Dollar cost averaging

Insights

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Executive summary

Investing a lump-sum of cash into volatile capital markets is challenging for both first-time and seasoned investors. Migrating from an investment whose value is unchanged daily to one with significant up and downs triggers several behavioral biases. These biases include loss and volatility aversion and anchoring. In this paper, we explain each of these behaviors, discuss how they may affect investing and offer multiple solutions to best fit different investor types. You are likely unique from other investors and may have differing emotions related to the uncertainty of navigating global capital markets.

Our research shows that investing the entire amount of your money immediately has produced the highest average historical returns. While this may be the optimal strategy purely from a returns perspective, it may not be the ideal strategy for every investor. Another option, a traditional dollar cost averaging approach, offered the lowest amount of investor regret, which we define as the average number of months the portfolio spent below its initial value. Investor regret is greatest when investing a lump sum right before a substantial market downturn.

In choosing between these two approaches — lump sum and dollar cost averaging investing — we believe it is important for you to work with an advisor to walk through the concepts of "return" and "regret" when developing a strategic plan for investing cash and to help you understand the various emotions that could possibly surface.

What should I do with all this money?

The sale of a business or company stock, or an inheritance or insurance policy proceeds due to the untimely death of a loved one provides a sudden cash infusion and often a new investing challenge. While this transition may be difficult it also creates a wonderful opportunity to invest your new wealth toward achieving your long-term financial goals.

 Important disclosures on page 7.

Similar to other investors' experiences, you may find that navigating the myriad of available investment choices can be overwhelming. For this reason, it may be valuable to work with an advisor to develop a strategic plan tailored to your unique situation. Before investing, we recommend starting with a planning process:

- Identify a list of your values and short- and long-term financial goals
- Determine the optimal mix of investment types (such as how much to invest in bonds, stocks or other asset classes)
- Select appropriate investment strategies
- Build a portfolio aimed at meeting expected risk and return targets

The next step is the execution phase, developing a strategy to arrive at your target portfolio. It may seem simple, but executing an investment strategy has its own challenges, such as:

- What is the best way to invest?
- What are the behavioral aspects to consider?
- What new feelings could I have and how could they appear?

In this paper, we present a variety of potential emotional responses and offer strategies to help mitigate actions that may undermine your potential for long-term investment success.

Behavioral finance and the emotional side of investing

We outline three important considerations for the emotional side of investing — loss aversion, volatility aversion and anchoring bias.

- **Loss aversion:** Amos Tversky and Daniel Kahneman introduced this concept in their "Prospects Theory" paper[1] that has been referred to as a "seminal paper in behavioral economics." Prospect theory analyzes how people make decisions when faced with an uncertain outcome. People tend to make decisions based on the potential value of losses or gains rather than the final outcome and use internal judgment to assign likelihoods to these events. Loss aversion is a bias within the prospect theory framework. When making investment decisions, this cognitive perception causes investors to prefer avoiding potential losses over receiving an equivalent potential gain. This loss aversion bias can make it difficult when deciding to invest in risky assets, due to a continuing fear of an imminent market decline.
- **Volatility aversion:** Volatility aversion arises from a similar cognitive bias as loss aversion. The concept stems from the Ellsberg paradox[2] — a decision theory about people's preference to take on risk in situations where they know specific probabilities of the outcome over situations when they do not know the outcome. Uncertainty characterizes global capital markets and asset values fluctuate over time, sometimes significantly. Capital markets practitioners use volatility, a measure of price fluctuations, to quantify the current and historical risk in asset markets, with high volatility signifying historically high fluctuations. Calculated using historical data, this measure is backward-looking and, thus, is an imprecise estimate of future market movements. When investing in risk assets, there is no way of knowing exactly how much price fluctuation will occur. Even after calculating a risky asset's past volatility, investing can be uncomfortable because both the future value of the asset, as well as the amount of volatility endured are uncertain outcomes, unlike holding cash, which has a known future value.
- **Anchoring bias:** Studied initially by Daniel Kahneman[3], anchoring is attaching importance to an initial data point and basing subsequent decisions and emotions on this reference point. There has been some conjecture in academics to explain anchoring,

[1] "Prospect Theory. An Analysis of Decision Making Under Risk." Kahneman, Daniel, and Amos Tversky. 1977.

[2] Ellsberg, Daniel (1961). "Risk, Ambiguity, and the Savage Axioms" (PDF). Quarterly Journal of Economics. 75 (4): 643–669. doi:10.2307/1884324. JSTOR 1884324. http://links.jstor.org/sici?sici=0033-5533%28196111%2975%3A4%3C643%3ARAATSA%3E2.0.CO%3B2-E

[3] Tversky, A.; Kahneman, D. (1974). "Judgment under Uncertainty: Heuristics and Biases" (PDF). Science. 185 (4157): 1124–1131. Bibcode:1974Sci...185.1124T. doi:10.1126/science.185.4157.1124. PMID 17835457. S2CID 143452957.

with no consensus explanation. For the context of this paper, we define an anchoring point as the initial amount of capital invested. When combined with loss aversion, these biases cause investors to experience escalating distress as portfolio values drop below their initial value. Their distress typically outweighs the pleasure they feel when the portfolio increases above the initial value.

Each of these behavioral characteristics can present emotional challenges related to capital market investing, with the central theme being uncertainty. It is important to acknowledge this challenge while taking a longer-term mindset and looking at investing in the context of the total portfolio, which may include a combination of equities (with uncertain returns and high price fluctuations), fixed income (with less uncertainty and regular receipt of cash flows) and other investments, including real estate, commodities, alternative investments and cash.

Our expertise can help you:

- Develop an appropriate asset allocation strategy and enter the global capital markets
- Navigate the challenges investing brings
- Work toward your long-term financial goals

Three methods for investing cash

In migrating from a lump sum of cash into a fully-diversified investment portfolio, we contemplated both the data on investment performance, as well as potential behavioral characteristics or issues. The three processes for investment we considered were lump sum (or immediate investment), traditional time-based dollar cost averaging and a volatility-based alternative for dollar cost averaging. Following are descriptions of each strategy.

- **Lump sum investing:** Full investment of cash at one time into a pre-determined target portfolio.
- **Traditional dollar cost averaging:** A systematic approach of investing the same dollar amount each period until one achieves full investment in the target portfolio. We break the initial total value into equal proportions and invest in intervals over a pre-determined period.
- **Volatility-based dollar cost averaging:** A systematic approach varying the regular investment amount depending on changes in portfolio value. We tested two strategies based on volatility, one with a value factor and one with a momentum factor. For value based, we increase investment amounts following periods of declining portfolio values and reduce them following periods of rising portfolio values. Momentum based is the opposite — increasing investment after a rising month for the target portfolio and decreasing investment after a declining month for the target portfolio.

Academia has published research on these strategies and they can be straightforward to develop, implement and track. If you are interested in this information, we provide a list of the research sources we studied at the end of this document.

We tested these three strategies over the period from January 1990 to January 2019 using a five-year investment horizon and three different portfolio styles. First, we looked at a simple 100 percent U.S. equity portfolio (represented by the S&P 500 Index). Next, we incorporated a traditional balanced portfolio allocated 70 percent to equities (via the S&P 500 Index) and 30 percent to bonds (via 10-year U.S. Treasury bond index). Lastly, we utilized a more contemporary globally diversified portfolio containing 49 percent domestic stocks (via the S&P 500 Index), 21 percent foreign equities (via the MSCI All-Country World ex-U.S. Index), 25 percent bonds (via the Bloomberg Barclays Global Aggregate Bond Index), and 5 percent real estate (via the Wilshire U.S. REIT Index).

Outlined below are our assumptions for each of the strategies:

- **Lump sum investing:** We assumed full investment at the first month.
- **Traditional dollar cost averaging:** We assumed regular and equal monthly investments over a two-year period, meaning we reached full investment in the target portfolio two years after starting. We assumed the money to invest was held in a very low risk (but also low return) asset, such as cash, while awaiting investment.

- **Volatility-based dollar cost averaging strategies:** We based the initial investment amount on the same monthly investment over two years, but varied the amount each month.
  - **Value-based strategy:** After a declining month for the target portfolio, we increased the target investment amount by 50 percent. After a rising month for the target portfolio, we decreased the target investment amount by 50 percent. In a portfolio with no price changes, we reached full investment in two years, sooner if we saw declines (just 16 months to full investment), and longer in steadily rising markets (four years to full investment). Again, we assumed the cash awaiting investment in the target portfolio is held in a very low risk and low or zero return asset, such as cash, while awaiting investment.
  - **Momentum-based strategy:** We followed a similar methodology to the value strategy, but increased investment after a rising month for the target portfolio and decreased investment after a declining month for the target portfolio. The opposite is true for the time frame to be fully invested. In a portfolio with no price changes, we reached full investment in two years, sooner if we only saw increases and longer in steadily declining markets.
- We hold cash awaiting investment in the target portfolio in very low risk and low or zero return asset, such as a money market fund, while awaiting investment.
- We measured results over a five-year period, starting from initial investment.

In summary, we found that lump sum investing provided the highest average five-year investment performance for all portfolios: the all-equity portfolio, the 70 percent equity/30 percent fixed income balanced portfolio, and the globally diversified portfolio. Meanwhile, there was no clear difference in the amount of time each method spent below the initial investment value. Over five year periods the portfolios averaged six to eleven months below their initial value.

Lump sum investment, on average, generated annualized returns 2 percent to 3 percent greater than strategies invested over time. Opportunity for investor regret was consistent on average portfolios spend six to nine months below the portfolios initial value.

Performance comparison

Results for all three portfolios tended to be consistent looking at rolling five-year averages. Lump sum investing, on average, delivered 9 percent to 11 percent annual returns, with returns falling between 6 percent to 8 percent, on average, for traditional dollar cost averaging, and for the two volatility-based strategies. In summary, our performance analysis favored lump sum investing.

Consistent performance seen across portfolios

	Average 5-year forward return*	% of time below beginning value
All equity portfolio		
Traditional DCA	7.5%	16.6%
Value-based DCA	7.7%	14.1%
Momentum-based DCA	8.1%	18.1%
Lump sum	11.0%	14.4%
70/30 U.S. portfolio		
Traditional DCA	6.5%	15.6%
Value-based DCA	6.7%	10.2%
Momentum-based DCA	7.4%	13.7%
Lump sum	10.1%	10.2%
Globally diversified portfolio		
Traditional DCA	6.4%	18.4%
Value-based DCA	6.3%	19.2%
Momentum-based DCA	7.0%	18.6%
Lump sum	8.9%	21.2%

Source: U.S. Bank Asset Management Group analysis. Data period: January 1990 to January 2019.

*The average annual return for a five-year period.

Index benchmarks were used to represent different portfolio strategies. All equity portfolio: represented by S&P 500 Index. Traditional balanced portfolio: 70 percent S&P 500 Index and 30 percent 10-year U.S. Treasury bond index. Globally diversified portfolio: 49 percent S&P 500 Index, 21 percent MSCI All-Country World ex-U.S. Index, 25 percent Bloomberg Barclays Global Aggregate Bond Index, and 5 percent MSCI U.S. REIT Index.

Past performance is not a guarantee of future returns. Returns shown represent results of market indexes and are not from actual investments and are shown for ILLUSTRATIVE PURPOSES ONLY. Please see important information regarding this performance in the disclosure section.

Loss aversion

On average, the all equity portfolio spent the most time below the initial investment value, from nine months to 11 months across all investing approaches. The 70/30 U.S. portfolio generated the widest diverging outcomes, ranging from six months for the lump sum strategy to almost 11 months for the traditional dollar cost averaging strategy.

Risks of regret

One concern if you happen to be a performance-oriented lump sum investor might be investing at or near a market peak. In reviewing four recent stock market peaks, we see investors can take quite some time to recover their initial investment value in these simple portfolios. Investing at the August 1987 market peak meant investors had to wait almost two years to see full recovery. Investing just before the 2007 financial crisis took from at least three years to nearly five years to recover the initial portfolio value. Finally, from the height of the dot com bubble in 2000, the lump sum investor would have waited until 2004 or 2006 to recover to the initial investment value. On average, time rewarded the patient investor.

Recovery time (# of months) for substantial U.S. market corrections

Market top:	1987	2000	2007	2020
All equity portfolio	21	74	53	7
70/30 U.S. portfolio	17	52	38	6
Globally diversified portfolio	21	55	41	6

Source: U.S. Bank Asset Management analysis.

Index benchmarks were used to represent different portfolio strategies. All equity portfolio: represented by S&P 500 Index. Traditional balanced portfolio: 70 percent S&P 500 Index and 30 percent 10-year U.S. Treasury bond index. Globally diversified portfolio: 49 percent S&P 500 Index, 21 percent MSCI All-Country World ex-U.S. Index, 25 percent Bloomberg Barclays Global Aggregate Bond Index, and 5 percent MSCI U.S. REIT Index.

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Conclusions

We studied a variety of investment strategies to begin an investment plan. This included analyzing lump sum investing, traditional dollar cost averaging and volatility-based dollar cost averaging. On average, the lump sum investment strategy, meaning immediate full investment, delivered the best investment performance. This reflects the general trend of stock markets (and economies) to grow over time. In addressing common investor concerns, a traditional dollar cost averaging approach resulted in the lowest instances of investor regret. This strategy gives up some performance relative to the lump sum strategy, but tends to spend less time below the initial investment balance. More complex strategies, such as volatility-based, appear to offer little extra benefit to investors.

The beginning of an investment plan can be a tumultuous period. As an investor, you may be in transition into the investment business from another form of income, or perhaps you've seen a significant change in your accumulated wealth status. This can bring new emotions, along with a likely change in lifestyle. Just starting a new investment plan can require a difficult leap of faith.

The choice then between lump sum investment versus dollar cost averaging comes down to a choice between maximizing investment returns and minimizing investor regret. Because your investment circumstances are unique, we believe it is important to work with an advisor to walk through these concepts and then develop a strategic plan for implementing an appropriate investment strategy to help work toward your objectives.

Research works analyzed:

- Dunham, Lee M., and Geoffrey C. Friesen. 2011. "Building a Better Mousetrap: Enhanced Dollar Cost Averaging." SSRN Electronic Journal, December. doi:10.2139/ssrn.2008465.
- Fruhwirth, Manfred, and Georg Mikula. 2008. "Can Prospect Theory Explain the Popularity of Savings Plans?" SSRN Electronic Journal. doi:10.2139/ssrn.1681343.

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- Hayley, Simon. 2012. “Dollar Cost Averaging - The Role of Cognitive Error.” Cass Business School.
- Kahneman, Daniel, and Amos Tversky. 1977. “Prospect Theory. An Analysis of Decision Making Under Risk.” Econometrica 47 (2): 263–92. doi:10.21236/ada045771.
- Leggio, K. 2001. “Does Loss Aversion Explain Dollar-Cost Averaging?” Financial Services Review 10 (1-4): 117–27. doi:10.1016/s1057-0810(02)00090-2.
- Milevsky, Moshe Arye, and Steven E. Posner. 1999. “A Continuous-Time Re-Examination of the Inefficiency of Dollar-Cost Averaging.” SSRN Electronic Journal, January. doi:10.2139/ssrn.148754.

This commentary was prepared May 2021 and represents the opinion of U.S. Bank and its affiliate U.S. Bancorp Investments. The views are subject to change at any time based on market or other conditions and are not intended to be a forecast of future events or guarantee of future results and is not intended to provide specific advice or to be construed as an offering of securities or recommendation to invest. Not for use as a primary basis of investment decisions. Not to be construed to meet the needs of any particular investor. Not a representation or solicitation or an offer to sell/buy any security. Investors should consult with their investment professional for advice concerning their particular situation. The factual information provided has been obtained from sources believed to be reliable, but is not guaranteed as to accuracy or completeness. Any organizations mentioned in this commentary are not affiliated or associated with U.S. Bank or U.S. Bancorp Investments in any way.

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Diversification and asset allocation do not guarantee returns or protect against losses. Based on our strategic approach to creating diversified portfolios, guidelines are in place concerning the construction of portfolios and how investments should be allocated to specific asset classes based on client goals, objectives and tolerance for risk. Not all recommended asset classes will be suitable for every portfolio.

Dollar cost averaging does not assure a profit and does not protect against loss in declining markets. Such a plan involves continuous investment in securities regardless of fluctuating price levels and investors should consider their ability to continue purchases through periods of fluctuating price levels

Past performance is no guarantee of future results. All performance data, while deemed obtained from reliable sources, are not guaranteed for accuracy. Indexes shown are unmanaged and are not available for investment. The **S&P 500 Index** is an unmanaged, capitalization-weighted index of 500 widely traded stocks that are considered to represent the performance of the stock market in general. The **Bloomberg Barclays Global Aggregate Index** is considered to be representative of bonds of foreign countries. The **MSCI All Country World Index** (ex-U.S.) tracks the performance of stocks representing developed and emerging markets around the world that collectively comprise most foreign stock markets. U.S. stocks are excluded from this index. The **MSCI U.S. REIT Index** represents approximately 85 percent of the U.S. Real Estate Investment Trust (REIT) universe.

Performance information for the portfolios shown is hypothetical and for illustrative purposes only. Performance was calculated using a model and does not represent actual returns achieved by any investor. The model portfolio results reflect a specific market environment and time period. Markets vary over time and under different market conditions the models may product different results. There is no guarantee any strategy discussed/presented would achieve stated investment objectives. The hypothetical returns rely on a number of assumptions. No representation or warranty is made as to the reasonableness of the assumptions made, or that all assumptions used in achieve the returns have been fully stated or fully considered. Changes in assumptions may have a material impact on model portfolio returns presented.

Model hypothetical returns have many inherent limitations and may not reflect the impact that material economics and market factors may have had on the decision-making process if client funds were actually managed in the manner shown. Performance results could vary from the hypothetical performance due to timing of entry into the market, underlying securities held in the portfolio at the time of purchase, deviations in the investors' financial and tax considerations, as well as account holdings and preferences, cash flows, frequency and precision of rebalancing, tax-management strategies, cash balances, account level advisory fees, varying custody fees and/or the timing of fee deductions.

All performance data presented reflect price appreciation as well as the reinvestment of dividends and interest. Performance is calculated as the total rate of return (confirm if this is true). No account level fees or others expenses are considered. If account level and other fees were included, model returns presented would be lower.

International investing involves special risks, including foreign taxation, currency risks, risks associated with possible difference in financial standards and other risks associated with future political and economic developments. Investing in **emerging markets** may involve greater risks than investing in more developed countries. In addition, concentration of investments in a single region may result in greater volatility. **Equity securities** are subject to stock market fluctuations that occur in response to economic and business developments. Investing in **fixed income securities** are subject to various risks, including changes in interest rates, credit quality, market valuations, liquidity, prepayments, early redemption, corporate events, tax ramifications, and other factors. Investment in debt securities typically decrease in value when interest rates rise. The risk is usually greater for longer-term debt securities. Investments in lower-rated and non-rated securities present a greater risk of loss to principal and interest than higher-rated securities. There are special risks associated with an investment in **commodities**, including market price fluctuations, regulatory changes, interest rate changes, credit risk, economic changes, and the impact of adverse political or financial factors. Investments in **real estate securities** can be subject to fluctuations in the value of the underlying properties, the effect of economic conditions on real estate values, changes in interest rates, and risks related to renting properties (such as rental defaults).

