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The Hidden Value

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Abstract

A well documented fact is that value ratios showed an ability to predict future returns, e.g. periods with low P/E or conversely high D/P ratios were usually followed by periods with higher than normal returns in the stock market. I propose an approach to valuation that applies the concept of Value Investing to indexes and consequently to ETFs. The method is based on the calculation of the return on equity (R) of the ETF, based on the Abnormal Earnings Model (AEM). The calculated R is compared to the actual ROE of the ETF and the difference is defined as the "margins of safety" (using Benjamin Graham's terminology) between the price of the index and its fair value. The higher the value of the difference ROE - R, the cheaper is the price of the index in relation to its fair value.

Keywords: Valuation; Indexes; ETF; Return on equity; Abnormal Earning Model (AEM)

Introduction

*"Towards the end of the last century, academic finance economists came to take seriously the view that aggregate stock returns are predicE2 = R * (B1 + E1*b) = E1 + R * b * E1 = E1 * (1 ."*

This, somewhat surprising, statement comes from John Y. Campbell an economics professor at Harvard University and Samuel B. Thompson, manager of research in Arrowstreet Capital, L.P., in an article that they published recently [1].

Campbell and Thompson investigated whether value ratios, such as P/E, P/B and D/P, were helpful in predicting the future returns of the overall stock market during the period of 1926 - 2005. Their first conclusion was that value ratios showed an ability to predict future returns, e.g. periods with low P/E or conversely high D/P ratios were usually followed by periods with higher than normal returns in the stock market. This conclusion should not come as a surprise to value investors, who follow the footsteps of Benjamin Graham, but it may raise some eyebrows in the academy. The second, and more interesting conclusion, was that the best predictions of future returns were obtained once the parameters of the forecast model were computed using the Dividend Growth Model, known also as the Gordon Model.

The Gordon Model, in its simplest form, determines the relation between the dividend yield (D/P), the expected growth in dividends (g) and the expected rate of return (r).

$$D/P = r - g \tag{1}$$

In a previous article, ("The Risk Premium Puzzle" [2]) I have shown that this simple relation can be utilized to detect abnormally large or small risk premiums. Another extension of the Gordon Model is the Abnormal Earnings Model (AEM). The AEM, which is also known as the Residual Income Model, can be derived from the Gordon Model with the addition of the long-term relation between the dividend growth rate (g), the return on equity (R) and the earnings retention rate (b):

$$g = R * b \tag{2}$$

Equation (2) is the result of the relation between dividends (D), earnings (E) and the retention rate (b):

$$D_1 = E_1 * (1 - b) \tag{2a}$$

If the company has a constant return on equity R and its book value is B - its second year earnings will be:

$$E_2 = R * (B_1 + E_1*b) = E_1 + R * b * E_1 = E_1 * (1 + R * b) \tag{2b}$$

The second year's dividend will be:

$$D_2 = (1 - b) * E_1 * (1 + R * b) \tag{2c}$$

Thus, the dividend growth rate will be:

$$D_2 / D_1 - 1 = R * b \tag{2d}$$

The retention rate (b) is the percentage of earnings (E) that is not paid out as dividends (D), but rather is retained to support future growth:

$$b = 1 - D/E = 1 - (D/P) * (P/E) \tag{3}$$

Using equations (1) and (2) we can derive the AEM.

$$P/B = 1 + (R - r) / (r - R*b) \tag{4}$$

Equation (4) is reached by placing equation (2) into equation (1) and substituting D by (1 - b)*E, which gives the definition of P/E:

$$P/E = (1 - b) / (r - R * b) \tag{4a}$$

Using the accounting definition of R we can obtain the relation between P/E and P/B:

$$R = ROE = E / B = (P/B) / (P/E) \tag{4b}$$

$$(P/B) = R * (P/E) \tag{4c}$$

Placing (4a) into (4c) results in the AEM:

$$(P/B) = R * (1 - b) / (r - R * b) = (R - r + r - R * b) / (r - R * b) = 1 + (R - r) / (r - R * b) \tag{4d}$$

Method

Campbell and Thompson used equations (1) and (4) in order to

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predict the expected rate of return on the stock market. I propose a slightly different approach - from equation (4) it is possible to extract the expected return on equity (R):

$$R = (P/B) * r / (1 + b * ((P/B) - 1)) \qquad (5)$$

The expected return on equity (R) is the level of profitability that conforms to the current level of price and the expected rate of return. However, it is not necessarily equal to the actual return on equity (hereinafter ROE) or to the historical level of the return on equity. Comparison of the level of R to, either the actual ROE, or to the historical level of the return on equity, can provide a useful insight on the current level of prices. High or low levels of R, in comparison to these benchmarks, may serve as signs that stocks are over or under valued.

Based on data from Morningstar, I performed such comparison for three ETFs that follow stock indexes of large American corporations: SPY - which follows the S&P 500; IVW - which follows the S&P growth index; and PRF - which is a fundamental index that follows RAFI 1000, the fundamental equivalent of a large-cap US index. These indexes represent the three investment styles defined by Morningstar: Large Blend (SPY), Large Growth (IVW) and Large Value (PRF).

Moving from company's level to index level

The relations between accounting data and market data, which are presented by equations (1) to (5), are theoretically correct at the company's level. When we move from the company's level to the index level we should define the meaning of these relations. Ideally, the index level figures should reflect average values; a kind of a representative company, that can be compared between the indexes. Such methodology is employed by Morningstar in the calculation of the P/B, P/E and D/P ratios for ETFs (I have discussed some conceptual issues emanating from this methodology in a previous article: "Has the US Stock Market become Cheaper?" [3]). However, when these average value ratios are used to derive other accounting ratios, the results of these indirect calculations may differ from their actual (unobservable) average values. This concern holds for the calculation of the retention rate (b) in equation (3) and the actual ROE in equation (4b).

In order to check the implications of this issue I have constructed a simulation using three synthetic portfolios of 20 stocks each. The portfolios were constructed according to the three investment styles: blend, growth and value. The value ratios for each stock were selected randomly, but within predetermined boundaries according to the portfolio's style. For the simulation of the retention rate (b) I have used the following boundaries:

P/E for growth stocks - 15 to 40; D/P for growth stocks - 0% to 1%.

P/E for blend stocks - 10 to 20; D/P for blend stocks - 1% to 3%.

P/E for value stocks - 5 to 15; D/P for value stocks - 3% to 7%.

For each portfolio I generated 20 iterations of random P/E and D/P, and for each iteration I calculated the average retention rate (marked as "b - Average") and the index retention rate from equation (3) (marked as "b - Fund"). The results are presented in table 1a.

The column named "Difference" presents the deviations of the calculated values of the retention rate (b - Fund) from the actual averages (b -Average). These deviations do not seem to be systematic; their magnitude is very small and their average is very close to zero.

A similar simulation was performed for the calculation of the ROE with the following boundaries for the relevant value ratios:

P/E for growth stocks - 15 to 40; P/B for growth stocks - 2.0 to 5.0.

P/E for blend stocks - 10 to 20; P/B for blend stocks - 1.0 to 2.5.

P/E for value stocks - 5 to 15; P/B for value stocks - 0.5 to 1.5.

In the same manner I generated 20 iterations of random P/E and P/B and calculated the average ROE (marked as "ROE - Average") and the index ROE from equation (4-b) (marked as "ROE - Fund"). The results are presented in table 1b.

As in the previous table, the column named "Difference" presents

Growth: P/E=15-40; D/P=0%-1%					Blend: P/E=10-20; D/P=1%-3%					Value: P/E=5-15; D/P=3%-7%				
P/E	D/P	b-Average	b-Fund	Difference	P/E	D/P	b-Average	b-Fund	Difference	P/E	D/P	b-Average	b-Fund	Difference
26.2	0.43%	89.4%	88.7%	0.7%	13.9	1.81%	74.9%	74.9%	0.0%	8.9	47.8%	58.2%	57.5%	0.8%
29.4	0.54%	84.8%	84.3%	0.5%	14.9	2.26%	65.9%	63.3%	-0.4%	11.0	4.86%	46.1%	46.6%	-0.5%
26.6	0.48%	86.2%	87.3%	-1.0%	15.5	2.06%	69.0%	68.3%	0.8%	9.5	4.75%	54.7%	55.0%	-0.3%
25.2	0.53%	86.8%	86.7%	0.1%	15.8	2.12%	66.6%	66.5%	0.1%	10.6	5.20%	44.3%	44.8%	-0.5%
28.1	0.51%	86.1%	85.8%	0.3%	14.6	1.94%	71.4%	71.8%	-0.4%	9.5	4.57%	56.4%	56.7%	-0.3%
26.6	0.54%	85.9%	85.6%	0.3%	15.5	1.99%	69.4%	69.2%	0.3%	10.5	4.85%	48.5%	49.0%	-0.5%
28.8	0.49%	85.2%	85.9%	-0.7%	13.9	2.17%	70.0%	69.9%	0.1%	10.2	4.88%	50.9%	50.4%	0.5%
27.8	0.60%	83.7%	83.3%	0.4%	15.6	1.90%	70.3%	70.4%	-0.1%	11.5	5.28%	40.2%	39.2%	1.0%
28.6	0.50%	85.6%	85.8%	-0.2%	13.7	1.93%	73.7%	73.5%	0.2%	10.7	4.92%	48.5%	47.4%	1.1%
27.7	0.54%	85.0%	85.2%	-0.1%	15.2	1.93%	70.6%	70.8%	-0.2%	10.4	4.72%	50.8%	51.1%	-0.3%
27.0	0.47%	87.9%	87.5%	0.4%	15.5	1.92%	70.1%	70.3%	-0.3%	10.5	5.20%	44.5%	45.5%	-1.0%
27.5	0.59%	83.2%	83.7%	-0.5%	13.8	1.92%	73.4%	73.6%	-0.2%	9.8	4.90%	54.0%	51.9%	2.1%
29.7	0.41%	88.3%	88.0%	0.3%	15.5	1.97%	69.3%	69.5%	-0.2%	8.5	4.83%	58.6%	59.0%	-0.4%
28.6	0.49%	85.9%	86.1%	-0.3%	14.5	2.05%	69.9%	70.3%	-0.3%	10.0	5.07%	50.0%	49.2%	0.8%
29.0	0.49%	85.2%	85.8%	-0.6%	16.0	1.84%	71.1%	70.6%	0.5%	10.0	4.99%	50.7%	50.1%	0.7%
25.5	0.53%	85.6%	86.5%	-0.9%	14.8	2.08%	69.6%	69.3%	0.3%	9.6	4.75%	56.6%	54.7%	1.9%
27.1	0.64%	82.9%	82.8%	0.1%	15.0	1.84%	72.5%	72.5%	0.0%	10.5	4.96%	47.6%	48.1%	-0.5%
26.5	0.53%	86.9%	86.1%	0.9%	14.8	1.93%	71.5%	71.6%	-0.1%	9.9	4.81%	52.2%	52.5%	-0.3%
25.1	0.49%	87.6%	87.7%	-0.1%	15.6	1.98%	68.8%	69.1%	-0.4%	9.5	4.98%	53.4%	52.9%	0.5%
28.9	0.53%	83.8%	84.7%	-0.8%	14.7	2.14%	68.4%	68.5%	-0.2%	9.8	4.67%	55.0%	54.3%	0.7%
Average				-0.1%					0.0%					0.3%

Table 1a: Average retention rate (marked as "b - Average") and the index retention rate from equation (3) (marked as "b - Fund").

the deviations of the calculated ROE from the actual (unobservable) average ROE. Unlike the previous case, here the simulation reveals a positive systematic deviation, with an average value of 0.5% to 1%. Whether such deviation has implications on my results will be discussed at a later stage.

Results

The results of the comparison between the calculated R and the actual ROE, for the end of December 2011, are presented in table 2a.

In order to calculate R, it is necessary to determine the expected rate of return, which is the sum of the risk free rate (rf) and the equity risk premium. There are several estimates of the risk premium; I chose the highest of them - 6.5% which was calculated by Goetzmann & Ibboston [4].

In the first part of table 2a, I used the current yield on 10 years US government bonds (currently 1.9%) as the risk free rate. The respective expected rate of return is 8.4%. The calculated R, based on this rate of return, varies between 9% to 10%. In comparison, the historical level of the return on equity was much higher: 12% - 18%. However, such high level of return on equity is only typical to the last fifteen years. Data presented by Campbell show that during the eighties and the early nineties the return on equity was in the range of 8% - 10%, not far from the calculated levels of R [5].

In the second part of table 2a, I used a higher risk free rate (5%), based on the notion that investors relate to the current low yields of government bonds as temporary and their expected rate of return is based on the long term return of government bonds. Based on the higher expected rate of return (11.5%), the calculated R is in the range of 13% - 14%. This level of R is in accordance with the historical return on equity in the last fifteen years, but somewhat higher if the comparison is made with earlier periods.

The results of the comparison of R to the historical return on equity are not conclusive. On one hand the levels of R seem quite low compared to the return on equity that we used to see since the mid-nineties; on the other hand, we cannot exclude the possibility that long term return on equity will be much lower in the future. In other words, the US market looked cheap at the end of 2011 only if we believe that the shift in the long term return on equity, which occurred in the mid-nineties, is permanent.

The cross-section comparison of the figures in table 2a are much more revealing. Here I compared the computed level of R to the actual ROE of each index. The calculation of the actual ROE is based on its definition as the ratio between earnings (E) and book value (B).

The actual ROE varies in a wide range: 20.6% for the growth index (IVW) and 12.4% for the fundamental (value) index (PRF). This should not come as a surprise since growth companies are expected to generate higher return on equity in order to maintain their growth prospects. The comparison of the calculated R to the actual ROE reveals large disparity between the indexes (the right column in table 2a). Regardless of the assumption about the correct expected rate of return, the growth index (IVW) stands out with a very high difference between ROE and R.

Discussion

What is the interpretation the difference ROE - R?

It is the extent to which profitability can decrease, but to be still in accordance with the current level of prices. If we use the current yield on government bonds as a the risk free rate, the current price of the growth index (IVW) will be in accordance with the index's fundamental values, even if the return on equity will go down from 20% to 10% (which implies a decrease of 50% in earnings). In the same manner, if we use the long term risk free rate, then the current price of IVW will be in accordance with the index's fundamental values, even if the return on equity will go down from 20% to 13% (which implies a decrease of 35% in earnings). Thus, we can think of the difference ROE - R as the "margins of safety" (using Benjamin Graham's terminology)

Growth: P/E=15-40; P/B=2.0-5.0					Blend: P/E=10-20; P/B=1.0-2.5					Value: P/E=5-15; P/B=0.5-1.5				
P/E	P/B	ROE-Average	ROE-Fund	Difference	P/E	P/B	ROE-Average	ROE-Fund	Difference	P/E	P/B	ROE-Average	ROE-Fund	Difference
28.5	3.6	13.6%	12.6%	1.1%	14.5	1.7	12.7%	11.9%	0.7%	9.5	1.0	11.3%	10.5%	0.8%
28.1	3.7	14.1%	13.1%	1.0%	16.1	1.9	12.0%	11.8%	0.2%	10.1	0.9	9.5%	8.8%	0.6%
29.6	3.4	12.4%	11.5%	0.9%	14.7	1.9	13.3%	12.8%	0.5%	9.0	1.1	12.8%	11.8%	1.0%
25.5	3.0	13.4%	11.8%	1.6%	14.6	1.5	11.0%	10.4%	0.6%	9.2	0.9	10.9%	10.1%	0.8%
27.5	3.5	14.5%	12.7%	1.8%	15.7	1.7	11.3%	10.7%	0.5%	11.0	0.9	9.1%	8.2%	1.0%
26.6	3.4	13.5%	12.7%	0.8%	14.7	1.8	12.8%	12.1%	0.7%	10.3	1.0	9.9%	9.2%	0.7%
26.8	3.7	14.8%	13.9%	0.9%	16.5	1.7	10.9%	10.4%	0.5%	9.7	0.9	10.7%	9.6%	1.1%
27.1	3.5	13.3%	13.0%	0.3%	15.6	1.7	11.6%	11.1%	0.4%	9.9	1.1	11.8%	10.9%	0.9%
24.8	3.5	15.4%	14.3%	1.1%	14.7	1.6	11.4%	10.9%	0.5%	8.5	0.9	12.7%	10.9%	1.8%
27.0	3.5	13.4%	13.0%	0.4%	15.0	1.7	12.2%	11.6%	0.6%	8.7	1.0	13.0%	11.6%	1.5%
27.9	3.4	13.1%	12.0%	1.0%	15.9	1.8	11.4%	11.1%	0.3%	10.4	0.9	9.3%	8.9%	0.4%
28.3	3.4	12.4%	12.0%	0.4%	14.6	1.6	11.6%	11.3%	0.3%	10.0	1.0	11.5%	10.2%	1.3%
27.7	3.4	13.6%	12.4%	1.2%	15.1	1.7	11.5%	11.1%	0.4%	10.7	1.1	11.5%	10.5%	1.0%
25.6	3.7	15.3%	14.4%	0.9%	15.5	1.7	11.5%	10.9%	0.6%	10.3	1.1	11.5%	10.3%	1.1%
28.7	3.7	14.1%	12.9%	1.2%	14.9	1.9	13.2%	12.4%	0.7%	9.3	1.0	11.4%	10.8%	0.6%
29.0	3.5	13.0%	12.0%	1.0%	15.2	1.7	11.7%	11.1%	0.6%	9.7	1.0	12.6%	10.8%	1.8%
28.5	3.2	12.1%	11.4%	0.7%	14.8	1.7	12.1%	11.7%	0.4%	9.1	0.9	11.4%	10.3%	1.2%
27.2	3.4	13.9%	12.6%	1.3%	15.6	1.9	12.6%	12.0%	0.7%	10.0	0.9	11.1%	9.4%	1.7%
28.2	3.1	11.9%	10.8%	1.0%	14.5	1.9	13.7%	13.3%	0.4%	9.6	1.0	10.9%	10.0%	0.9%
27.7	3.7	14.9%	13.3%	1.6%	14.6	1.6	11.6%	11.2%	0.4%	9.4	0.8	10.1%	8.9%	1.2%
Average				1.0%					0.5%					1.1%

Table 1b: Random P/E and P/B and average ROE (marked as "ROE - Average") and the index ROE from equation (4b) (marked as "ROE - Fund").

Dec-11										
rf = 1.9% r = 8.4%										
Ticker	Index	No.of Stocks	Style	P/E	P/B	D/P	b	ROE	R	ROE-R
SPY	S&P500	500	Large-Blend	13.6	1.95	2.05%	72.2%	14.4%	9.7%	4.7%
IVW	S&P500 Growth	279	Large-Growth	15.6	3.21	1.62%	74.8%	20.6%	10.2%	10.5%
PRF	FTSE-RAFI	993	Large- Value	12.8	1.58	2.06%	73.7%	12.4%	9.3%	3.1%
rf = 5.0% r = 11.5%										
Ticker	Index	No.of Stocks	Style	P/E	P/B	D/P	b	ROE	R	ROE-R
SPY	S&P500	500	Large-Blend	13.6	1.95	2.05%	67.0%	14.4%	13.7%	0.7%
IVW	S&P500 Growth	279	Large-Growth	15.6	3.21	1.62%	82.2%	20.6%	13.1%	7.5%
PRF	FTSE-RAFI	993	Large- Value	12.8	1.58	2.06%	67.2%	12.4%	13.1%	-0.7%

Table 2a: Comparison between the calculated R and the actual ROE, for the end of December 2011.

Nov-08										
rf = 2.2% r = 8.7%										
Ticker	Index	No.of Stocks	Style	P/E	P/B	D/P	b	ROE	R	ROE-R
SPY	S&P500	500	Large-Blend	10.7	1.52	3.09%	67.0%	14.2%	9.8%	4.4%
IVW	S&P500 Growth	314	Large-Growth	10.5	2.05	1.69%	82.2%	19.5%	9.6%	9.9%
PRF	FTSE-RAFI	984	Large- Value	10.4	1.13	3.14%	67.2%	10.8%	9.0%	1.8%
rf = 5.0% r = 11.5%										
Ticker	Index	No.of Stocks	Style	P/E	P/B	D/P	b	ROE	R	ROE-R
SPY	S&P500	500	Large-Blend	10.7	1.52	3.09%	67.0%	14.2%	13.0%	1.3%
IVW	S&P500 Growth	314	Large-Growth	10.5	2.05	1.69%	82.2%	19.5%	12.7%	6.8%
PRF	FTSE-RAFI	984	Large- Value	10.4	1.13	3.14%	67.2%	10.8%	12.0%	-1.1%

Table 2b: Comparison between the calculated R and the actual ROE, for the end of November 2008.

Accumulated total return 11/08-12/11		
Ticker	Index	
SPY	S&P500	54.4%
IVW	S&P500 Growth	63.8%
PRF	FTSE-RAFI	75.9%

Table 3: Cumulative total return (capital gains and dividends) of the three indexes for a period of three years/

between the price of the index and its fair value. The higher the value of ROE - R the cheaper is the price of the index in relation to its fair value.

The analysis in table 2a applies the concept of Value Investing to indexes and consequently to ETFs. The, somewhat, surprising conclusion for the US stock market is that the growth index seems to be cheaper than the blend and value indexes.

Has the difference in the “margins of safety” between the three indexes changed over time?

Unfortunately data sets of value ratios for various indexes are not readily available and have to be constructed. Based on such data set, table 2b presents the same calculation for the end of November 2008.

The results are very similar to those in table 2a, and point to the same conclusion: it seems that the growth index (IVW) had higher “margins of safety” at the end of 2008 too.

In the previous section I have shown the existence of deviations of the calculated ROE from the actual (unobservable) average ROE. However, this systematic deviation does not change the conclusions of the analysis. The “margins of safety” that were used to measure which index is relatively cheaper, were computed as the difference between the calculated ROE and R. Thus, if the actual (unobservable) average ROE is systematically larger than the calculated ROE the “margins of safety” are even larger than the model predicts.

Conclusions

One would expect that the “undervaluation” of the growth index will be reflected in superior returns over time. However, testing the ability of any methodology to predict returns requires comprehensive data sets over a long period of time. Unfortunately data sets which are needed for the methodology that I presented here are not easy to come by.

Table 3 presents the cumulative total return (capital gains and dividends) of the three indexes for a period of three years.

The results seem to be mixed: on one hand the return of the growth index (IVW) is higher than the respective return of the blend index (SPY); on the other hand the value index (PRF) provided the highest return, in spite of the fact that its “margins of safety” were the lowest.

Notwithstanding, a period of three years is definitely too short to draw any conclusion. Additional analysis of more extensive data sets is required in order to conclude whether the methodology of “margins of safety” can predict future returns of indexes.

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