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Abstract

I propose a fast and parsimonious way to estimate the implied rate of return on common equity of single stocks and indexes, resulting from the combination of two easily computable ratios.

KEYWORDS: Earnings Yield, Implied Cost of Equity, Price Earnings Ratio, Quadratic Roe Ratio, Roe Discount Model

I propose a fast and parsimonious way to estimate the implied rate of return on common equity of single stocks and indexes, resulting from the combination of two easily computable ratios.

The first ratio is the (EY) Earnings Yield rate, a well known and used measure of return, the second ratio is a brand new one, the QRR (Quadratic Roe Ratio) that, luckily, is just as easy to compute that the first ratio.

The first part of the formula: the Equity Yield

The inverse of the Price Earnings ratio, the Equity Yield rate, is a direct measure of return to the shareholder, expressed in percentage form and so directly comparable with bond return.

$$Ke = \frac{Eps_1}{P_0} \quad (1)$$

Where Eps_1 is the Earnings per share forecasted on the next 12 months and P_0 is the current price of the share.

Unfortunately, when the payout is lower than 100%, the formula produces a downward biased estimate. Its value is at the low end of the range of plausible estimates.

The second part of the formula: the QRR rate

The QRR (Quadratic Roe Ratio) is a new, fast and easy, equity valuation formula, based on a single parameter: the Roe.

The formula is extremely simple: $$PB = \frac{Roe^2}{Ke^2} \quad (2)$$

Where PB is the ratio of $P_{0,}$ the current price of the share, divided by Bps_0, the latest book value of the share available. Roe is the ratio of the net income of the firm (trailing or forecasted) divided by the shareholders' equity. Ke is the implied market return.

From the (2) formula we can directly compute the value of Ke:

$$Ke = \frac{Roe}{\sqrt{PB}} \quad (3)$$

The (3) formula is an indirect derivation of the Easton (2003) formula:

$$Ke = \sqrt{\frac{Eps_2 - Eps_1 + Ke * Dps_1}{P_0}} \quad (4)$$

where we impose Payout = 0 and a constant return of equity during the next 12 and 24 months, with $Roe_1 = Roe_2$.

QRR computation doesn't make use of dividends, buybacks or growth estimates.

QRR has been developed for a correct valuation of not dividend paying stocks.

Unfortunately, when used to evaluate dividend paying companies, it produces upward biased results. Its value is at the high end of the range of plausible estimates.

The combined formula: the RDM

So we have a good formula to evaluate 100% paying out shares, and another that's good for evaluating zero dividend paying firms.

I propose a way to get the right valuation formula starting from these two flawed ones, overcoming the limitation of the two components

The solution is straight and consists of simply combining both of them with a weighting equal to the actual payout rate of the stocks we are trying to evaluate (and portfolios and indexes as well).

I name this blended valuation as Roe Discount Model.

The RDM formula is the following:

$$Ke = \frac{Roe}{PB} * PY + \frac{Roe}{\sqrt{PB}} * (1 - PY) \quad (5)$$

Where the first half expresses the return of the dividend stream and the second half the return of the growth component.

PY is the current payout of earnings, in percent.

An alternative formulation, using Eps, Dps and Bps instead of Roe and PB is the following:

$$Ke = \frac{\frac{Eps_1}{Bps_0}}{\frac{P_0}{Bps_0}} * PY + \frac{\frac{Eps_1}{Bps_0}}{\sqrt{\frac{P_0}{Bps_0}}} * (1 - PY) \quad (6)$$

equivalent to the simpler:

$$Ke = \frac{Eps_1}{P_0} * PY + \frac{Eps_1}{\sqrt{P_0 * Bps_0}} * (1 - PY) \quad (7)$$

The pricing formula is the following:

$$P_0 = \frac{Eps_1 * PY}{Ke} + \frac{\left[Eps_1 * \sqrt{\frac{P_0}{Bps_0}} * (1 - PY) \right]}{Ke} \quad (8)$$

Where the first half expresses the value of actualized dividend stream and the second half the value of the growth component.

The rationale of mixing valuation methods

Since each company is free to choose its own payment policy, I assume two extreme scenarios.

In the first case the firm pays out all the earned profit as dividends.

In the second case the firm keeps all the money inside.

As we have a good way to calculate the implied return of these special cases, we can estimate the implied return of the whole firm by taking the (weighted) average of these two extreme returns.

Limitations and defects

The Roe Discount Model requires that you insert the forecast of the value of two parameters into the formula (Roe and Payout or Eps and Dps, depending to the chosen version), so which

number are we going to use?

Differently from the many other more data-hungry valuation methods, that require the estimate and forecast of many data on a multi-year horizon, we just need two figures.

It is very similar to the single figure required for the most used valuation method: the PE.

The problem is: which number are we going to use?

It is the same problem that you run into with the data to put into the Terminal Value estimate when doing a DCF valuations, but applied now and not 5 years from now.

By the way, RDM looks particularly valuable in this case, since the standard formula

$$TV = \frac{E_n + g}{Ke - g} \quad (9)$$

is quite a lot sensitive to growth rate assumptions.

Ideal solution: we should get and use an estimate of the most probable foreseeable future for the firm, the sector and the economy.

Good solution: next year forecast, adjusted for analysts' optimistic bias and sector cyclically profitability.

Just acceptable solution: trailing actual data of the latest 4 quarters, smoothed and corrected for non recurring financial items.

You can not escape it, when you use a thrifty formula, such as the one proposed here (or the PE ratio), what you gain with a very simple mathematics, you pay with a high sensitivity to the chosen value.

Some few data to check the numbers

To check the plausibility of the numbers coming out from the RDM, I paired its estimates to the estimates published by Aswath Damodaran, Professor of Finance at the Stern School of Business at New York University.

The sample is formed by 41 observations of trailing Eps and Dps of the 500 S&P index,

covering a horizon starting January 1, 2010 and ending January 1, 2020.

The data are exposed in Table 1 and Figure 1.

The mean (median) implied cost of equity estimated respectively by Damodaran and by the Roe Discount Model is 8,14% (8,09%) and 8,15% (8,43%).

The standard deviation is respectively 0,51% and 1,61%, with RDM showing a descending trend while Damodaran's estimates are not showing any discernible trend.

I also employed the Roe Discount Model to make a one time estimate of the implied cost of equity of the components of the Dow Jones index.

This time I used the analysts' forecasts, adjusted to a 12 months fixed horizon.

The data are exposed in Table 2.

The mean (median) implied cost of equity, estimated on 24 of the 30 companies included in the index, is 8,25% (8,41%).

For 6 firms I couldn't make any estimate as their book value was negative (Home Depot, McDonald's and Boeing) or the expected earnings are lower than dividends (Dow, Chevron and Exxon), preventing the use of the RDM formula.

I emphasize that since I used as input the consensus of analysts' forecasts, results are for sure higher than the correct ones.

Untabulated results show that, using as input the mean of trailing and forecasted 12 and 24 months data, there is a reduction of the dispersion of results vs using single year data.

Summary and conclusion

I describe a model able to obtain estimates of the cost of equity capital using as input only four parameters: current price, latest book value, forecast of earnings and dividends.

The model produces reasonable results, in line with third parts estimates.

I'm the first to admit that I have presented only an anecdotal prove of the utility of the new valuation formula, whose greatest merit is for now its simpleness.

A lot of statistical work has to be done to find out whether the estimates of the implied cost of equity produced by the Roe Discount Model are of some value.

We need to know how much its results are accurate, reliable and unbiased and may satisfy the need of scholars and practitioners as a tool to predict the future return of investments.

Particularly we need to compare the actual return of RDM based portfolios vs more elaborated models as the dividend discount models, residual income valuation models, abnormal growth models or simple heuristic methods as the ranking by PE or PEG.

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Table 1
S&P500 Data and Implied Equity Returns

Date	S&P500 Price	S&P500 Bps	S&P500 Eps Trailing	S&P500 Dps Trailing	ROE	PY	PB	US 10Y Treasury Rate	EY	QRR	RDM	DKE
Jan 1, 2009		451,37										
Apr 1, 2009		449,43										
Jul 1, 2009		488,09										
Oct 1, 2009		498,43										
Jan 1, 2010	1.123,58	513,58	60,51	26,60	13,41%	44%	2,19	3,73%	5,39%	9,06%	7,45%	8,09%
Apr 1, 2010	1.197,32	531,35	72,18	25,80	16,06%	36%	2,25	3,85%	6,03%	10,70%	9,03%	8,01%
Jul 1, 2010	1.080,20	542,00	79,33	25,92	16,25%	33%	1,99	3,01%	7,34%	11,51%	10,15%	8,11%
Oct 1, 2010	1.171,58	568,35	84,34	26,24	16,92%	31%	2,06	2,54%	7,20%	11,79%	10,36%	7,85%
Jan 1, 2011	1.283,02	579,14	90,48	26,59	17,62%	29%	2,22	3,39%	7,05%	11,84%	10,43%	8,59%
Apr 1, 2011	1.331,51	594,05	93,29	26,88	17,56%	29%	2,24	3,45%	7,01%	11,73%	10,37%	8,76%
Jul 1, 2011	1.325,19	613,08	95,26	27,65	17,58%	29%	2,16	3,00%	7,19%	11,95%	10,57%	8,72%
Oct 1, 2011	1.207,22	613,18	98,29	28,46	17,29%	29%	1,97	2,15%	8,14%	12,33%	11,11%	9,79%
Jan 1, 2012	1.300,58	613,14	99,19	30,02	17,13%	30%	2,12	1,97%	7,63%	11,76%	10,51%	9,29%
Apr 1, 2012	1.386,43	633,04	99,36	30,57	16,73%	31%	2,19	2,05%	7,17%	11,30%	10,03%	8,69%
Jul 1, 2012	1.360,18	639,45	98,23	31,64	16,02%	32%	2,13	1,53%	7,22%	10,99%	9,77%	8,12%
Oct 1, 2012	1.438,22	662,33	96,24	32,78	15,70%	34%	2,17	1,75%	6,69%	10,65%	9,30%	8,10%
Jan 1, 2013	1.480,40	667,37	97,00	34,89	15,82%	36%	2,22	1,91%	6,55%	10,62%	9,16%	7,91%
Apr 1, 2013	1.571,10	679,09	97,00	35,37	15,32%	36%	2,31	1,76%	6,17%	10,07%	8,65%	7,44%
Jul 1, 2013	1.669,08	679,15	100,26	36,53	15,68%	36%	2,46	2,58%	6,01%	10,00%	8,55%	8,31%
Oct 1, 2013	1.720,03	693,22	103,33	37,67	15,60%	36%	2,48	2,62%	6,01%	9,90%	8,48%	8,21%
Jan 1, 2014	1.822,36	716,24	110,24	38,50	16,52%	35%	2,54	2,86%	6,05%	10,36%	8,85%	7,82%
Apr 1, 2014	1.864,26	718,21	109,43	39,31	16,11%	36%	2,60	2,71%	5,87%	10,00%	8,52%	7,86%
Jul 1, 2014	1.973,10	734,24	111,33	40,21	16,39%	36%	2,69	2,54%	5,64%	10,00%	8,43%	7,92%
Oct 1, 2014	1.937,27	737,18	114,13	41,46	16,46%	36%	2,63	2,30%	5,89%	10,16%	8,61%	7,73%
Jan 1, 2015	2.028,18	727,36	112,11	43,07	15,65%	38%	2,79	1,88%	5,53%	9,37%	7,90%	7,66%
Apr 1, 2015	2.094,86	729,29	108,17	44,31	15,06%	41%	2,87	1,93%	5,16%	8,89%	7,36%	7,79%
Jul 1, 2015	2.094,14	736,30	102,37	44,85	13,94%	44%	2,84	2,32%	4,89%	8,27%	6,79%	8,13%
Oct 1, 2015	2.024,81	745,08	98,09	45,81	13,31%	47%	2,72	2,07%	4,84%	8,07%	6,56%	8,70%
Jan 1, 2016	1.918,60	740,29	94,20	47,03	12,95%	50%	2,59	2,09%	4,91%	8,04%	6,48%	8,21%
Apr 1, 2016	2.075,54	753,17	93,07	47,24	12,76%	51%	2,76	1,81%	4,48%	7,69%	6,06%	8,05%
Jul 1, 2016	2.148,90	765,12	92,46	47,30	12,56%	51%	2,81	1,50%	4,30%	7,49%	5,86%	7,77%
Oct 1, 2016	2.143,02	780,01	95,01	47,82	12,75%	50%	2,75	1,76%	4,43%	7,69%	6,05%	7,92%
Jan 1, 2017	2.275,12	769,38	100,41	48,53	13,56%	48%	2,96	2,43%	4,41%	7,89%	6,21%	8,12%
Apr 1, 2017	2.359,31	785,18	105,47	48,78	14,00%	46%	3,00	2,18%	4,47%	8,08%	6,41%	7,56%
Jul 1, 2017	2.454,10	799,04	109,28	49,42	14,28%	45%	3,07	2,32%	4,45%	8,15%	6,48%	7,45%
Oct 1, 2017	2.557,00	818,22	111,23	50,04	14,26%	45%	3,13	2,36%	4,35%	8,07%	6,39%	7,28%
Jan 1, 2018	2.789,80	826,52	114,28	50,89	14,85%	45%	3,38	2,58%	4,10%	8,08%	6,31%	7,66%
Apr 1, 2018	2.653,63	833,44	119,00	51,37	15,16%	43%	3,18	2,87%	4,48%	8,49%	6,76%	8,06%
Jul 1, 2018	2.793,64	836,39	125,02	51,88	15,65%	41%	3,34	2,89%	4,48%	8,56%	6,87%	8,26%
Oct 1, 2018	2.785,46	843,58	132,43	53,16	16,19%	40%	3,30	3,15%	4,75%	8,91%	7,24%	8,53%
Jan 1, 2019	2.607,39	852,02	135,11	54,85	16,35%	41%	3,06	2,71%	5,18%	9,34%	7,65%	8,67%
Apr 1, 2019	2.903,80	868,42	135,55	55,41	16,26%	41%	3,34	2,53%	4,67%	8,89%	7,17%	8,28%
Jul 1, 2019	2.996,11	885,14	135,40	56,13	16,19%	41%	3,38	2,06%	4,52%	8,80%	7,02%	7,73%
Oct 1, 2019	2.977,68	903,34	133,11	57,14	15,78%	43%	3,30	1,71%	4,47%	8,69%	6,88%	7,26%
Jan 1, 2020	3.278,20	914,49	139,15	58,40	16,33%	42%	3,58	1,76%	4,24%	8,63%	6,79%	6,96%
Median					15,68%	36%	2,60	2,36%	5,64%	9,90%	8,43%	8,09%
Mean					15,39%	39%	2,60	2,45%	5,72%	9,67%	8,15%	8,14%
Std. Dev.					1,48%	7%	0,41	0,59%	1,15%	1,48%	1,61%	0,51%

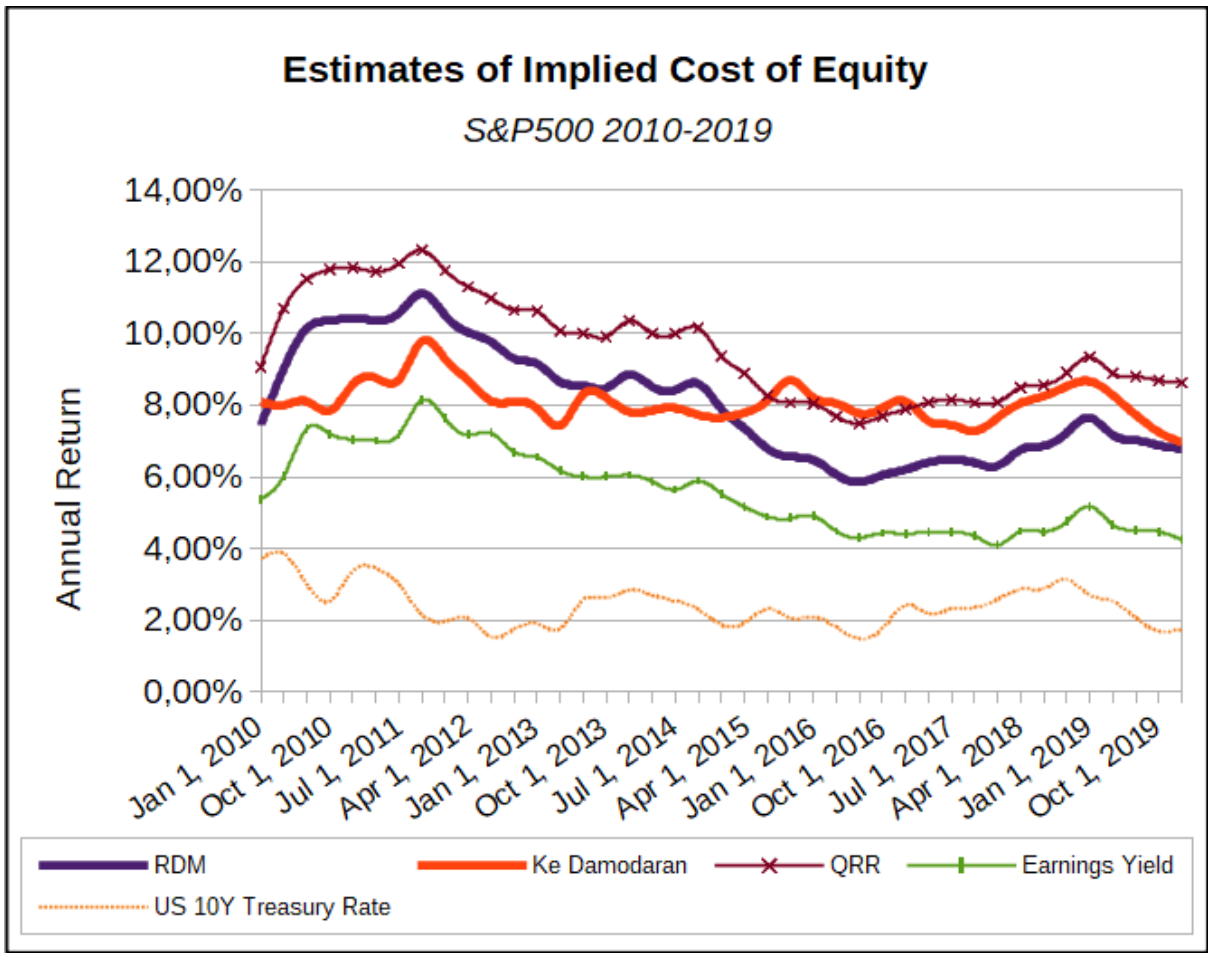
EY: Earnings Yield, QRR: Quadratic Roe Return, RDM: Roe Discount Model,
DKE: Damodaran's Equity Cost (Trailing 12 m Equity Risk Premium + US 10Y Treasury rate);
Source 1: https://www.multpl.com/s-p-500-pe-ratio
Source 2: http://www.stern.nyu.edu/~adamodar/pc/implprem/ERPbymonth.xlsx

Table 2
Dow Jones Components, Implied Equity Return at 19 Jun 2020

19. Jun. 2020	Price	Bps 0	Eps 12	Dps 12	ROE 12	PY 12	PB 0	EY	QRR	RDM
Apple	349,72	16,31	14,12	3,39	86,60%	24,0%	21,44	4,04%	18,70%	15,18%
American Express	100,94	27,01	4,85	1,78	17,95%	36,8%	3,74	4,80%	9,29%	7,64%
Boeing	187,02	-9,01	2,49	0,95						
Caterpillar	127,46	26,22	6,23	4,35	23,77%	69,7%	4,86	4,89%	10,78%	6,67%
Cisco	45,32	8,47	2,67	1,48	31,57%	55,4%	5,35	5,90%	13,65%	9,35%
Chevron	90,63	74,00	0,94	5,20						
Walt Disney	114,35	48,97	2,20	1,27	4,49%	57,6%	2,34	1,92%	2,94%	2,35%
Dow	41,65	17,32	1,53	2,88						
Goldman Sachs	201,63	225,05	16,98	5,13	7,54%	30,2%	0,90	8,42%	7,97%	8,11%
Home Depot	246,65	-2,26	10,30	6,01						
IBM	122,47	25,55	9,62	6,50	37,66%	67,5%	4,79	7,86%	17,20%	10,89%
Intel	59,62	18,75	4,60	1,36	24,55%	29,6%	3,18	7,72%	13,77%	11,98%
Johnson & Johnson	143,83	23,30	7,41	4,11	31,82%	55,5%	6,17	5,15%	12,80%	8,56%
JPMorgan Chase	97,81	76,19	6,68	3,68	8,77%	55,1%	1,28	6,83%	7,74%	7,24%
Coca-Cola	46,02	4,27	1,98	1,67	46,37%	84,5%	10,77	4,30%	14,13%	5,83%
McDonald's	186,56	-11,65	6,80	5,30						
3M	158,15	18,57	8,46	5,94	45,55%	70,2%	8,52	5,35%	15,61%	8,41%
Merck	77,90	10,71	4,62	2,47	43,18%	53,5%	7,28	5,93%	16,01%	10,61%
Microsoft	195,15	15,34	6,18	2,16	40,32%	34,9%	12,72	3,17%	11,30%	8,47%
Nike	95,78	5,56	2,21	0,94	39,71%	42,8%	17,24	2,30%	9,56%	6,46%
Pfizer	33,42	11,82	2,06	1,54	17,42%	74,7%	2,83	6,16%	10,36%	7,22%
Procter & Gamble	118,92	19,10	5,15	3,20	26,99%	62,2%	6,23	4,33%	10,82%	6,79%
Raytheon	64,89	52,81	2,71	2,01	5,14%	74,0%	1,23	4,18%	4,63%	4,30%
Travelers	116,56	102,00	9,57	3,47	9,38%	36,3%	1,14	8,21%	8,78%	8,57%
UnitedHealth	291,24	64,76	16,32	4,76	25,21%	29,1%	4,50	5,61%	11,89%	10,06%
Visa	192,20	16,51	5,69	1,31	34,47%	23,0%	11,64	2,96%	10,10%	8,46%
Verizon	56,16	15,55	4,66	2,51	29,99%	53,9%	3,61	8,30%	15,78%	11,75%
Walgreens Boots A.	44,13	30,70	4,83	1,91	15,73%	39,5%	1,44	10,94%	13,12%	12,26%
Walmart	119,85	26,82	5,27	2,23	19,63%	42,4%	4,47	4,39%	9,29%	7,21%
Exxon	45,98	43,08	0,01	3,50						
Median					26,10%	53,7%	4,65	5,25%	11,06%	8,44%
Mean					28,07%	50,1%	6,15	5,57%	11,51%	8,52%
Std. Dev.					17,99%	17,8%	5,26	2,19%	3,81%	2,75%

Bps 0: Current Bps estimate, Eps 12: Forecasted Eps computed on a fixed 12 months horizon, Dps 12: Forecasted Dps computed on a fixed 12 months horizon, PY 12: Payout computed on a fixed 12 months horizon, ROE 12: Eps 12/ Bps 0, EY: Earnings Yield, QRR: Quadratic Roe Return, RDM: Roe Discount Model;
Source: https://www.marketscreener.com

Figure 1
S&P500 Estimates of Implied Cost of Equity



RDM: Roe Discount Model, Ke Damodaran: Damodaran's Equity cost (Trailing 12 month Equity Risk Premium + US 10Y Treasury rate), QRR: Quadratic Roe Return;
Source 1: https://www.multpl.com/s-p-500-pe-ratio
Source 2: http://www.stern.nyu.edu/~adamodar/pc/implprem/ERPbymonth.xlsx