

Dollar-Cost Averaging Withdrawals: A Simulation Comparison of Interval Length and Timing

Brian Porter

Abstract

Dollar-cost averaging (DCA) is a common investment technique. The premise being, by investing a fixed amount in a given security over equal periodic intervals, one will buy more shares when the price of the security is low, and less shares when the price is high. To its advantage, DCA's instinctive purchasing of more shares when the price of a security is low, partially fulfills the cliché investing advice, *buy low and sell high*. Because the average price of the cumulative shares purchased with DCA will always be less than the average price of the security over the same period of time (Whitehead, 1999), DCA can reduce an investor's risk (Malkiel, 2004). Given its proven results, and simplicity to execute, DCA is a popular technique for buying investments, often touted by investment companies (e.g., Fidelity Investments) and investment gurus (e.g., Jane Bryant Quinn and the Motley Fools).

Previous research has largely focused entirely on building wealth using DCA. Very little research has examined the withdrawal of funds, such as during one's retirement years. Although DCA is a proven method for building wealth, is it also an effective tool for selling investments? This research examines DCA from the perspective of withdrawing funds. DCA may be a common application used by retirees to sell funds during their golden years, yet little research exists to support its performance. In fact, one hypothesis is that the appeal of DCA for investing, is a detriment for withdrawals. That is, using DCA to withdraw funds would result in selling more shares when prices are low, and selling fewer shares when prices are high. One would prefer exactly the opposite, to sell more shares when prices are *high*.

This study fills the gap that currently exists in this area of research and advances this body of knowledge in three important ways. One, it examines DCA, a technique for building wealth, and applies it to the withdrawal of funds. Two, it compares two controllable factors for DCA withdrawals, *interval length* and *timing of withdrawals*. Three, it uses recent data that are comprehensive of the overall market. Results of this study indicate that both interval length and timing of withdrawals impact the performance of DCA as a withdrawal strategy. It is also found that, contrary to intuitive thinking, the performance of DCA is relatively good.

Introduction

As defined contribution retirement plans, rather than defined benefit retirement plans, become the norm, the number of people investing for retirement continues to grow. From 1975 to 1998, there was an increase of 42 million Americans enrolled in non-Social Security retirement programs, from 44 million to 86 million. In 1975, the predominant plan was defined benefit with 32 million Americans participating in 103,000 different defined benefit

Brian E. Porter is a Professor at Hope College

plans. In contrast, 10 million Americans were participating in 208,000 different defined contribution plans. By 1998, the dominate plan had switched. Forty-six million were defined contribution plans and 40 million defined benefit plans (Migration News). The trend is clearly away from defined benefit plans and to defined contribution plans. Even financially healthy companies, such as IBM, Hewlett Packard, and Motorola have frozen their traditional pension plans and replaced them with 401(k)s (Donlan, 2006).

Another pivotal factor that may increase individually managed retirement plans is the looming possible overhaul of the current Social Security system. Whether or not Social Security is currently in crisis is debatable. However, it is evident that Social Security faces a deficit. Demographics are forcing the need to revisit Social Security as it currently exists. In the next two decades the number of people over the age of 65 will nearly double from what it is today (Schwadron, 2006). In 1950, there were 16 workers to support every one beneficiary of Social Security. Today, there are only 3.3 workers supporting every Social Security beneficiary. It is projected that in 45 years, there will be only 2 workers supporting each beneficiary (Rohrich, 2005). In response to the current Social Security situation, one proposed solution is personal Social Security accounts. These personal accounts would function very similarly to defined contribution retirement accounts where individuals will periodically invest into mutual funds. Though support for this proposal has considerable detractors it also has advocates, most notably is Alan Greenspan, former chairman of the Federal Reserve (Andrews, 2005). Should personal Social Security accounts become a reality, it will instigate millions of investors to be more involved in retirement investing.

Because of this shift from traditional defined benefit plans to self-managed defined contribution plans, an increasing number of people, even those with little, or no, finance and investing expertise, are being forced to make financial investing decisions for retirement. Unfortunately, according to the nonprofit group Jump\$tart Coalition for Personal Financial Literacy, too many people are financially illiterate. According to the organization's 2006 survey, high school seniors were able to correctly answer only 52.4 percent of questions about personal finance and economics (Jump\$tart). Federal Reserve Chairman Ben Bernanke recently told Congress that "Sharpening Americans' financial know-how and skills is crucial to consumers' ability to make smart money choices and is also good for the overall economy" (Aversa).

Without knowledge or strategy, DCA is often used for investing and withdrawing funds from personally managed retirement accounts. One alternative to DCA is market timing, where one attempts to withdraw funds (i.e., sell) when the market is high. However, the efficient market hypothesis implies that market timing is but a game of chance. This sentiment is strongly echoed, and extensively explained, in the highly acclaimed book *A Random Walk Down Wall Street* (Malkiel, 2004). Therefore, it is useful to examine DCA, a passive strategy that does not attempt to time the market. This study will provide much needed insight into the implementation and implications of DCA as a strategy for withdrawals.

Prior Research

Though there is very little research pertaining to the withdrawal of funds (e.g., during retirement), DCA has been extensively researched as a tool for investing and growing wealth. It

is worthwhile to understand this research as a foundation for this study. In general, there are two scenarios where an investment strategy of DCA is applicable. First, there is the situation when one receives a lump sum amount, such as an inheritance or severance payout. In this instance, one has the option of either investing the entire lump sum at once, or periodically investing an equal portion of the lump sum amount during periodic fixed intervals. This is commonly termed as a decision between lump sum investing or DCA. Research has largely indicated that a lump sum investment, rather than DCA, is superior (Constantinides, 1979). Rozeff (1994) indicates that, if the stock market has a positive expected risk premium, a lump sum investment strategy is superior to DCA. Atra and Mann (2001), however, show that results of lump sum and DCA are heavily dependent on the seasonality of the equity returns. More recently, Abeysekera and Rosenbloom (2000) have challenged the precept that DCA is consistently inferior to a lump sum investment. Their simulation study indicates that the superiority of lump sum or DCA is dependent on many factors, including the expected rate of return on the stock and opportunity cost of capital represented by the risk-free rate.

The second, and much more common, scenario of DCA is the ongoing investment of periodic cash flows, such as with contributions to a defined contribution retirement plan. Austin (1995) performed a simulation study of DCA that invested in an S&P 500 fund over a 19 year period. The simulation examined two key factors, timing relative to market cycles, and periodic cash flow frequency. Results indicate that timing does matter. DCA works best when initiated and terminated at periods when market prices are high relative to interim prices. It was also found that shorter investment frequencies, such as weekly or monthly, are superior to longer frequencies, such as quarterly or annually. Johnson and Krueger (2004) determined that DCA is a good strategy, and trying to time the market is not recommended.

Factors Examined

A simulation study has been completed that examines two unique factors regarding DCA as a withdrawal strategy: (1) interval length between withdrawals, and (2) timing of the interval. In total, 72 different simulations were performed, 60 of which examined these two factors. In addition, for comparison purposes, 12 additional simulations were performed.

For the first factor examined, *interval length between withdrawals*, three different interval lengths were studied that utilized a pure DCA strategy. The interval lengths studied were *yearly*, *monthly*, and *weekly*. The second factor researched, *timing of the interval*, is dependent upon the interval length. For example, a *weekly* interval length has five possible *timings*, one for each day of the week—*Monday*, *Tuesday*, *Wednesday*, *Thursday*, or *Friday*. A *monthly* interval length has 31 possible timings, one for each possible day of a month—the 1st day of the month, the 2nd day of the month, the 3rd day of the month, and so forth. In total, 60 different DCA simulations were performed. A summary of the 60 different interval and timing combinations is provided in Table I. In certain circumstances, when a particular timing interval was not always feasible, a default was selected. For example, the heuristic to “sell on the 31st of each month” is not possible in five months of the year (February, April, June, September, and November). Instead, in these five months, withdrawals occurred on the last day of the month. Similarly, if the heuristic was to “sell on Mondays” and a particular Monday was a holiday (i.e., the markets were closed), the withdraw occurred on the next business day (e.g., Tuesday).

For comparison purposes, in addition to the 60 DCA simulations, six *market timing* simulations were also performed. Unlike with DCA, the interval lengths for the market timing simulations are not constant. Rather than selling shares (i.e., withdrawals) at a specified time (e.g., 1st of each month or every Tuesday), as with DCA, a *market timing* strategy attempts to sell shares at opportune times, such as when shares are selling at a high price. The obvious difficulty with market timing is that the future is unpredictable. That is, it is not possible to know, at any given point in time, if the current selling price of a security is lower or higher than will be the security's selling price tomorrow, next week, or one month from now. For the six market timing intervals examined in this simulation, a predefined heuristic was used to trigger withdrawals when a certain market condition was met. For example, one heuristic used was to sell if the S&P 500 Index is greater than the previous day. A second heuristic was to sell if the S&P 500 Index is less than the previous day. This heuristic was repeated for two day and three day intervals. That is, sell if the S&P Index is greater (or less) than the two (three) previous days.

Finally, again for comparison purposes, six additional simulations were performed that employed fictitious/hindsight withdrawal strategies. For example, one simulation sold investments on the exact day the S&P 500 Index was at the highest point for the year. This is an optimal yearly withdrawal strategy. In contrast, a second fictitious/hindsight simulation made yearly withdrawals on the exact day the S&P 500 Index was at the lowest point for the year. The ending values associated with these best and worst possible withdrawal strategies provide upper and lower bounds for comparison purposes. The other four fictitious/hindsight simulations followed similar withdrawal strategies but on a weekly and monthly basis. A summary of the six different market timing simulations and the six fictitious/hindsight simulations is provided in Table II.

The Simulation Model

The research simulated withdrawal strategies for the 20 year period from January 3, 1983 through December 31, 2002. It was assumed that on January 1, 1983 the beginning saving balance was \$1,000,000. This amount is an approximated cumulative savings of an investor at the point of retirement. A fixed amount was withdrawn from this investment according to the DCA strategy employed (e.g., *withdraw fixed amount of money on 1st day of each month*). The amount withdrawn from the account varied depending on the DCA strategy and what amount would result in a zero balance on December 31, 2002. That is, subsequent to the final withdrawal in 2002, there was \$0 remaining in the account. To reflect inflation and cost of living, the amount of withdrawal increased by 4% at the end of each calendar year. For example, in the simulation with the heuristic *yearly withdrawals on January 1 of each year*, the first withdrawal on January 1, 1983 was \$95,859.15. The second withdrawal on January 1, 1984 was \$99,693.52 (i.e., \$95,859.15 * 1.04). The final withdrawal on January 1, 2002 was \$201,960.78 (i.e., \$95,859.15 * 1.04¹⁹). Further, after the withdrawal on January 1, 2002, the balance in the account was \$0. Therefore, each withdrawal had effectively an equal *real dollar amount* or *buying power*.

To approximate a representative benchmark of a diversified higher-risk investment portfolio, the simulation invested money in the S&P 500 index. The S&P 500 Index represents approximately 70% of all United States publicly traded companies (Fool.com). Those stocks

included in the S&P 500 are selected based on market size, liquidity, and sector representation. As such, it is highly diverse. Further, the S&P 500 Index accurately reflects the investment choice of a large percentage of investors. Evidence of this is the fact that the Vanguard S&P 500 Index Fund (VFINX) is the largest mutual fund in the world with assets of over 103.4 billion dollars (money.cnn.com, 2005). A diversified mutual fund, such as an S&P Index fund, is also representative of a typical investment choice that would be available to millions of additional investors should personal Social Security accounts become a reality. Therefore, the simulation used daily closing price data for the S&P 500 Index for the 20 year period from January 3, 1983 through December 31, 2002. The assumption was that funds were invested in a no-load mutual fund, thus transaction costs were not considered. Dividends were excluded, which is consistent with prior simulation studies (Johnson and Krueger, 2005).

Simulation Results

The key measurement examined in all 72 simulations was the dollar amount withdrawn, which can be measured each period or in total over the 20 years from January 3, 1983 through December 31, 2002. The total dollar value for the withdrawals for each of the 72 simulations is given in Tables III through VIII.

Several observations can be made regarding the simulation results. Overall, concurring with research by Austin (1995) in regards to DCA as an investment strategy, interval length does impact results for withdrawals. However, in contrast to investing, where shorter interval frequencies are superior to longer frequencies, the reverse is true for withdrawals. For the 20 year period, from January 1, 1983 to December 31, 2002, the S&P Index experienced upward movement. In markets that go up, waiting to withdraw money for as long as possible yields better returns. For example, medians of the total withdrawals for different intervals are as follows: weekly \$3,047,816 (Table VI), monthly \$3,052,682 (Table III), yearly on the 1st \$3,091,915 (Table IV), and yearly on the 15th \$3,096,286 (Table V). In each instance, waiting longer to withdraw funds increases the total amount to be withdrawn. Even waiting 14 days, making withdrawals on the 15th rather than the 1st, increases the total amount, though only slightly. A larger difference of \$48,470 is seen in comparing weekly withdrawals with yearly withdrawals.

For yearly withdrawals (Tables IV and V), in general, the later in the year that withdrawals are made, the better the performance. However, there are exceptions, particularly with the third quarter being a very good period to sell. For withdrawals made on the 1st of the month, September is the best performing month, followed by July and December. For withdrawals made on the 15th, December is the best month and August is the second best month. This is an interesting finding, because it refutes the so-called *Halloween effect* and the adage, *sell in May and go away*. Investors should avoid selling in January, with the 1st of January (i.e., the first trading day after the New Year) being by far the lowest. When comparing withdrawals within the same month, in all instances, except two months, the 15th is superior to the 1st. Only in July and September is it better to make withdrawals on the 1st rather than the 15th.

When looking at monthly withdrawals (Table III), it is evident that allowing the funds to grow, by making withdrawals later in the month, is preferable. Waiting until the 27th, or later, is

particularly beneficial. However, the 16th is also a very good day to make withdrawals. The total amount withdrawn is \$3,057,057 and is the fifth best day of the month to make withdrawals, even better than the following ten days that are later in the month (i.e., 17th through the 26th).

When comparing weekly withdrawals (Table VI), there is only a small difference between the performances of the days of the week. However, in contrast to yearly and monthly intervals, waiting is not the best strategy. Tuesday is the best day to make withdrawals, followed closely by Wednesday. Withdrawing money at the earliest opportunity (i.e., Monday) is the worst performing day.

DCA, as a withdrawal strategy, performs adequately compared with the market timing strategies simulated in this research. Table VII indicates that timing can improve results, but not greatly. Further, it is difficult to determine what differentiates the performance of the timing strategies. Ironically, the best performing strategy is *sell if S&P 500 is up for two days*, with a total withdrawal of \$3,064,069 and the worst performing timing strategy is *sell if S&P 500 is up for three days*, with a total withdrawal of \$3,051,477. In comparison, DCA on a monthly interval is extremely competitive with a median ending value of \$3,052,682 (Table III). Of course, there are other market timing strategies that were not examined in this research that may have performed better or worse.

A final observation is that DCA performs moderately in comparison with the fictitious/hindsight strategies (Table VIII). This is evident when comparing the results of DCA with the best and worst case strategies. Table VIII summarizes the greatest and lowest possible ending values (i.e., upper and lower bounds) for yearly, monthly, and weekly withdrawal intervals. For yearly withdrawals, the upper and lower bounds for total amounts are \$3,463,930 and \$2,676,627 (the midpoint is \$3,070,279). On average, the ending value for yearly DCA (Tables IV and V) is superior to the midpoint. For monthly withdrawals, the upper and lower bounds for total amounts are \$3,139,919 and \$2,964,479 (the midpoint is \$3,052,199). On average, the ending value for monthly DCA (Table III) is almost equal to this midpoint. For weekly withdrawals, the upper and lower bounds for total amounts are \$3,082,523 and \$3,022,191 (the midpoint is \$3,052,357). On average, the ending value for weekly DCA (Table VI) is slightly inferior to this midpoint. Relative to best and worst possible ending values, the results of DCA are adequate.

Conclusion

As the predominant retirement plan increasingly becomes defined contribution, rather than defined benefit, the usage of DCA as an investing strategy continues to grow. DCA is also a method for withdrawing funds, such as during retirement years. Previous research has largely focused on investing and growing wealth with DCA, but scarcely little research has examined the withdrawal of funds. This research has examined DCA as a withdrawal strategy. Results indicate that waiting longer to make withdrawals can improve performance. Also, longer intervals, on average, are better than shorter intervals. With yearly withdrawals, the third quarter (i.e., July through September) is a very favorable period in which to make withdrawals. For monthly withdrawals, the 16th of the month is competitive with later days of the month. When

withdrawals are made weekly, Tuesday is the best day and Monday is the worst. Overall, the returns on DCA perform adequately compared with timing and best/worst case possibilities.

**Summary of 72 Simulation Combinations: Interval Length & Timing,
Market Timing, and Fictitious Hindsight**

<u>Interval</u> <u>Length and Timing</u>	<u>Examples of Withdrawal Dates</u>	<u>Quantity of Simulations</u>
Yearly on the 1 st of the month	Jan 1 st , Feb 1 st , Mar 1 st , ... Dec 1 st	12
Yearly on the 15 th of the month	Jan 15 th , Feb 15 th , Mar 15 th , ... Dec 15 th	12
Monthly	1 st , 2 nd , 3 rd , 4 th , 5 th , ... 31 st	31
Weekly	Mon, Tue, Wed, Thu, Fri	5

<u>Market Timing or Fictitious/Hindsight</u>	<u>Withdrawal Strategy: Sell if...</u>
Market Timing	Lower than previous day
Market Timing	higher than previous day
Market Timing	Lower than previous two days
Market Timing	higher than previous two days
Market Timing	Lower than previous day three days
Market Timing	higher than previous day three days
Fictitious/Hindsight	highest value of week
Fictitious/Hindsight	lowest value of week
Fictitious/Hindsight	highest value of month
Fictitious/Hindsight	lowest value of month
Fictitious/Hindsight	highest value of month
Fictitious/Hindsight	lowest value of month

Summary of Simulation Results: Monthly

<u>Day of Month</u>	<u>Year 1983</u>	<u>Year 2002</u>	<u>All 20 Years</u>
1	\$102,153	\$215,221	\$3,041,918
2	\$102,267	\$215,460	\$3,045,304
3	\$102,307	\$215,546	\$3,046,518
4	\$102,216	\$215,354	\$3,043,799
5	\$102,290	\$215,510	\$3,046,004
6	\$102,342	\$215,619	\$3,047,550
7	\$102,288	\$215,506	\$3,045,941
8	\$102,319	\$215,571	\$3,046,864
9	\$102,301	\$215,532	\$3,046,311
10	\$102,334	\$215,603	\$3,047,316
11	\$102,319	\$215,571	\$3,046,863
12	\$102,427	\$215,798	\$3,050,070
13	\$102,464	\$215,875	\$3,051,168
14	\$102,553	\$216,064	\$3,053,835
15	\$102,581	\$216,123	\$3,054,669
16	\$102,661	\$216,292	\$3,057,057
17	\$102,514	\$215,982	\$3,052,682
18	\$102,508	\$215,970	\$3,052,501
19	\$102,508	\$215,970	\$3,052,501
20	\$102,555	\$216,069	\$3,053,901
21	\$102,581	\$216,123	\$3,054,669
22	\$102,537	\$216,030	\$3,053,352
23	\$102,543	\$216,042	\$3,053,519
24	\$102,575	\$216,110	\$3,054,490
25	\$102,566	\$216,091	\$3,054,227
26	\$102,612	\$216,188	\$3,055,595
27	\$102,665	\$216,300	\$3,057,171
28	\$102,740	\$216,458	\$3,059,403
29	\$102,777	\$216,535	\$3,060,486
30	\$102,831	\$216,649	\$3,062,108
31	\$102,922	\$216,841	\$3,064,811
Mean	\$102,492	\$215,936	\$3,052,019
Median	\$102,514	\$215,982	\$3,052,682
High	\$102,922	\$216,841	\$3,064,811
Low	\$102,153	\$215,221	\$3,041,918

Summary of Simulation Results: Yearly on 1st of Month and Yearly on 15th of Month

Table IV

Yearly Withdrawals on 1st of Month: Dollar Value

<u>Month</u>	<u>Year 1983</u>	<u>Year 2002</u>	<u>All 20 Years</u>
Jan	\$ 95,859	\$201,961	\$2,854,501
Feb	\$ 98,483	\$207,489	\$2,932,641
Mar	\$ 99,934	\$210,546	\$2,975,844
Apr	\$100,478	\$211,692	\$2,992,038
May	\$102,030	\$214,962	\$3,038,259
Jun	\$103,691	\$218,463	\$3,087,741
Jul	\$104,616	\$220,410	\$3,115,257
Aug	\$104,459	\$220,079	\$3,110,580
Sep	\$104,636	\$220,452	\$3,115,861
Oct	\$103,972	\$219,054	\$3,096,088
Nov	\$104,090	\$219,303	\$3,099,606
Dec	\$104,526	\$220,221	\$3,112,588
Mean	\$102,231	\$215,386	\$3,044,250
Median	\$103,832	\$218,759	\$3,091,915
High	\$104,636	\$220,452	\$3,115,861
Low	\$ 95,859	\$201,961	\$2,854,501

Table V

Yearly Withdrawals on 15th of Month: Dollar Value

<u>Month</u>	<u>Year 1983</u>	<u>Year 2002</u>	<u>All 20 Years</u>
Jan	\$ 97,012	\$204,389	\$2,888,824
Feb	\$ 99,628	\$209,901	\$2,966,734
Mar	\$100,537	\$211,816	\$2,993,800
Apr	\$101,231	\$213,278	\$3,014,458
May	\$102,501	\$215,954	\$3,052,276
Jun	\$103,826	\$218,746	\$3,091,741
Jul	\$104,328	\$219,803	\$3,106,682
Aug	\$104,957	\$221,128	\$3,125,411
Sep	\$104,131	\$219,389	\$3,100,830
Oct	\$104,215	\$219,566	\$3,103,331
Nov	\$104,245	\$219,629	\$3,104,229
Dec	\$105,061	\$221,348	\$3,128,516
Mean	\$102,639	\$216,246	\$3,056,403
Median	\$103,979	\$219,068	\$3,096,286
High	\$105,061	\$221,348	\$3,128,516
Low	\$ 97,012	\$204,389	\$2,888,824

Summary of Simulation Results: Weekly, Market Timing, and Fictitious Hindsight

Day	All 20 Years	Yearly Average
Mon	\$3,042,322	\$152,116
Tue	\$3,052,441	\$152,622
Wed	\$3,051,585	\$152,579
Thu	\$3,046,606	\$152,330
Fri	\$3,047,816	\$152,391
Mean	\$3,048,154	\$152,408
Median	\$3,047,816	\$152,391
High	\$3,052,441	\$152,622
Low	\$3,042,322	\$152,116

Rule: Sell if S&P is...	All 20 Years	Yearly Average
Up 1 day	\$3,055,578	\$152,779
Down 1 day	\$3,053,807	\$152,690
Up 2 day	\$3,064,069	\$153,203
Down 2 day	\$3,057,353	\$152,868
Up 3 day	\$3,051,477	\$152,574
Down 3 day	\$3,056,336	\$152,817
Mean	\$3,056,437	\$152,822
Median	\$3,055,957	\$152,798
High	\$3,064,069	\$153,203
Low	\$3,051,477	\$152,574

Rule: Sell if S&P is...	All 20 Years	Yearly Average
High of Week	\$3,082,523	\$154,126
Low of Week	\$3,022,191	\$151,110
High of Month	\$3,139,919	\$156,996
Low of Month	\$2,964,479	\$148,224
High Year	\$3,463,930	\$173,197
Low Year	\$2,676,624	\$133,831
Mean	\$3,058,278	\$152,914
Median	\$3,052,357	\$152,618
High	\$3,463,930	\$173,197
Low	\$2,676,624	\$133,831

References

- Abeyssekera, S and Rosenbloom, E., "A Simulation Model For Deciding Between Lump-Sum and Dollar-Cost Averaging," *Journal of Financial Planning*, vol. 13, no. 6, June 2000.
- Andrews, E., "Greenspan Defends His Support of Tax Cuts," *The New York Times*, Section A, p. 21, March 16, 2005.
- Atra, R. and Mann, T., "Dollar-Cost Averaging and Seasonality: Some International Evidence," *Journal of Financial Planning*, vol. 14, no. 7, July 2001.
- Autsin, M., "Does Dollar-Cost Averaging Work? A Simulated Study Tests Whether Dollar-Cost Averaging Produces Higher Returns Than Buy-and-Hold Strategies" *Financial Planning*, vol. 25, no. 9, September 1995.
- Aversa, Jeannine, "Bernanke Says Financial Literacy Important," *The Associated Press*, <http://www.chron.com/disp/story.mpl/ap/business/3882169.html>
- Constantinides, G., "A Note on the Suboptimality of Dollar-Cost Averaging as an Investment Policy," *Journal of Financial and Quantitative Analysis*, vol. 14, no. 2, June 1979.
- Donlan, T., "Shock Therapy," *Barron's*, Vol. 86, Issue 3, p. 43, April 11, 2006.
- Fidelity Investments Monthly Investment Plan*,
https://www.fidelity.com/hk/planinvestment/monthly/dollar_cost_averaging.html
- Fool.com: Motley Food Index Center, <http://www.fool.com/school/indices/sp500.htm>
- Johnson, K. and Krueger, T., "Market Timing versus Dollar-Cost Averaging: Evidence Based on Two Decades of Standard & Poor's 500 Index Values," *Journal of Academy of Finance*, Fall 2004, vol. 2, pp. 24-34.
- Jump\$Start Coalition for Personal Financial Literacy, <http://www.jumpstartcoalition.org/>
- Malkiel, B., *A Random Walk Down Wall Street*, W.W. Norton & Company, 2004.
- Maranjian, S., *The Motley Fool Money Guide*, Motley Fool, 2001.
- Migration News, Immigration and Pensions,
http://migration.ucdavis.edu/MN/more.php?id=2344_0_5_0
- Money.CNN.com: Report: Magellan Falls to No. 5,
http://money.cnn.com/2005/04/28/funds/fidelity_magellan/index.htm
- Quinn, J., *Smart and Simple Financial Strategies for Busy People*, Simon and Schuster, 2006.

Rohrich, K., “Overhauling Social Security is a Necessity,” Canada Free Press, <http://www.canadafreepress.com/2005/klaus030305.htm>, March 3, 2005

Rozeff, M., “Lump-Sum Investing Versus Dollar-Averaging,” *Journal of Portfolio Management*, Winter 1994.

Schwadron, T., “76 Million Reasons to Reconsider What is Typical for Those Over 60,” *The New York Times*, Section G, p. 2, April 11, 2006.

Whitehead, T., “Below Average: Over Time, Markets Go Up—Not Down. That’s Why Dollar Cost Averaging Doesn’t Work,” *Canadian Business*, vol. 72, no. 10, June 11, 1999.