A HOW-TO GUIDE ON CALCULATING TOTAL SHAREHOLDER RETURN

By Terry Adamson, Paul Goings and Dan Kapinos

Overview

The calculation of Total Shareholder Return is *not* trivial

As highlighted in past Radford Reviews, companies continue to issue performance equity that vest contingent on the Total Shareholder Return (TSR), either on an absolute or relative basis[1]. TSR calculation is *not* trivial, and there are complicated nuances to consider. We at Radford have observed a variety of methodologies used to calculate TSR, and we believe companies ultimately will converge to a single "best practice." This review is intended to provide our opinion of what that future best practice should be.

The Dividend Challenge

Treatment of dividends is one of the challenges of calculating TSR. Otherwise, this calculation would be straightforward, and TSR would be the ratio of the stock price(s) at the end of the performance period (generally with an averaging period) to the stock price(s) at the beginning of the performance period (generally with an averaging period also). However, TSR should reflect dividends paid during the performance period, since shareholders also receive those gains. In general, a stock's price drops the day the ex-dividend period starts, since the buyer will not receive the benefit of the dividend payout until the next dividend date. As the next dividend date approaches, the stock price may gradually rise in anticipation of the dividend.

There are four dates to conceptually be aware of with respect to dividends:

- Declaration Date: The date on which a company announces an upcoming dividend payment, usually by issuing a press release a few weeks before the dividend is actually paid;
- Ex-Dividend Date: After the record date has been determined, then the ex-dividend date is assigned. The ex-dividend date for stocks is typically two business days prior to the record date. If an investor buys a stock before the ex-dividend date, then he or she will receive the dividend payment. If an investor purchases the stock on or after the ex-dividend date, then he or she is not entitled to receive the dividend;

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[1] For a complete listing of companies who have incorporated performance awards based on Relative Total Shareholder Return, visit our web portal at www.RelativeTSR.com

> Record Date: A dividend record date is the date on which the company finalizes the list of investors who qualify as "shareholders of record." Investors listed as shareholders of record will receive the firm's dividend payment; and the

Theoretically, dividends should be based on the ex-dividend date

> Payable Date: A dividend payable date is the date on which a company pays a dividend to its shareholders of record.

In our experience, we have observed that companies calculate TSR using the Ex-Dividend Date, the Record Date, and/or the Payable Date. Theoretically, the appropriate calculation of TSR should assume that dividends are re-invested on the Ex-Dividend Date, as it represents the date that a dividend asset is guaranteed.

The Averaging Period Challenge

Calculation of TSR is eased using a single day spot rate, while use of an averaging period makes the calculation significantly more time-consuming. Use of an averaging period requires collection of more data and the calculation of accumulated shares for every day in the performance period. Reviewing our research database on averaging periods at www.RelativeTSR.com (based on more than 420 companies), we have observed that the median Averaging Period is 20 days, and the mean Averaging Period is 39 days.

Percentile	Performance Period Length (Years)	Averaging Period (Days)
25th Percentile	3	10
Average	3	39
Median	3	20
75th Percentile	3	30

Note that Radford believes the use of an averaging period is a strategically preferable design that minimizes the risk of a single day extreme impacting the measurement of long-term shareholder return. An example of the calculation can be found on Page 4.

Alternative Observed Methodologies

As described, we have seen multiple approaches for calculating TSR, and have summarized some of them below:

No Dividend Re-investments

Some companies use an approach such that dividends are only accumulated during the Performance Period and not reinvested. For example, note the Covidien Ltd. (with link to SEC filing) plan design:

Total Shareholder Return for the Company and each company in the Healthcare Industry Index shall include dividends paid and shall be determined as follows:

Total Shareholder Return = "(Change in Stock Price + Dividends Paid)/Beginning Stock Price" where "Dividends Paid" means the total of all dividends paid on one (1) share of stock during the Performance Cycle.

We cannot think of any theoretical reasons why a company would not re-invest dividends for this calculation, except for the practical reasons of easing the administrative burden. However, with modern technologies, the calculation time and processes should be eased, and this should generally not be a concern.

Average of Years

As an example, Boston Scientific (with link to SEC Filing) used this approach in a recent plan design,

"Total Shareholder Return will be defined as the change in stock price plus dividends paid over the average closing stock price for the last 60 days of the calendar year prior to the year in which the grant is made. At the end of the three year performance period, final Total Shareholder Return will be calculated using the simple average of the three annual performance cycles."

There have been arguments that the "average of years" could be more appropriate for certain cyclical industries. However, we are concerned that this approach could yield favorably skewed results for volatile companies. For example, consider the returns of two alternative companies, both starting at a $10 stock price:

	Company ABC		Company XYZ	
	Return	Stock Price	Return	Stock Price
Year 1	50.00%	$15.00	10.00%	$11.00
Year 2	(50.00)%	$7.50	10.00%	$12.10
Year 3	33.33%	$10.00	10.00%	$13.31
Simple Average	11.11%		10.00%	
Actual Return	0.00%		33.10%	

Note that Company ABC would rank higher than Company XYZ in their relative rank because it ignores the compounding effect of TSR returns, however, ultimately Company XYZ yields a better return to shareholders.

Volume Weighted Average Prices (VWAPs)

Some very-thinly traded stocks may use a Volume Weighted Average Price (VWAP) for the Averaging Period calculation. For example, see the disclosure of Sims Metal Management (with link to SEC filing):

"TSR is calculated in each case on the following basis:
> *dividends are re-invested at the ex-dividend date;*
> *share prices are calculated as a volume weighted average sale price of shares for the three months preceding the start and end dates of the performance period;"*

Given that an averaging period is already being used, we don't believe that the use of a VWAP is necessary, except for the case of extremely thinly traded stocks. An example of a VWAP calculation can be found within the Example on the subsequent page.

Radford's Opinion of "Best Practice" – An Example

We believe that the most common methodology for calculating TSR uses point-to-point periods and assumes that dividends will be reinvested on the ex-dividend date. The example below illustrates methodology to calculate a 10-day average TSR over the 1/1/2007 – 12/31/2009 period. The calculation can be completed using the three steps on the next page.

Step 1: Calculate the accumulated number of shares assuming dividends are re-invested on the ex-dividend date. In the Example below, a single share accumulates to 1.0441 shares after re-investing for dividends.

t Ex-Dividend Date	S_t Stock Price	D_t Actual Divs	P_t Shares Purchased	AP_t Mo. Acc. Divs
10/29/2009	$41.19	$0.15	0.0036	1.0441
7/30/2009	$39.64	$0.15	0.0038	1.0404
4/29/2009	$41.43	$0.15	0.0036	1.0367
1/29/2009	$37.96	$0.15	0.0040	1.0330
10/30/2008	$38.10	$0.15	0.0039	1.0291
7/30/2008	$45.38	$0.15	0.0033	1.0251
4/29/2008	$46.00	$0.15	0.0033	1.0218
1/30/2008	$42.72	$0.15	0.0035	1.0186
10/30/2007	$45.22	$0.15	0.0033	1.0151
7/30/2007	$40.52	$0.15	0.0037	1.0118
4/27/2007	$39.26	$0.15	0.0038	1.0081
1/30/2007	$35.45	$0.15	0.0042	1.0042
1/1/2007				1.0000

Step 2: Calculate the average Asset Value at the Beginning and at the End of the period.

End of Performance Period					Beginning of Performance Period				
t Meas. Date	S_t Stock Price	V_t Volume	AP_t Mo. Acc. Divs	AV_t Asset Value	t Meas. Date	S_t Stock Price	V_t Volume	AP_t Mo. Acc. Divs	AV_t Asset Value
12/31/2009	$38.34	949,700	1.0441	$40.03	12/29/2006	$35.34	1,072,900	1.0000	$35.34
12/30/2009	$38.74	588,500	1.0441	$40.45	12/28/2006	$35.35	784,900	1.0000	$35.35
12/29/2009	$38.77	815,000	1.0441	$40.48	12/27/2006	$35.55	1,551,600	1.0000	$35.55
12/28/2009	$38.67	1,047,700	1.0441	$40.37	12/26/2006	$35.50	860,400	1.0000	$35.50
12/24/2009	$39.06	389,200	1.0441	$40.78	12/22/2006	$35.57	978,200	1.0000	$35.57
12/23/2009	$38.67	903,500	1.0441	$40.37	12/21/2006	$35.96	1,331,500	1.0000	$35.96
12/22/2009	$38.69	1,045,300	1.0441	$40.40	12/20/2006	$35.96	1,930,300	1.0000	$35.96
12/21/2009	$38.12	1,831,400	1.0441	$39.80	12/19/2006	$35.86	1,601,500	1.0000	$35.86
12/18/2009	$37.77	2,625,600	1.0441	$39.44	12/18/2006	$36.00	1,508,500	1.0000	$36.00
12/17/2009	$37.89	1,963,400	1.0441	$39.56	12/15/2006	$36.21	2,790,800	1.0000	$36.21
Average Price with Dividends Re-invested				$40.17	Average Price with Dividends Re-invested				$35.73
Volume Weighted Average Price				$39.95	Volume Weighted Average Price				$35.82

***Step 3*:** Calculate the TSR as the ratio of the End Asset Value to the Beginning Asset Value

Total Shareholder Return

The TSR is calculated as $12.43\% = \frac{\$40.17}{\$35.73} - 1$

VWAP Total Shareholder Return

The VWAP TSR is calculated as $11.53\% = \frac{\$39.95}{\$35.82} - 1$

The mathematics behind the calculation can be found in Appendix 1.

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Conclusion

As Performance Plan designs continue to evolve in the United States, methodologies are progressing to best measure and quantify performance. We highlight in this Radford Review what we believe to be the most theoretically appropriate methodology for calculating Total Shareholder Return. Further, we believe the methodology presented can be easily incorporated into customized, web-based communication platforms. Contact your Radford consultant for further information on how Radford can help create a custom ***PeerTracker*** platform for your Relative TSR plan.

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Appendix 1: Mathematics Behind Calculating Total Shareholder Return

We believe that the most common methodology for calculating TSR is using point-to-point periods, assuming that dividends will be reinvested on the ex-dividend date.

The three steps below will calculate the TSR at each time *t* during a Performance Period using an averaging period of *x* days. Note that time 0 represents the beginning of the Performance Period.

Step 1: Since dividends are assumed to be re-invested, it is required to calculate the number of shares purchased with dividends and accumulate the purchased shares until the measurement date *t*. Therefore, on each ex-dividend date (D_t), the number of shares purchased, P_t, can be calculated as $P_t = \frac{D_t}{S_t}$. Where S_t is the stock price at time *t*. The total accumulated shares purchased through dividends at any time *t* can be calculated as $AP_t = \left(\sum_{t=0-x}^{t} P_t \right) + 1$. Note that the averaging period before the Grant Date should also include dividends, since the ex-dividends are also part of the underlying asset of the share price at that time. Lastly, we need to calculate the total value of the asset, AV_t, such that $AV_t = S_t \times AP_t$

Step 2: Next, it is required to calculate the total *x*-day Average Stock Price at the beginning of the Performance Period. At the beginning of the Performance Period, it can simply be calculated as $AS_0^x = \frac{\sum_{t=0-x}^{0} (AV_t)}{x}$, and AS_t^x, can be generalized at any time *t* (including the Terminal measurement at the end of the Performance Period) as follows:

$$AS_t^x = \frac{\sum_{t=t-x}^{t} (AV_t)}{x}$$

Step 3: Finally, the TSR with an x-day averaging period at any time *t*, TSR_t^x, can be calculated as $TSR_t^x = \frac{AS_t^x}{AS_0^x} - 1$