Financial Independence Through Dollar Cost Averaging and Dividend Reinvestments

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This paper describes how to achieve financial independence by using the Dividend Reinvestment Plan (DRIP) in conjunction with dollar cost averaging to purchase stocks of quality companies, paying increasing dividends. The formula derived in this paper uses historical data over the 15 year period from 1993 – 2007 to compute returns.

INTRODUCTION

The American dream is to work hard, play by the rules, and then be rewarded financially over the long run. Of course, to increase the probability of this long run financial reward, a graduate degree is critical if not mandatory. This dream has become a nightmare for many as unemployment among the professional classes has risen substantially, beginning with the recession of 2007 and continuing well into 2010.

The purpose of this paper is to show how one can become financially independent, which we define as the ability to do anything you want to do when you want to do it. We do this by applying the results of a previous paper (Rubin & Spaht, 2010) which dealt with dividend growth and reinvestment of dividends to that of our current research of dollar cost averaging of periodic additional investments.

According to Standard & Poor's (S&P) "The Outlook" (November 11, 2009), dividends from high-quality common stocks will become the primary financial instruments, rather than bonds, from which retirees will receive their income during the next decade. Furthermore, S&P reports that since bonds currently generate relatively low income and will continue to do so in the future, high-quality common stocks are the only choice for baby boomers' current and future investment income.

The Wall Street Journal (WSJ) reiterates the preceding line of thought in its "Personal Finance Section" (November 21, 2009), noting that dividend paying stocks have done better historically than non-dividend paying stocks. This has been the case during the bear markets of 1981-82, 1990, 2000-02, 2008, and the first quarter of 2009.

In an article in the February 2010 issue of "Kiplinger's," Dr. Jeremy Siegel, noted finance professor at University of Pennsylvania's Wharton School, states, "The evidence is overwhelming that dividend-paying stocks are still your best long-term investment." He sorted stocks in Standard & Poor's 500-stock index from January 1, 1957, until December 1, 2009, and discovered that if an investor had invested $1000 in a portfolio containing the highest dividend yielding stocks, he/she would have accumulated more than $450,000 (assuming all of the dividends had been reinvested)! This is an annualized return of

12.25%, an average return of almost 2.5 percentage points higher than the return on Standard & Poor's entire stock index.

According to an article in the September 6, 2010 issue of "Barron's," it is not time to abandon stocks. Duncan Richardson, chief investment officer of Eaton Vance, states "Over the long run, dividend investing, with or without tax implications to investors, have outperformed in almost all periods and in almost all countries. A careful study of a company's dividend payouts and policy can tell you a lot about the quality and sustainability of a company's earnings. If a company can sustain a high dividend, its stock is often less volatile. So one of the appeals of dividend-strategy investing has been that you can lower the risk of a portfolio." This line of thought indicates that, regardless of tax implications, long-term dividend investors outperform other types of investors.

In a recent study in the September 20, 2010 edition of "Barron's," Ed Clissold, an equity strategist at Ned Davis Research, makes a strong case for the dividend investing strategy. His studies show that "Since December 31, 1929, $100 invested in the price-only S&P 500 index has grown to $4,989, but to $117,774 in the S&P total return index. So out of a total return of $117,774, just $4,989, or 4.2%, has come from capital appreciation, while 95.8% has come from dividends and their reinvestment."

In an article in the November 2010 issue of "Smart Money," Glenn Ruffenach makes the case for beginning a dividend investment program early in one's life. He provides an example of investing in stocks with a three percent dividend yield at age 55. Given that the dividends increase by six percent each year for ten years, the dividend yield as a percentage of the original cost of the stocks would increase to 5.37 percent at age 65. This strategy provides a dependable increasing income stream month after month.

Once again, the case for the long-term dividend investment strategy is strongly apparent. For those investors who adopt ten and fifteen year horizons, the dividend investment strategy will lead to financial independence for life. Regardless of the direction of the market, a constant and growing dividend is a never-ending income stream. Documentation of this thesis follows.

This paper utilizes a sample of 10 stocks from the *S&P 500 Dividend Aristocrats Index* for 2010. In addition, each of the stocks (1) has a "strong buy" or "buy" recommendation from the S&P equity analysts and (2) has a record of consistently increasing dividends for at least the last 25 years.

Let us assume that a person had invested in each of these selected stocks from 1993 through 2007 with an initial investment of $5000 and then, on a quarterly basis for the next 15 years, (1) reinvested the dividends and (2) invested a fixed amount of $125 (total of $500 per year or $7,500 for the 15 year period) in each of the 10 stocks. By how much would the stock value have grown, and by how much would the dividend income have grown? *(The time period 1993 – 2007 was selected because it contains almost equally good years and bad years in the stock market. The bursting of the Tech bubble at the end of 2000 as well as the stock market highs in 2007 are both represented.)*

We begin this paper by deriving a formula referred to as the DCA-QDRIP (Dollar Cost Averaging Quarterly Dividend Reinvestment Plan) formula which is used to determine the returns for the various stocks purchased over this 15 year period. Once the formula is established, we will use it to compare the accumulation of stock value and the dividend income during the 15^{th} year with what would have been the accumulation of stock value and dividend income had the dividends not been reinvested. Output from these computations can be found in Tables 2 - 5.

DCA-QDRIP FORMULA

To derive the DCA-QDRIP (Dollar Cost Averaging Quarterly Dividend Reinvestment Plan) formula, the formula used to compute accumulations in stock value, consider an arbitrary stock and let:

P(n) = the price per share of stock during the n^{th} year (P(n) is computed by finding the average of the high and low price per share during the n^{th} year),

D(n) = the declared dividend per share of the n^{th} year,

A(n) = the dollar amount invested to purchase additional shares of stock during the n^{th} year (this value is assumed to be $125 per quarter or $500 per year in this paper),

S = the number of shares initially purchased,

S_i = the number of shares owned at the end of the i^{th} quarter,

and S_{Pi} = the number of shares purchased during the i^{th} quarter.

Two assumptions are made in the derivation of the formula. First of all, since P(n) is the average price per share of stock during the entire n^{th} year, it will remain constant and not fluctuate throughout the year. Secondly, since the dividend is normally declared annually and distributed quarterly, it also will remain constant throughout the year and not change until the first quarter of the following year. Note that since S_i is the number of shares owned at the end of the i^{th} quarter, then S_{i-1} represents the number of shares owned at the beginning of the i^{th} quarter.

Under the above assumptions, the amount of dividend (DIV(i)) generated by one share of stock and used by the investor to purchase additional shares of stock during the i^{th} quarter is:

$$\text{DIV(i)} = .25\text{D}\left(\left[\frac{\text{i-1}}{4}\right]+1\right),$$

where [ ] denotes the greatest integer function. Also, the price (PRICE(i)) per share of stock over this same time period is:

$$\text{PRICE(i)} = \text{P}\left(\left[\frac{\text{i-1}}{4}\right]+1\right).$$

Thus the quotient,

$$\frac{\text{DIV(i)}}{\text{PRICE(i)}} = \frac{.25\text{D}\left(\left[\frac{\text{i-1}}{4}\right]+1\right)}{\text{P}\left(\left[\frac{\text{i-1}}{4}\right]+1\right)},$$

represents the number of shares of stock purchased by the investor from the dividends of a single share of stock during the i^{th} quarter. This continuing process is illustrated in Table 1.

TABLE 1
SHARES PURCHASED FROM THE DIVIDENDS OF ONE SHARE OF STOCK

	Quarters			
Year	1	2	3	4
1	$\frac{.25\text{D}\left(\left[\frac{1-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{1-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{2-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{2-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{3-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{3-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{4-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{4-1}{4}\right]+1\right)}$
2	$\frac{.25\text{D}\left(\left[\frac{5-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{5-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{6-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{6-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{7-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{7-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{8-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{8-1}{4}\right]+1\right)}$
3	$\frac{.25\text{D}\left(\left[\frac{9-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{9-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{10-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{10-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{11-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{11-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{12-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{12-1}{4}\right]+1\right)}$
4	$\frac{.25\text{D}\left(\left[\frac{13-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{13-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{14-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{14-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{15-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{15-1}{4}\right]+1\right)}$	$\frac{.25\text{D}\left(\left[\frac{16-1}{4}\right]+1\right)}{\text{P}\left(\left[\frac{16-1}{4}\right]+1\right)}$
5	… … … …	… … … …	… … … …	… … … …

Also note that the number of shares S_i owned at the end of the i^{th} quarter is given by:

$$S_i = S_{i-1} + S_{Pi}$$

$$= S_{i-1} + S_{i-1} \bullet \frac{DIV(i)}{PRICE(i)} + \frac{.25A\left(\left[\frac{i-1}{4}\right]+1\right)}{PRICE(i)}$$

$$= S_{i-1} + S_{i-1} \bullet \frac{.25D\left(\left[\frac{i-1}{4}\right]+1\right)}{P\left(\left[\frac{i-1}{4}\right]+1\right)} + \frac{.25A\left(\left[\frac{i-1}{4}\right]+1\right)}{P\left(\left[\frac{i-1}{4}\right]+1\right)}.$$

For the purpose of this paper, since \$125 per quarter is used to purchase additional shares of stock, we have:

$$S_i = S_{i-1} + S_{i-1} \bullet \frac{.25D\left(\left[\frac{i-1}{4}\right]+1\right)}{P\left(\left[\frac{i-1}{4}\right]+1\right)} + \frac{125}{P\left(\left[\frac{i-1}{4}\right]+1\right)}. \quad \text{(DCA-QDRIP Formula)}$$

Therefore, at the end of n years (or 4n quarters), the investor will have accumulated a value in stock of A dollars where:

$$A = P(n) \bullet S_{4n}$$

$$= P(n) \bullet \left[S_{4n-1} + S_{4n-1} \bullet \frac{.25D\left(\left[\frac{4n-1}{4}\right]+1\right)}{P\left(\left[\frac{4n-1}{4}\right]+1\right)} + \frac{125}{P\left(\left[\frac{4n-1}{4}\right]+1\right)} \right].$$

APPLICATIONS OF Q-DRIP FORMULA

Referencing Table 2, if one had invested an initial \$5000 in each of the 10 stocks and reinvested the dividends while also investing an additional \$125 in each stock quarterly, then, at the end of 15 years, that portfolio would have grown in value from \$50,000 to \$553,968, resulting in a very nice 343.17% increase (annual rate of 10.43%).

Notably, some of the stocks did significantly better than average. Becton, D'son had over a 576% gain in stock value at an annual rate of return of 13.59%. Even during the collapse of the stock market in 2008 and into the first quarter of 2009, Becton, D'son held up well, recouping most of its losses by the end of the fourth quarter of 2009.

Aflac had over a 714% gain in stock value at an annual rate of return of 15.01%. Because its investment portfolio contained a significant amount of mortgage related loans and the fact that it is an insurance company, Aflac's stock had a substantial decrease in 2008 and into the first quarter of 2009. But by the end of the fourth quarter of 2009, Aflac had returned to its growth pattern.

Referencing Table 3, two stocks standout for their ability to grow dividends assuming \$125 was invested in each stock quarterly: Wal-Mart Stores and McDonald's Corp. Wal-Mart had over 2,168% dividend gain at an annual rate of return in dividend income growth of 24.98%. McDonald's had over 2,588% dividend gain at an annual rate of return in dividend income growth of 26.50%. This is an income growth rate that few, if any, professions could match.

It is important to note that both Wal-Mart and McDonald's are ranked 1 (highest) for relative safety and A++ (highest) for company's financial strength by "Value Line Investment Survey" (October 1, 2010). Thus, these two stocks are virtually United States Treasury substitutes for safety with a much higher capital and dividend growth rate.

Even though Aflac lost its United States Treasury substitute ranking for safety because of mortgage loan investment related losses, these shares have above-average capital gain appreciation potential and annual dividend growth rate ("Value Line Investment Survey," October 5, 2010). Aflac should hold to its tradition for capital appreciation and dividend growth as the economy slowly improves.

By reinvesting the dividends (DRIP plans) as illustrated by Tables 2 - 3, Dollar-Cost Averaging, the most basic of investment strategies, is implemented. As Standard & Poor's "The Outlook" (September 3, 2008) discusses, Dollar-Cost Averaging is an investment strategy that literally guarantees purchasing the most shares of stock when their prices are low and the least shares of stock when their prices are high. It is a mathematical truth that, by following such an investment strategy, the average cost per share will be

substantially below the highs in the market. The reinvested dividends purchase whole shares and fractions of shares which in turn generate their own dividends, allowing the compounding effect and geometric rise in stock value and dividend growth.

The DRIP plans eliminate the emotions that influence investment decisions. In 2008 and into the first quarter of 2009, when the stock market was reaching generational lows and the volatility was overwhelming, the investor who maintained loyalty to the DRIP plans was forced to buy more shares as prices declined. As the market posted a more than 60% gain in the last three quarters of 2009, the investor was limited in the number of shares that could be purchased at the higher prices.

TABLE 2
STOCK VALUE GROWTH WITH DCA-QDRIP PLAN
1993-2007

Stocks Name	IIV	ICS	INS	FCS	FNS	FIV	% GAIN	ARR
Abbot Labs	5000	13.40	373.13	54.15	817.37	44,260.30	254.08	8.79
Aflac, Inc.	5000	4.65	1,075.27	54.55	1,867.36	101,865.00	714.92	15.01
Becton, D'son	5000	8.25	606.06	77.60	1,089.55	84,549.10	576.39	13.59
Coca-Cola	5000	20.65	242.13	54.95	519.73	28,559.10	128.47	5.66
Exxon Mobil	5000	15.90	314.47	82.15	784.06	64,410.80	415.29	11.55
Johnson & Johnson	5000	10.40	480.77	64.25	931.05	59,820.00	378.56	11.00
McDonald's Corp.	5000	13.00	384.62	53.00	809.67	42,912.60	243.30	8.57
PepsiCo, Inc.	5000	19.40	257.73	70.45	576.25	40,596.80	224.77	8.17
Procter & Gamble	5000	12.85	389.11	67.80	789.85	53,551.60	328.41	10.19
Wal-Mart Stores	5000	14.25	350.88	46.75	715.36	33,442.80	167.54	6.78
TOTAL	50,000					553,968.10	343.17	10.43

IIV = Initial investment value
ICS = Initial year's average cost per share ((high price – low price)/2)
INS = Initial number of shares purchased
FCS = Final year's average cost per share ((high price – low price)/2)
FNS = Final number of shares
FIV = Final investment value
% GAIN = Percentage total return (includes both reinvestment of dividends and investment of $125 per quarter per stock + initial $5,000 investment in each stock)
ARR = Annual rate of return in accumulations of stock value (includes both reinvestment of dividends and investment of $125 per quarter per stock + initial $5,000 investment in each stock)

TABLE 3
DIVIDEND GROWTH WITH DCA-QDRIP PLAN
1993-2007

Stocks Name	INS	IDS	IDI	FNS	FDS	FDI	% GAIN	ARI
Abbot Labs	373.13	0.34	136.87	817.37	1.30	1,062.58	676.34	15.76
Aflac, Inc.	1,075.27	0.06	69.08	1,867.36	0.80	1,493.89	2,062.45	24.55
Becton, D'son	606.06	0.17	110.84	1,089.55	0.98	1,067.76	863.36	17.56
Coca-Cola	242.13	0.34	88.34	519.73	1.36	706.83	700.11	16.01
Exxon Mobil	314.47	0.72	247.21	784.06	1.37	1,074.17	334.52	11.06
Johnson & Johnson	480.77	0.25	129.57	931.05	1.62	1,508.30	1,064.12	19.16
McDonald's Corp.	384.62	0.11	45.18	809.67	1.50	1,214.51	2,588.05	26.50
PepsiCo, Inc.	257.73	0.31	85.71	576.25	1.43	824.04	861.41	17.92
Procter & Gamble	389.11	0.28	117.29	789.85	1.28	1,011.00	761.99	16.63
Wal-Mart Stores	350.88	0.07	26.17	715.36	0.83	593.75	2,168.46	24.98
TOTAL			1,056.26			10,556.83	899.45	17.87

INS = Initial number of shares purchased
IDS = Initial declared dividend per share
IDI = Initial dividend income (beginning with end of first year)
FNS = Final number of shares
FDS = Final declared dividend per share
FDI = Final dividend income (last year)
% GAIN = Percentage return in dividend income growth (includes both reinvestment of dividends and investment of $125 per quarter per stock + initial $5,000 investment in each stock)
ARI = Annual rate of return in dividend income growth (includes both reinvestment of dividends and investment of $125 per quarter per stock + initial $5,000 investment in each stock)

Notice that had the investor pocketed the dividends instead of reinvesting them (See Table 4), the portfolio would have been worth only $452,696 ($101,272 less than with the DRIP plans) for a percentage gain of 262% (annual rate of 8.96%). The annual rate of return in dividend income growth would have been 16.27%, which is 1.6% less than when the dividends are being reinvested (See Tables 2 and 3).

Not reinvesting the dividends has a significant impact on individual stock value growth and dividend growth rates. For example, McDonald's had a 191.58% gain in stock value and a 2,194.72% gain in dividend growth without the DRIP plan. This is 51.72% less gain in stock value and 393.33% less gain in dividend growth than it would have been had the dividends been reinvested. It pays to reinvest the dividends.

TABLE 4
STOCK VALUE GROWTH WITHOUT REINVESTING DIVIDENDS
1993-2007

Stocks Name	IIV	ICS	INS	FCS	FNS	FIV	% GAIN	ARR
Abbot Labs	5000	13.40	373.13	54.15	621.17	33,636.40	169.09	6.82
Aflac, Inc.	5000	4.65	1,075.27	54.55	1,629.77	88,904.10	611.23	13.97
Becton, D'son	5000	8.25	606.06	77.6	920.32	71,416.60	471.33	12.32
Coca-Cola	5000	20.65	242.13	54.95	421.18	23,143.80	85.15	4.19
Exxon Mobil	5000	15.90	314.47	82.15	558.61	45,890.20	267.12	9.06
Johnson & Johnson	5000	10.40	480.77	64.25	733.74	47,142.70	277.14	9.25
McDonald's Corp.	5000	13.00	384.62	53.00	687.68	36,447.10	191.58	7.39
PepsiCo, Inc.	5000	19.40	257.73	70.45	472.36	33,277.70	166.22	6.75
Procter & Gamble	5000	12.85	389.11	67.80	630.12	42,722.00	241.78	8.54
Wal-Mart Stores	5000	14.25	350.88	46.75	644.19	30,115.70	140.93	6.04
TOTAL	50,000					452,696.30	262.16	8.96

IIV = Initial investment value
ICS = Initial year's average cost per share ((high price – low price)/2)
INS = Initial number of shares purchased
FCS = Final year's average cost per share ((high price – low price)/2)
FNS = Final number of shares
FIV = Final investment value
% GAIN = Percentage total return (includes $125 invested per quarter per stock + initial $5,000 investment in each stock)
ARR = Annual rate of return in accumulations of stock value (includes $125 invested per quarter per stock + initial $5,000 investment in each stock)

TABLE 5
DIVIDEND GROWTH WITHOUT REINVESTING DIVIDENDS
1993-2007

Stocks Name	INS	IDS	IDI	FNS	FDS	FDI	% GAIN	ARI
Abbot Labs	373.13	0.34	134.80	621.17	1.30	807.52	499.08	13.64
Aflac, Inc.	1,075.27	0.06	68.55	1,629.77	0.80	1,303.82	1,802.04	23.42
Becton, D'son	606.06	0.17	109.47	920.32	0.98	901.91	723.89	16.26
Coca-Cola	242.13	0.34	87.47	421.18	1.36	572.80	554.86	14.37
Exxon Mobil	314.47	0.72	240.57	558.61	1.37	765.30	218.13	8.62
Johnson & Johnson	480.77	0.25	127.70	733.74	1.62	1,188.66	830.79	17.27
McDonald's Corp.	384.62	0.11	44.95	687.68	1.50	1,031.52	2,194.72	25.08
PepsiCo, Inc.	257.73	0.31	84.89	472.36	1.43	675.47	695.70	15.97
Procter & Gamble	389.11	0.28	115.76	630.12	1.28	806.55	596.75	14.87
Wal-Mart Stores	350.88	0.07	26.10	644.19	0.83	534.68	1,948.84	24.07
TOTAL			1,040.26			8,588.23	725.58	16.27

INS = Initial number of shares purchased
IDS = Initial declared dividend per share
IDI = Initial dividend income (beginning with end of first year)
FNS = Final number of shares
FDS = Final declared dividend per share
FDI = Final dividend income (last year)
% GAIN = Percentage return in dividend income growth (includes $125 invested per quarter per stock + initial $5,000 investment in each stock)
ARI = Annual rate of return in dividend income growth (includes $125 invested per quarter per stock + initial $5,000 investment in each stock)

CONCLUSION

Results from the DCA-QDRIP (Dollar Cost Averaging Quarterly Dividend Reinvestment Plan) formula derived in this paper prove the efficacy of long-term investment in quality stocks that have a record of consistency in dividend increases. Thus, investments in high-quality, dividend-paying stocks can provide a safe and long-term plan for financial independence for those who have retired or will soon retire, and thereby negate the risk of outliving one's income.

The investment strategy of combining dividend growth and the reinvestment of the dividends with that of dollar cost averaging of periodic additional investments has a significant advantage over that of just investing for dividend growth and the reinvestment of those dividends. The greater discipline established through dollar cost averaging of periodic additional investments dramatically increases the investment return.

Finally, this paper shows that financial independence for life can be achieved with relatively small sums of money by making quality investments and being disciplined to do the same thing period after period of time.

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