Dollar Cost Averaging Versus Random Investing

Harvey Rubin
Louisiana State University Shreveport

Carlos Spaht
Louisiana State University Shreveport

The concept of retirement funding is devolving. In previous times, an employee worked 30 years and retired on a defined benefit plan. But times have changed. Some companies have eliminated pension plans, thereby erasing retirement benefits. Others have switched to defined-contribution plans where minimum yearly income is not guaranteed. Many individuals have lost jobs before becoming fully vested in retirement plans. Others have become independent contractors and are not covered by pension plans. This paper discusses how one can effectively and economically develop a strategy that will generate an increasing retirement income stream and provide security during his/her retirement years.

INTRODUCTION

In developing the strategy of an increasing retirement income stream, the first step is the preparation of a quarterly budget (since stock dividends are paid quarterly). Although this preparation may seem elementary, it is a critical step in generating future retirement income. Budgets are usually divided into two basic parts, income and expenses. The expenses in turn are divided into fixed and variable (discretionary) expenses. Included in the variable expenses are savings and investments, usually placed as the last items in the budget. A major problem with such budgets is that many people do not have enough income to get through all of their fixed expenses, especially if an unexpected event occurs (e.g. automobile repairs, medical bills, etc.). Consequently, insufficient funds remain to cover all the variable expenses, particularly savings and investments.

The authors believe that savings and investments should be moved to the first two items of the fixed expenses category of the budget. Then, after having set aside sufficient funds in the savings category (perhaps six months' to one year's salary depending upon dependents and obligations), money should be allocated to the investments category. If this investment payout is not made every quarter, few to no funds will be accumulated and any return on investments will be minimal, at best.

The most fiscally sound way to approach investing is through dollar cost averaging by investing the same sum of money each quarter into common stocks. However, this stock payout should not be made into arbitrarily chosen common stocks on a random or hearsay basis. It should instead be made into dividend paying aristocrat stocks.

Using this strategy, the payout will be made sometimes when the market is high, sometimes when it is moderate, and sometimes when it is low. However, it does not really matter over the long run. It can be shown mathematically that, over time, the costs of the shares of these dividend paying aristocrat stocks

will be below the high points in the market. Moreover, investing in such a way negates the volatility of the market.

However, the opposite is true when purchasing stocks randomly or emotionally. In this case, investments are often made at higher points of the market and in weak stocks, almost always guaranteeing an investment loss.

PERSPECTIVE

The purpose of this paper is to document the case for financial independence (defined as the financial ability to do anything you want to do anytime you want to do it) by (1) investing relatively small sums of money on a continuous basis in quality common stocks which have exhibited dividend growth and (2) reinvesting the dividends. The authors incorporate the research of previous papers (Spaht & Rubin, 2007; Rubin & Spaht, 2010; Rubin & Spaht, 2011; Spaht & Rubin, 2012; Rubin & Spaht, 2013; Spaht & Rubin, 2014) concerning investment strategies applicable for attaining financial independence.

In an article in the *Wall Street Journal* titled, "The Case for Sticking with Stocks – No Matter the Price," Brett Arends states, "The stock market still remains the best investment around, especially for anyone looking to save for a period of 10 years or more." His conclusions are based on Andrew Smithers' book, Valuing Wall Street. In this book, three points are made. First, historical average returns from stocks have been much greater than alternatives even if the stocks are overvalued. In fact, Smithers points out that, since 1801, the average annual returns above inflation has been 6.8 percent for stocks, 3.5 percent for bonds, and 2.8 percent for cash. Second, stocks that are overvalued usually become even more overvalued before correcting down. For example, investors who sold out of the market in the year 2000 had to wait until the year 2009 before they could return to investing at the low point. Third, trying to sell at the high point in the market and buy at the low point is easier said than done. The emotional stress is usually too great (Arends, 2014).

Trying to time the market, even for professional investors, is usually a losing proposition. The *Hulbert Financial Digest* study of the last 15 years shows that only 11 of 81 stock-market timers had net gains during the Internet bubble burst that lasted from March through October 2000. Moreover, since that time, these market timers collectively have an annualized loss of 0.8 percent (Hulbert, 2014).

Jason Zweig, author of the *Intelligent Investor* column of the *Wall Street Journal*, believes an investor has imperfect self-knowledge concerning when to buy and when to sell. He believes most investors buy and sell primarily based on their emotions, resulting in earning lower returns than the market indexes (Zweig, 2013).

Warren Buffett's famous quote, "The markets are designed to transfer money from the active to the patient," emphasizes how important discipline and patience are to a successful investment strategy. Only a fraction of the stock mutual funds have performed better than the market over the last 34 years. This is because the pressure is for mutual funds to perform well in the short run. Thus, the funds have to constantly buy and sell to show good performance for each quarterly report (Hulbert, 2014).

The risk in the stock market involves the willingness of the investor to stay invested in both good and bad times. Persistency seems to be the name of the game. According to Robert Shiller, United States' stocks have increased 90-fold since 1950 (adjusted for inflation and dividends). According to Professor Shiller, "Since 1871, a broad group of United States' stocks has earned a positive return in 60 percent of all one-month periods – but in 95 percent of all 15-year periods and in every 20-year period adjusted for dividends and inflation" (Housel, 2014).

Dollar cost averaging on a consistent basis allows for investing in stocks when the market is high and overvalued as well as when the market is low and undervalued. Over a period of time, this dollar cost averaging leads to greater success than constantly buying and selling does (Housel, 2014). In the words of Charles Munger, the Vice Chairman of *Berkshire Hathaway*, "Successful investing requires this crazy combination of gumption and patience. It's waiting that helps you as an investor" (Zweig, 2014).

According to a study by *Putnam Investors*, investors who were not invested in the market in the 10 best days over the last 15 years had an annualized gain of only 2.1 percent. However, those investors who

stayed fully invested over the same period of time had a gain of 6.5 percent. A study by *Morningstar Direct* shows that between 1926 and March 2014, the S&P 500 Index had positive returns 94 percent of the time over 940 rolling monthly 10 year periods and 99.7 percent of the time over 880 rolling monthly 15 year periods (Summers, 2014).

Investing in dividend paying stocks is also important. Tom Hutchinson points out that the returns of dividend paying stocks in the S&P 500 have dominated the returns of the non-dividend paying stocks on the index. In fact, over the period 1972 – 2012, dividend paying stocks averaged an annual return of 8.92%, almost 5 times what their non-dividend counterparts averaged (only 1.83%). Moreover, the dividend paying stocks did this with much less volatility (Hutchinson, 2012).

In addition, Don Kilbride, manager of the *Vanguard Dividend Growth Fund*, states that dividend growth is the critical factor in the success of his fund. The thesis of his strategy is the compounding of dividends. He invests in companies that are growing and returning a portion of that growth to stockholders in the form of dividends (Kapadia, 2013).

This paper discusses how a persistent investor, who invests on a quarterly basis in quality dividend paying stocks, can become financially independent regardless of the volatility of the market and the surrounding economic conditions. The key to the investment strategy is to use stocks that have dividend reinvestment and optional payment programs. Such stocks require a low minimum amount (usually $250) to open the account and low minimum optional payments (usually $25). The companies offering dividend reinvestment and optional payment programs have either no fees or minimal fees (usually a few dollars). The frequency of the optional payments is at the discretion of the investor.

ANALYSIS

The assumption is made that, in the beginning of the first quarter of 1993, investments were made in a sample of 10 randomly selected stocks contained in the *S&P 500 Dividend Aristocrats Index*. The sample was limited to those stocks that had a strong buy or buy recommendation from the S&P equity analysts. Such a sample also only included stocks that had a record of consistency in increasing dividends for at least the last 25 years. The 10 stocks randomly selected were Abbott Labs; AFLAC, Inc.; Becton, D'son; Coca-Cola; Exxon Mobile; Johnson & Johnson; McDonald's; Pepsi Co., Inc.; Proctor & Gamble; and Wal-Mart Stores.

Let us assume that a person had invested in each of these selected stocks from 1993 through 2007 with an initial investment of $250 and then, on a quarterly basis for the next 15 years, (1) reinvested the dividends and (2) invested a fixed amount of $75 (total of $300 per year or $4,500 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 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 \$75 per quarter or \$300 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 very 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:

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

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

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

Thus the quotient,

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

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

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 \$75 per quarter is used to purchase additional shares of stock, we have:

$$S_i = S_{i-1} + S_{i-1} \bullet \frac{.25D\left(\left[\frac{i-1}{4}\right]+1\right)}{P\left(\left[\frac{i-1}{4}\right]+1\right)} + \frac{75}{P\left(\left[\frac{i-1}{4}\right]+1\right)}. \qquad \text{(DCA-QDRIP Formula)}$$

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

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

$$= P(n) \bullet \left[S_{4n-1} + S_{4n-1} \bullet \frac{.25D\left(\left[\frac{4n-1}{4}\right]+1\right)}{P\left(\left[\frac{4n-1}{4}\right]+1\right)} + \frac{75}{P\left(\left[\frac{4n-1}{4}\right]+1\right)}\right].$$

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

Stocks Name	IIV	ICS	INS	FCS	FNS	FIV	% GAIN	ARR
Abbot Labs	250	13.40	18.66	54.15	207.78	11,251.10	136.87	5.917
Aflac, Inc.	250	4.65	53.76	54.55	432.09	23,570.50	396.22	11.27
Becton, D'son	250	8.25	30.30	77.60	249.77	19,382.4	308.05	9.828
Coca-Cola	250	20.65	12.11	54.95	141.082	7,752.44	63.21	3.320
Exxon Mobil	250	15.90	15.72	82.15	208.20	17,103.50	260.07	8.916
Johnson & Johnson	250	10.40	24.04	64.25	213.01	13,685.90	188.12	7.310
McDonald's Corp.	250	13.00	19.23	53.00	230.94	12,239.70	157.68	6.514
PepsiCo, Inc.	250	19.40	12.89	70.45	165.63	11,668.80	145.66	6.175
Procter & Gamble	250	12.85	19.46	67.80	196.06	13,292.60	179.84	7.101
Wal-Mart Stores	250	14.25	17.54	46.75	211.48	9,886.76	108.14	5.008
TOTAL	2,500					139,833.70	194.39	7.464

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 \$75 per quarter per stock + initial \$250 investment in each stock)
ARR = Annual rate of return in accumulations of stock value (includes both reinvestment of dividends and investment of \$75 per quarter per stock + initial \$250 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	18.66	0.34	11.23	207.78	1.30	270.11	2,305.25	25.503
Aflac, Inc.	53.76	0.06	5.68	432.09	0.80	345.67	5,985.74	34.106
Becton, D'son	30.30	0.17	9.10	249.77	0.98	244.78	2,589.89	26.510
Coca-Cola	12.11	0.34	7.26	141.08	1.36	191.87	2,542.84	26.350
Exxon Mobil	15.72	0.72	20.23	208.20	1.37	285.23	1,309.94	20.806
Johnson & Johnson	24.04	0.25	10.63	213.01	1.62	345.08	3,146.28	28.220
McDonald's Corp.	19.23	0.11	3.72	230.94	1.50	346.41	9,212.10	38.244
PepsiCo, Inc.	12.89	0.31	7.04	165.63	1.43	236.85	3,264.35	28.548
Procter & Gamble	19.46	0.28	9.63	196.06	1.28	250.95	2,505.92	26.223
Wal-Mart Stores	17.54	0.07	2.15	211.48	0.83	175.53	8,064.19	36.951
TOTAL			85.67			2,692.48	3,042.85	27.924

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 $75 per quarter per stock + initial $250 investment in each stock)
ARI = Annual rate of return in dividend income growth (includes both reinvestment of dividends and investment of $75 per quarter per stock + initial $250 investment in each stock)

TABLE 4
STOCK VALUE GROWTH WITHOUT REINVESTING DIVIDENDS
1993-2007

Stocks Name	**IIV**	**ICS**	**INS**	**FCS**	**FNS**	**FIV**	**% GAIN**	**ARR**
Abbot Labs	250	13.40	18.66	54.15	167.48	9,068.97	90.93	4.406
Aflac, Inc.	250	4.65	53.76	54.55	386.47	21,081.70	343.83	10.445
Becton, D'son	250	8.25	30.30	77.6	218.86	16,983.30	257.54	8.865
Coca-Cola	250	20.65	12.11	54.95	119.54	6,568.48	38.28	2.184
Exxon Mobil	250	15.90	15.72	82.15	162.21	13,325.80	180.54	7.119
Johnson & Johnson	250	10.40	24.04	64.25	175.82	11,296.40	137.82	5.946
McDonald's Corp.	250	13.00	19.23	53.00	201.07	10,656.70	124.35	5.535
PepsiCo, Inc.	250	19.40	12.89	70.45	141.66	9,980.17	110.11	5.074
Procter & Gamble	250	12.85	19.46	67.80	164.06	11,123.50	134.18	5.837
Wal-Mart Stores	250	14.25	17.54	46.75	193.53	9,047.51	90.47	4.389
TOTAL	2,500					119,132.53	150.81	6.322

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 $75 invested per quarter per stock + initial $250 investment in each stock)
ARR = Annual rate of return in accumulations of stock value (includes $75 invested per quarter per stock + initial $250 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	18.66	0.34	11.10	167.48	1.30	217.72	1,861.44	23.688
Aflac, Inc.	53.76	0.06	5.65	386.47	0.80	309.17	5,372.04	33.092
Becton, D'son	30.30	0.17	9.02	208.86	0.98	214.48	2,277.83	25.400
Coca-Cola	12.11	0.34	7.20	119.54	1.36	162.57	2,157.92	24.938
Exxon Mobil	15.72	0.72	19.81	162.21	1.37	222.23	1,021.81	18.849
Johnson & Johnson	24.04	0.25	10.52	175.82	1.62	284.83	2,607.51	26.569
McDonald's Corp.	19.23	0.11	3.70	207.07	1.50	301.61	8,051.62	36.936
PepsiCo, Inc.	12.89	0.31	6.99	141.66	1.43	202.58	2,798.14	27.186
Procter & Gamble	19.46	0.28	9.53	164.06	1.28	210.00	2,103.57	24.720
Wal-Mart Stores	17.54	0.07	2.15	193.53	0.83	160.63	7,371.16	36.086
TOTAL			85.67			2,285.82	2,568.17	26.436

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 $75 invested per quarter per stock + initial $250 investment in each stock)
ARI = Annual rate of return in dividend income growth (includes $75 invested per quarter per stock + initial $250 investment in each stock)

RESULTS OF INVESTING WITH DCA-QDRIP PLAN

In referencing Table 2, if the investor had invested an initial $250 in each of the 10 stocks and reinvested the dividends into the same stocks while also investing an additional $75 in each stock quarterly (all investments made at the beginning of each quarter), then at the end of 15 years, that portfolio would have grown in value from $2,500 to $139,833.70. This results in a percentage increase of 194.39% in total return which annualizes to a rate of 7.46%.

In referencing Table 3, by using the above investment protocol, the dividend income would have increased from $85.67 to $2,692.48. This is an increase of 3,042.85% in dividend growth which annualizes to 27.92%.

Thus, if you are a very small investor, but you maintain the discipline of constantly investing small sums and reinvesting the dividends, the portfolio growth and income growth are substantial. These growth rates can add a substantial sum to one's salaried income while simultaneously preserving the purchasing power of the portfolio.

RESULTS OF INVESTING WITHOUT DCA-QRIP PLAN

In referencing Table 4, if the investor had invested an initial $250 in each of the 10 stocks and also invested an additional $75 in each stock quarterly (all investments made at the beginning of each quarter), but not reinvested the dividends generated by the same stocks, then at the end of 15 years, that portfolio would have grown in value from $2,500 to $119,132.53. The resulting percentage increase is 150.81% in total return (annual rate of 6.32%). Moreover, the dividend income would have increased from $85.67 to $2,285.82, resulting in an increase of 2,568.17% return in dividend income (annual rate of 26.44%). Table 5 details the dividend income.

Therefore, even if the investor elects not to have the dividends reinvested, the growth rates are impressive. However, having the dividends sent directly to the investor each quarter does result in a decline in the investor's future standard of living.

CONCLUSION

In a quality portfolio of stocks, the longer the amount of time an investment is made, the greater return that is generated. By an initial investment of a relatively small sum of money, one can construct a quality portfolio that will provide a substantial return to that investor.

The fundamental point is that discipline is extremely important. Continuous investing, no matter how small the sum, is the key. It is a mathematical truth that, if the investment is made at the same period of time each quarter, the average cost per share will be significantly below the high points in the market price.

Reinvested dividends greatly influence the growth in the values of the portfolio and the dividend income. If the investor is not in current need of the dividend income, dividend reinvestment is appropriate. It is an effective and efficient way to accumulate wealth and an increasing income stream. However, if current income is important for maintaining an acceptable standard of living, the direct payment of those dividends to the investor will still allow for significant portfolio and dividend income growth.

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