An Investment Strategy for the Unluckiest Investor's Grandchildren to Inherit

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Using the "S&P 500", an investor makes a onetime selection of stocks. Each quarter from 1993 to 2007, he continues investing a fixed amount and reinvesting the dividends in each of the stocks. Unfortunately, all of his transactions are made at the stocks' highest prices. At the end of 2007, he stops investing additional funds, but continues reinvesting the dividends. This continues until his death at the end of 2019, and his portfolio is left as his grandchildren's inheritance. They have decided to use it for college tuition. What is the portfolio's final worth? Will it be sufficient?

Keywords: finance, financial independence, retirement, retirement planning, stocks, investing, dividends

INTRODUCTION

The pursuit of the "American Dream" has been the motivation for generations of Americans as well as those who immigrate to become Americans. Through hard work, savings, and investing, many of them believed they could achieve comfortable life styles and financial security. Their emphasis was focused on contributing the maximum amount allowed by pension law to 401(k) and IRA plans.

As the year 2007 began, optimism was reaching high points in tandem with the record highs in the stock market and home values. While 2007 progressed, the value of 401(k) plans, IRA plans, and homes continued to grow. Certainly early retirement became a great possibility for a large portion of the pension covered population. But then came 2008 and 2009, bringing deep despair because of the downward spiral of the market.

Diversification has always been a cardinal rule of all investment strategies. The theory being that one asset class, two asset classes, three asset classes, and so-forth could not suffer almost a complete collapse at the same time. The belief was that the investor should always have at least one asset class working when all other asset classes were not working. In 2008 and 2009, this diversification rule ceased to be viable. Stocks, bonds, and real estate fell to new lows; there was no shelter from the near economic collapse. New phrases such as "under water" and "too big to fail" entered into our conversations. Many 401(k) and IRA plans decreased at an alarming rate, threating the financial survival of an ordinary person. Was the "American Dream" of financial security dead forever, never to return?

The purpose of this paper is to address this "American Dream" question from the perspective of a worst-case scenario – the unluckiest investor in the world. This unlucky investor always invested at the high points

in the stock market up to the year 2008 when he saw his hard built portfolio slipping away. Instead of continuing to invest by dollar cost averaging (investing equal amounts at regular time intervals), he stopped all investment activities except for the continual reinvestment of the dividends in his stocks. He continued this until December 31, 2019, and then died. He left his portfolio in his will to his grandchildren to be used for their college education, which was to begin during the fall semester of 2020.

What is the portfolio worth at that time, and will it be adequate for this purpose? In answering this question, the authors incorporated current research with the research of previous papers (Spaht & Rubin, 2007; Rubin & Spaht, 2010; Rubin & Spaht, 2011; Spaht & Rubin, 2012; Spaht & Rubin, 2013; Spaht & Rubin, 2014; Rubin & Spaht, 2015; Rubin & Spaht, 2016; Rubin & Spaht, 2018).

PERSPECTIVE

It is becoming increasingly important for the average person to begin and continue a quality investment stock portfolio. Sadly, in 2018, corporate-sponsored 401(k) plans contained only $95,600 on the average. The amounts for Roth IRAs and 403(6)'s were only $98,400 and $78,700 respectively. (Daugherty, Investopedia, 2019). In addition, average amounts of savings in retirement accounts per household for baby boomers was only $157,000. (Parker, Investopedia, 2019).

Interestingly, 69% of these baby boomers believe that they will continue to work during their retirement. They believe that the company pension plans will provide stable incomes throughout retirement since they are defined benefit plans. However, defined benefit plans are disappearing at an increasing rate and being replaced by defined contribution plans. With the transition from these defined benefit plans to defined contribution plans [401(k)s], over thirty years of stock market growth has been missed by the baby boomers. (Kopp, Investopedia, 2019). In addition, it is anticipated that a substantial portion of the workforce will be independent contractors by the year 2025 without company-sponsored plans.

Thus, it is virtually mandatory that one begin a quality investment program. This paper now discusses the building blocks for such a strategy.

ANALYSIS

The authors utilized a sample of 10 stocks from the *S&P Dividend Aristocrats Index*. The 15-year period 1993-2007 was selected because it contains almost equally bad and good years in the stock market. The bad years were represented with the beginning of the bursting of the Tech bubble at the end of the year 2000, and the good years with the ending of the stock market highs in 2007. The *S&P Dividend Aristocrats Index* was used as the basis for stock selection because it measures the performance of those companies within the S&P 500 that are heavily capitalized and financially strong and that have increased their dividends yearly for at least 25 consecutive years. Since a 25-year period in the stock market contains the lowest of lows and highest of highs in stock prices, these companies have been successful in both good and bad years.

Increasing dividends are usually reflected in price appreciation of stocks. The continuing increasing dividend stream occurs at stock price lows, stock price highs, and everywhere in between. Thus, the investment strategy of dollar cost averaging is ideal for Dividend Aristocrat investing, resulting in the almost mathematical certainty that the average cost per share will be substantially below the absolute high point in the 15-year market. In fact, this is the case even given that the fixed amounts and dividends reinvested are at the periodic high point in the 15-year cycle. (Spaht & Rubin, 2018).

Assume that the unlucky investor made an initial investment of $5000 in each of the selected stocks at the high market price of the stock in 1993. Then, on a quarterly basis from 1993-2007, he reinvested the dividends and 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 also at the year's high market price of the stock. How much did the stock value of the portfolio grow over the 15-year period? And do the results indicate that investing in high-quality, dividend-paying stocks provide a safe and long-term plan for financial security?

The analysis starts with 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, it is used to compute the accumulation of stock value at the end of the 15 years. Output from the computations of the values of each of these stocks at the end of the 15-year period can be found in Table 2 and Table 3 under the columns labeled "VS J2008". (Spaht & Rubin, 2013).

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 highest price per share of stock 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 highest 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	$\frac{.25\mathrm{D}\left(\left[\frac{1-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{1-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{2-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{2-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{3-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{3-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{4-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{4-1}{4}\right]+1\right)}$
2	$\frac{.25\mathrm{D}\left(\left[\frac{5-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{5-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{6-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{6-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{7-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{7-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{8-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{8-1}{4}\right]+1\right)}$
3	$\frac{.25\mathrm{D}\left(\left[\frac{9-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{9-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{10-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{10-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{11-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{11-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{12-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{12-1}{4}\right]+1\right)}$
4	$\frac{.25\mathrm{D}\left(\left[\frac{13-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{13-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{14-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{14-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{15-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{15-1}{4}\right]+1\right)}$	$\frac{.25\mathrm{D}\left(\left[\frac{16-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{16-1}{4}\right]+1\right)}$
5	… … … …	… … … …	… … … …	… … … …

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

$$S_i = S_{i-1} + S_{Pi}$$
$$= S_{i-1} + S_{i-1} \bullet \frac{\mathrm{DIV(i)}}{\mathrm{PRICE(i)}} + \frac{.25\mathrm{D}\left(\left[\frac{\mathrm{i}-1}{4}\right]+1\right)}{\mathrm{PRICE(i)}}$$
$$= S_{i-1} + S_{i-1} \bullet \frac{.25\mathrm{D}\left(\left[\frac{\mathrm{i}-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{\mathrm{i}-1}{4}\right]+1\right)} + \frac{.25\mathrm{D}\left(\left[\frac{\mathrm{i}-1}{4}\right]+1\right)}{\mathrm{P}\left(\left[\frac{\mathrm{i}-1}{4}\right]+1\right)}.$$

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

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

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

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

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

Stocks Name	IIV-J1993	VS-J1993	INS-J1993	FCS-D2007	FNS-D2007	VS-J2008	% GAIN	ARR
Abbott Labs	5000	14.90	335.57	59.50	695.67	41,392.30	231.14	8.31
Aflac, Inc.	5000	5.20	961.54	63.90	1,613.43	103,098.00	724.78	15.10
Becton, D'son	5000	9.00	555.56	85.9	956.40	82,154.90	557.24	13.37
Coca-Cola	5000	22.30	224.22	64.30	456.45	29,349.50	134.80	5.86
Exxon Mobil	5000	17.30	289.02	95.30	682.54	65,045.60	420.37	11.62
Johnson & Johnson	5000	11.70	427.35	68.80	795.54	54,732.80	337.86	10.35
McDonald's Corp.	5000	14.50	344.83	63.70	690.91	44,011.10	252.09	8.75
PepsiCo, Inc.	5000	21.00	238.10	79.00	505.11	39,904.00	219.23	8.05
Procter & Gamble	5000	14.30	349.65	75.20	683.73	51,416.80	311.33	9.89
Wal-Mart Stores	5000	16.60	301.21	51.40	602.65	30,976.40	147.81	6.24
TOTAL	50,000					542,081.40	333.67	10.27

IIV-J1993 = Initial investment value beginning in January 1993
VS-J1993 = Initial year's cost per share beginning in January 1993
INS-J1993 = Initial number of shares purchased beginning in January 1993
FCS-D2007 = Final year's cost per share at end of December 2007
FNS-D2007 = Final number of shares at end of December 2007
VS-J2008 = Value of shares beginning in January 2008
% 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)

Referencing Table 2, if, beginning in January of 1997, one had invested an initial $5,000 in each of the 10 stocks and reinvested the dividends while also investing an additional $125 in each stock quarterly (all investments made at the high point of the year in each stock's price), then the portfolio would have grown in value from $50,000 to $542,081 in 15 years. The result is a portfolio increase of 333.67% for the 15 years at an annual rate of 10.27%.

However, recall that due to despair with the collapsing market in the first quarter of 2008, the unlucky investor ceased investing additional sums and only reinvested the dividends. This practice continued until his death at the end of 2019.

But notice (see Table 3) that even though the portfolio's value was only $542,081 beginning in January 2008, and the investor only reinvested the dividends in the stocks, the portfolio's value almost tripled to $1,608,625 by the end of 2019! This ending value is so substantial that even the most expensive college education could be financed.

TABLE 3
STOCK VALUE GROWTH USING DRIP PLAN JANUARY 2008 – DECEMBER 2019

Stocks Name	VS-J2008	CPS-J2008	NS-J2008	NS-D2019	CPS-D2019	VS-D2019	TOTAL RETURN	ARR
Abbott Labs	41,392.30	26.78	1545.64	2091.14	86.86	181,636.70	338.82	13.11
Aflac, Inc.	103,098.00	30.99	3326.82	4472.00.	52.90	236,568.70	129.46	7.16
Becton, D'son	82,154.90	86.78	946.70	1171.74	271.97	318,678.90	287.90	11.96
Coca-Cola	29,349.50	30.55	960.70	1391.07	55.35	76,995.50	162.34	8.37
Exxon Mobil	65,045.60	93.51	695.60	1003.83	69.78	70,047.60	7.69	0.62
Johnson& Johnson	54,732.80	65.91	830.42	1192.40	145.87	173,935.40	217.79	10.11
McDonald's Corp.	44,011.10	58.10	757.51	1086.59	197.61	214,721.40	387.88	14.12
PepsiCo, Inc.	39,904.00	75.29	530.00	753.88	136.67	103,032.10	158.20	8.22
Procter& Gamble	51,416.80	72.31	711.06	1030.23	124.90	128,675.70	150.26	7.94
Wal-Mart Stores	30,976.40	46.90	660.48	880.08	118.84	104,588.70	237.64	10.67
TOTAL	542,081.40					1,608,625.10	196.75	9.49

VS-J2008 = Value of shares beginning in January 2008
CPS-J2008 = Cost per share beginning in January 2008
NS-J2008 = Number of shares beginning in January 2008
NS-D2019 = Final number of shares at end of December 2019
CPS-D2019 = Cost per share at end of December 2019
VS-D2019 = Value of shares at end of December 2019
TOTAL RETURN = Percentage total return (includes only reinvestment of dividends).
ARR = Annual rate of return in accumulations of stock value (includes only reinvestment of dividends).

CONCLUSION

This paper proves the power of reinvesting dividends in dividend-paying quality stocks. The authors took an investor who chose such stocks, but had the bad luck of only investing in them at the high points of the market. He later became frustrated and chose only to reinvest the dividends in the stocks he had chosen. Yet his portfolio grew substantially and easily generated enough money to send his grandchildren to college. The old investment adage, "It's the time in the market and not the amount of money in the market," is still very much relevant.

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