive statistics, both EPS2 and EPS3 value drivers provide with same level of valuation error, which are least amongst the value drivers considered.

2.1.3 Earnings per Share Forecasted for Year 1

Referring to Figure 3 SD value of Earnings Per Share forecasted for 1st fiscal year to come (referred to as EPS1) is a bit higher as compare to SD of EPS forecasted for year 2 & 3 both. However, value of 29.25% can be considered to be essentially of same SD level.

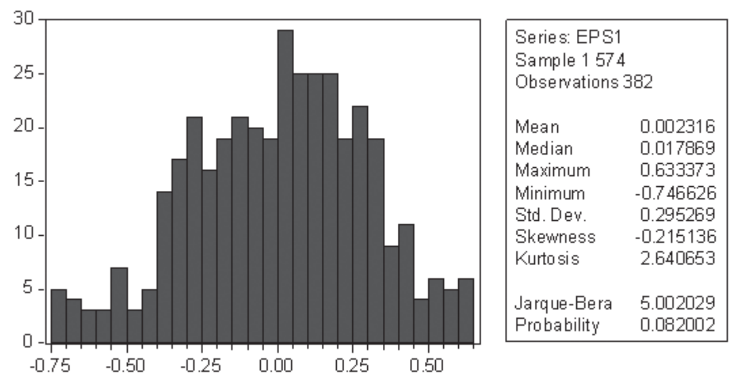


Figure 3 Earnings Per Share forecasted for year 01 (EPS1)

It has mean and median values of 0.21% and 1.7% with a maximum and minimum value range of 63.33% and -74.66% respectively. With these figures we can conclude that the mean value is representative of the population, but with a greater range of valuation error 138% as compared to EPS2 and EPS3.

However, EPS1 has a skewness of -0.23, which is the highest skewness value amongst all the negatively skewd value of all value drivers. Therefore we can conclude that valuation errors are more balanced or least skewed amongst others.

2.1.4 EBITDA per Share

After EPS forecasted for year 1, 2 & 3, EBITDA per share valuation error has the least amount of Standard deviation at 46.52%, which is significantly higher as compare to SD for valuation errors of EPS forecasted, which were 30% at most (see Figure 4).

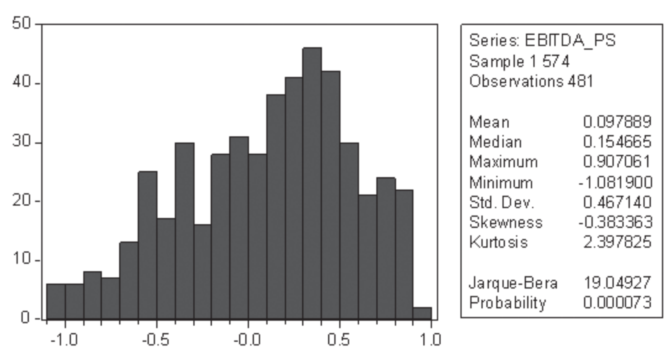


Figure 4 EBITDA per Share

A tolerable difference between mean and median values of 10% and 15.4% suggests that values are representative. The range of values has increased to 198.7%, as compared to calculated range for EPS forecasted, indicating increased volatility in the valuation errors for EBITDA per share. Although the skewness of -0.39 is comparable to skewness for valuation errors for EPS3, value of excess kurtosis of 0.6 for EBITDA is greater as compared to all values of excess kurtosis calculated for EPS forecasted.

2.1.5 Earnings per Share Reported

Standard Deviation of Earnings per Share Reported (referred to as EPSR) valuation error is 51.9%, which is more than that for both SD of EBITDA per share and EPS forecasted, see Figure 5.

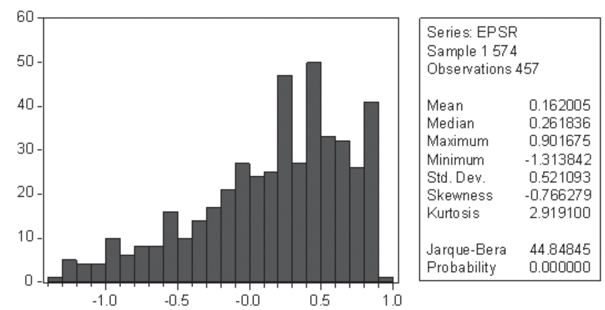


Figure 5 Earnings per Share Reported (EPSR)

Significant difference in calculated values of mean 16.14% with median of 25.72% show that mean is not representative; however range of values is only 221%, which is less than that of EBITDA per share. The data is more negatively skewed as compared to EBITDA (i.e. -75.66%), but value of excess kurtosis is almost equal to zero i.e. 0.07, which may suggest that data may be more normally distributed. However, skewness is suggesting otherwise.

More detailed discussion on the normality of valuation errors would be presented in the coming sections.

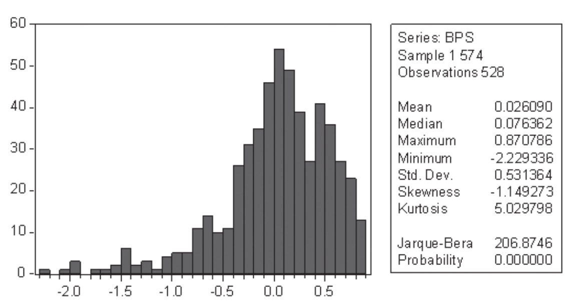


Figure 6 Book Value Per Share (BPS)

Referring to Figure 6 range of values of for Book Value Per Share (BPS) 309% is the highest amongst all value drivers. Data for BPS valuation errors is also most negatively skewed amongst all the value driver valuation errors at -1.14. Plus its kurtosis value is almost 5 (or excess kurtosis of -2). All the above values point to the fact that valuation errors for BPS are very erratic and highly spread.

2.1.7 Operating Cash flow per share

In Figure 7 the SD of Operating Cash flow per share (referred to as OCPS) valuation error is 55.09%, which as a measure of dispersion shows that as compared to EPS forecasted, errors are more dispersed for OCPS. Mean and median values of 14.43% and 24.52%, have a huge difference, which also point to the fact that mean is not representative of ample and values are varied and extreme. Like all the other valuation errors, it is also negatively skewed, but with skewness value of -1.08 it is more negatively skewed than others. Excess kurtosis value of 1.08 also indicated fatter tail of distribution.

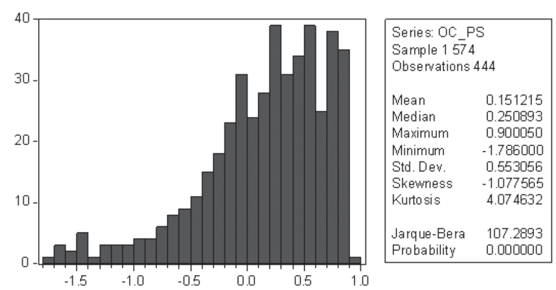


Figure 7 Operating Cash flow per share (OCPS)

2.1.8 Revenue Per Share

Valuation error of Revenue Per share has a SD of 59.19%, with range of 270%, (see Figure 8). These values show that valuation errors for Revenue per share are more dispersed than for forecasted EPS. Skewness of -1.035 and excess kurtosis of .56 indicate that data is heavily skewed in negative direction with fat tails.

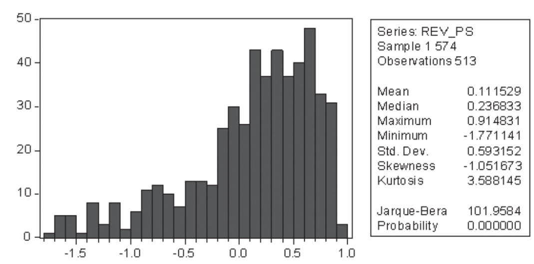


Figure 8 Revenue Per Share (REVPS)

2.1.9 Dividend Per Share

With a SD of 61%, DPS (refer Figure 9) valuation error is the most heavily dispersed amongst all other value drivers. The range of values of 260% though is a lot more as compared to EPS forecasted, but it is at the same level as that of other valuation errors of value drivers.

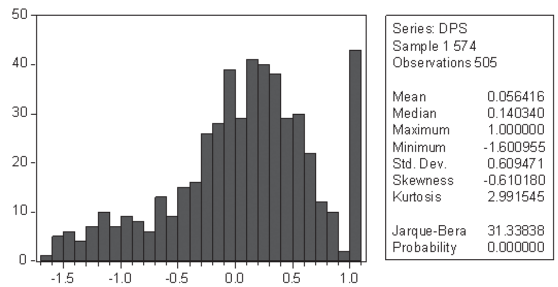


Figure 9 Dividend Per Share (DPS)

Mean and median values of 5.8% and 13.8% suggest mean is not representative, but skewness value of -0.6 suggests that it is less skewed than most other value drivers except for EPS forecasted for fiscal year 1, 2 & 3 and EBITDA per share valuation errors. Excess kurtosis value of 0.02 is least amongst all value drivers which suggests that data is normally distributed, but all other statistical values are suggesting otherwise. We would have a more detailed analysis of the normality of the data with the help of Jerque-Bera test calculated on valuation errors of various value drivers.

2.2 Summary of Descriptive Statistics

Table 3 Summary of Descriptive Statistics

	EPS3	EPS2	EPS1	EBITDA_PS	EPSR	BPS	OC_PS	REV_PS	DPS
Mean	0.33%	0.02%	0.23%	9.79%	16.20%	2.61%	15.12%	11.15%	5.64%
Median	2.81%	0.77%	1.79%	15.47%	26.18%	7.64%	25.09%	23.68%	14.03%
Maximum	57.71%	58.92%	63.34%	90.71%	90.17%	87.08%	90.01%	91.48%	100.00%
Minimum	-72.17%	-71.31%	-74.66%	-108.19%	-131.38%	-222.93%	-178.60%	-177.11%	-160.10%
Range	129.88%	130.22%	138.00%	198.90%	221.55%	310.01%	268.61%	268.60%	260.10%
Std. Dev.	27.35%	28.25%	29.53%	46.71%	52.11%	53.14%	55.31%	59.32%	60.95%
Skewness	-0.41	-0.25	-0.22	-0.38	-0.77	-1.15	-1.08	-1.05	-0.61
Kurtosis	2.81	2.65	2.64	2.40	2.92	5.03	4.07	3.59	2.99
Jarque-Bera	10.83	6.08	5.00	19.05	44.85	206.87	107.29	101.96	31.34
Probability	0.004	0.048	0.082	0.000	0.000	0.000	0.000	0.000	0.000
Obs	369	390	382	481	457	528	444	513	505

Statistical Summary mentioned in Table 3 shows the variables discussed earlier, arranged in ascending values according to their Standard Deviation of valuation errors. It reveals the means for EPS forecasted for year 1, 2 & 3 have mean value of even less than 0.3% as compared to other value drivers whose average valuation errors range from 2.5 - 16.15%. So clearly there is a marked difference in the arithmetic mean of EPS1, EPS2 & EPS3 when compared with rest of the value drivers. The median values also follows the same trend; however the difference between mean and median values for EPS forecasted is far less than for other value drivers, which suggests that mean calculated for EPS forecasted is more representative as compared to other value drivers.

Range of value for EPS forecasted valuation errors (i.e. EPS1, EPS2 & EPS3) are 130 - 138%, while for other value drivers range starts from 200 - 310%, which highlights the fact that valuation errors for EPS forecasted are less dispersed than for other value drivers. Standard deviation (SD) of valuation errors also strengthens the same conclusion, as SD of EPS forecasted valuation drivers range from 27.13 - 29.25%, while rest of the SD of value drivers range from 46.52 - 61%.

Skewness calculated for all valuation errors of value drivers are negatively skewed to varying degrees. EPS2 and EPS3 are considerably less negatively skewed as compared to the rest.

Negative skew here means that majority of the values are on the right hand side of the distribution or most of the values are positive. Referring back to procedure on how valuation errors were calculated for each value driver, which is as follows:

Valuation error = (Price Close - Predicted Value)/ Price Close

Considering the above formula, positive valuation error means that 'Predicted value' or the value calculated through harmonic mean of value driver is less than the 'Price Close' or the quoted market price of stock.

From Table 3, the Jerque-Bera normality test indicates null hypothesis of normality is rejected for all value drivers except for EPS1 and EPS2. However, EPS3 only gets rejected by a short margin as opposed to rest of the value drivers which get rejected by a huge margin as their probability value is zero. Hence result of Jerque-Bera normality test show that Earnings Per share forecasted for year 1 and 2 valuation errors are normally distributed. Even though Earnings Per share forecasted for year 3 get rejected, it does so by a short margin and therefore we can make an approximation that its valuation errors are more normally distributed as compared to the rest of value drivers. If we compare EPS forecasted for year 1, 2 & 3 we can safely conclude that EPS forecasted for year 2 and 3 lead to less valuation errors as compared to EPS forecasted for year 1. On the whole, if EPS forecasted is taken as a single driver then they provide the least amount of valuation error compared with any other value driver as detailed in the explained results of remaining value drivers.

2.3 Inter Quartile Range

The valuation error dispersion can be viewed from the perspective of their inter quartile range is regarded as a more robust dispersion measure rather than total range and standard deviation, as inter quartile range is not effected by extreme values (B Wright, 2002).

Table 4 Inter Quartile Range Summary

	EPS3	EPS2	EPS1	BPS	EBITDA PS	EPSR	OC PS	DPS	REV PS
Q1	-15.60%	-17.26%	-21.73%	-22.50%	-22.17%	-13.00%	-11.82%	-25.47%	-17.57%
Q2	2.81%	0.77%	1.79%	7.64%	15.47%	26.18%	25.09%	14.03%	23.68%
Q3	19.47%	20.70%	22.11%	41.58%	45.07%	55.32%	56.68%	47.30%	55.71%
Q4	57.71%	58.92%	63.34%	87.08%	90.71%	90.17%	90.00%	100.00%	91.48%
IQR	35.07%	37.96%	43.84%	64.08%	67.24%	68.31%	68.50%	72.77%	73.28%

The abovementioned Table 4 shows the calculated Quartile and Inter quartile range (as IQR = Q3 - Q1) for valuation errors of all value drivers. The lowest IQR is for Valuation error EPS forecasted for year 3 (EPS3), followed by EPS2 and EPS1. EPS forecasted IQR ranges from 35% - 44%, second lowest IQR after EPS are BPS at 64% and third lowest are EBITDA & EPSR at 67% - 68%. This confirms and is consistent with the results and conclusions reached in the descriptive statistics summary.

2.4 Graphical Analysis of Valuation Errors for Value drivers

In the previous section we analyzed the valuation errors of all value drivers that we considered with the help of descriptive statistics parameters including inter quartile range to assess the distribution of valuation error. In this section graphical analysis of valuation errors is attempted, which would provide us with more visual information about the nature of valuation errors from various value drivers.

Here the 'frequency distribution graphs' are plotted such that horizontal or X axis indicates midpoint with range of 0.25 or 25%. The range starts from -1.25 to 1.25 (i.e. -125% to 1.25%), which covers entire range of valuation errors effectively. The vertical or the Y axis in the middle indicates the frequency of the ranges and since it is pivoted at zero of X axis, any skewness in the plotted graph can be spotted easily.

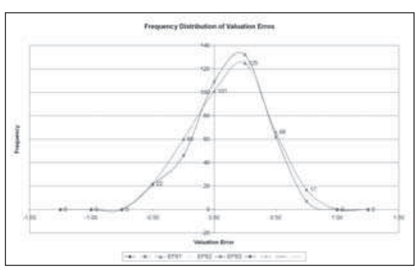


Figure 10 Frequency Distribution of EPS forecasted Valuation Errors for year 1, 2 & 3 (EPS1, EPS2, and EPS3)

In Figure 10 graph plotted is for Earnings per share forecasted valuation errors, which shows that most of the values lay on the positive side as indicated by the negative skewness value. The unmistakeable bell shaped curve of normal distribution can be seen for EPS1, EPS2 and EPS3. Plus it can also be observed from the graph that valuation errors range from -50% to 75%.

The second graph plotted in Figure 11 contains the plotted values for the rest of valuation errors. At a glance, plotted curves show that most of the valuation errors for value drivers are in the positive region. However the plotted lines appear much more erratic as compared to 'EPS forecasted' graph. Also even through visual observation, it can be noticed that values are spread over a greater range i.e. from -125% to 100%.

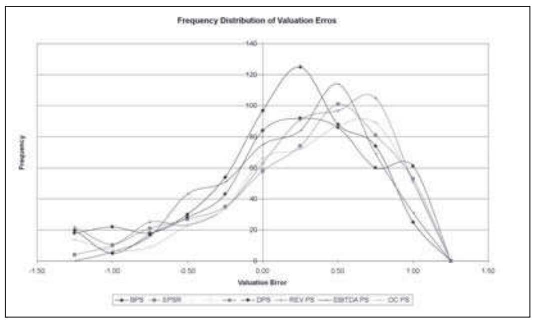


Figure 11 Frequency Distribution of BPS, EPSR, DPS, REVPS, EBITDAPS, OCPS Valuation errors

Figure 12 combines both the plotted graphs in Figure 10 & Figure 11, which highlights the differences in the distribution of valuation errors of the value drivers. Valuation errors of EPS forecasted for year 1, 2 & 3 appear to be more tightly distributed as compared to the rest of value drivers. It also appears to be more peaked between 0 - 25% of the range as compared to other value drivers which seem to peak after 50% of range. Plus EPS forecasted plotted lines have that distinctive bell shaped curve, which seems to be absent in rest of the value drivers, in other words they appear to be more normally distributed.

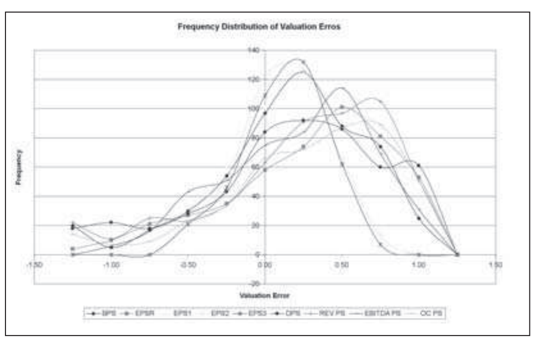


Figure 12 Combined Frequency Distribution of graph of all value driver valuation errors

To graphically ascertain the normal distribution of data we can use Quantile-Quantile Plot for normal distribution. “Quantile-quantile plots are used to compare the distribution of random variables” (Klinke, 2001). Here we would compare valuation error with “pre-defined” normal distribution. Any deviations from normal distribution can be visually checked by observing how closely valuation error data form various value drivers follow straight line of normal distribution.

It can be clearly observed from Figure 13 of Q-Q plot that 'earning per share valuation error for year 1, 2 & 3' data follows straight line of normal distribution more closely in all four quartiles. It is almost perfect for EPS forecasted for year 1 & 2. It is still less closely followed by 'EBITDA per share' and 'EPS reported' valuation errors, with noticeable deviations at the ends. For BPS, OCPS (Operating Cash flow per share), Revenue per share and DPS it is totally out of line. In short valuation errors plotted for EPS forecasted for year 1, 2 & 3 are normally distributed, which is verified by the bell shape graph and Bera-Jerque normality test performed in descriptive statistic section. The null hypothesis of normality gets rejected for EPS forecasted for year 3 (EPS3) but only by a short margin. Here in the Q-Q plot it can be visually checked that EPS3 is also normally distributed.

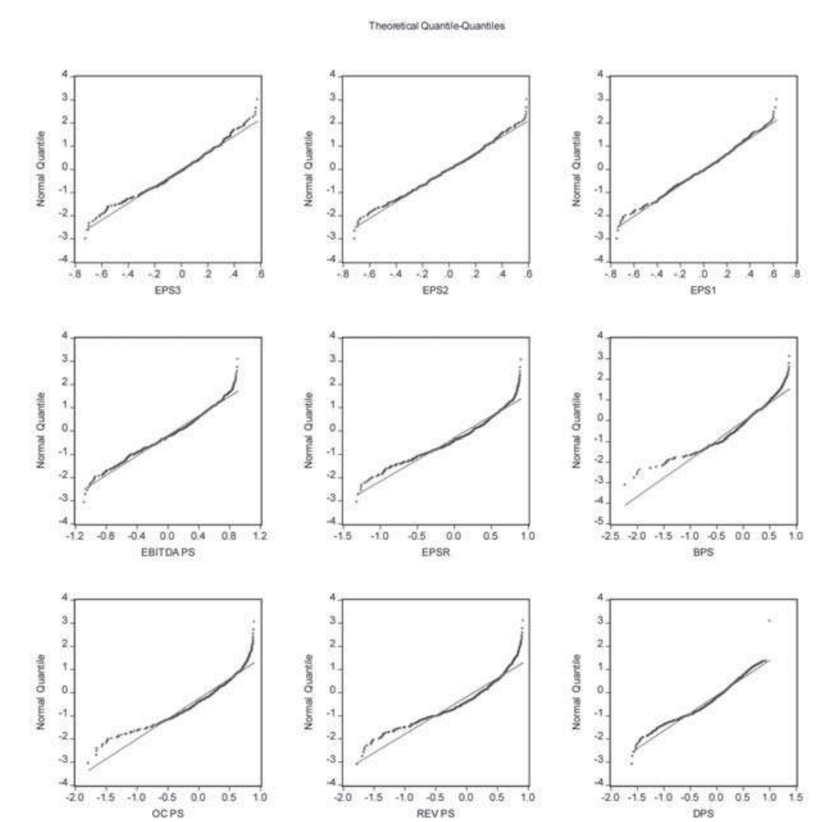


Figure 13 Q-Q Plot for Normal distribution

Hence for graphical analysis it can be concluded with certain confidence EPS1, EPS2 and EPS3 valuation errors are more tightly and normally distributed as compared to the rest of valuation errors from other value drivers considered here. In other words, normal distribution of valuation errors for EPS forecasted imply that expected valuation error is its 'mode', which in our case is 0.77% - 2.81% (refer Table 3 Summary of Descriptive Statistics). As “normal distribution is symmetric around the expected value, larger deviations from the expected value are less likely than smaller deviations” (Bodie, 2007).

Therefore EPS forecasted valuation error is expected to be less than 3%, with most of the valuation errors distributed tightly around that value, this in comparison to other value drivers is insignificant.

3.1 Conclusion and Recommendations

In the preceding analysis of various value driver valuation errors, it was established that EPS forecasted for year 2 & 3 (EPS2 & EPS3) had the least valuation errors as compared to other value drivers. This result was closely followed by EPS forecasted for year 1 (EPS1), whose valuation errors were essentially within same range as of EPS 2 & 3. However the fact that EPS forecasted for year 2 & 3 yielded less valuation errors seems to confirm the notion that investors price securities in relation to future earnings. When EPS forecasted value drivers for all three years are taken together as a whole, it emerges as a value driver which has the least and most tightly normally distributed valuation errors, when analyzed both statically & graphically. This result is consistent and completely in line with all previous researches done by Liu et al. (2002, 2006) and Schreiner et al. (2007).

After EPS forecasted, amongst historical value drivers EBITDA per share (EBITDA PS) has the least valuation errors. EBITDA PS in reality enables investors to compare companies without the effects of various acting practises which could distort profits and cash flows, it is also said to be the “cash generating capability of a business” (Walton, 2006).

Book Value per share (BPS), Earnings per share reported (EPSR) and Operating Cash Flow per share (OCPS) come next inline after EBITDA PS. Therefore Operating Cash flow has performed as a worse value driver as compared to EBITDA PS when both essentially gauge cash flow of the business. One possible explanation for this is offered by research of J. Estridge et al (2007) is that “there is no consistent definition of cash flows that reflects the underlying economics of the business (operating and financing) in a way that is useful for valuation”. On the other hand, EBITDA is not plagued by ambiguity issues and hence more meaningful to investors.

Another research done by Black et al. (1998), establishes that relevancy of earnings or cash flow rather depends on “life cycle” of the firm. It proved that “earnings are more useful than cash flow measures only in growth and mature stages” (Black et al., 1998). For young start ups cash flow is vital as they have to survive. Considering our researched sample of FTSEALL, most of the companies are well established companies and therefore investors tend to value these companies with their forecasted earnings. Considering the above results, it can be concluded that forward looking earnings based (i.e EPS forecasted) value drivers come up with least valuation errors and hence are recommended to be used in multiple based valuations.

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