The lost (or found) decade: Capturing volatility benefits using DCA

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The phrase “The Lost Decade” was originally applied to 1990s Japan, but the recent economic situation has led many people to apply the term to the United States. For example, from 2000 to 2009, real income fell, unemployment rose and poverty jumped. Of particular interest to this discussion is the fact that the stock market, as measured by the Standard & Poor's 500 index, was relatively flat over this time period (see Figure 1). Thus, many investors (and the financial media in particular) have suggested that a whole decade of investment has been lost. But has it? The answer really depends on your investing approach.

Dollar-cost averaging

Beginning with Williams and Bacon (1993), there has been a lively debate about whether lump-sum investing or dollar-cost averaging, or DCA, is the better approach. The typical view is that practitioners are proponents of DCA; in contrast, academic statistical evidence suggests that lump-sum investing almost always produces superior returns. Dubil (2005); Greenhut (2006); Chittenden, Moon, and Toles (2010); and Atra and Mann (2011) all re-examined this issue, generally concluding that the historically upward trend in stock prices supports the use of lump-sum investing over DCA. Following this advice, an investor who employed lump sum investing would, in fact, have experienced a true "lost decade" from 2000 to 2009.

These studies provide compelling evidence, but they generally ignore one particularly relevant piece of information -- the choice between lump sum and DCA assumes the investor has already accumulated investable funds and must therefore choose the timing of the investment. For most individual investors, this is not the case. The majority of investors are constantly accumulating assets, such as through a monthly contribution to a retirement account. In this case, the investors have little choice but to follow DCA. Are they doomed to underperformance? The answer is no, and the lost decade will illustrate this point. However, before this can be clarified, it is necessary to examine return calculation methodologies.

Dollar-weighted returns

Suppose an investor purchases an asset for $100. One year later the asset is worth $50. The first year return is thus minus 50 percent. Also, suppose the second year that the asset gains in value, ending at $75. Thus, the second year return is 50 percent. Taking the straight (arithmetic) average gives a return of:

$$\frac{50\% + (-50\%)}{2} = 0\%$$

The arithmetic average suggests that this investor was even. But this is obviously not the case, as she invested $100, and two years later she only had $75, or a loss of 25 percent. On an average (geometric) basis, the average return is:
This loss is much more reflective of the actual return the investor earned.

The difference between these two averages is driven by volatility and the associated compounding of the volatile returns. As the example illustrates, a 50 percent loss is much more impactful on a portfolio than an associated 50 percent gain. In fact, a 50 percent loss must be followed by a 100 percent return just to break even. This is the downside of volatility, and it is one of the reasons why volatility is generally considered a risk -- i.e., higher volatility assets require a higher rate of return.

The example, like prior studies on DCA, assumes that the investor is making a lump-sum investment. However, what if the investor was dollar-cost averaging and invested $100 each period? The investor does not need to earn 100 percent to offset the original loss. The original $100 investment would be worth $50 at the end of the first year, at which time another $100 would be added. At the end of the second year, the $150 would have grown to $225, which is greater than the absolute amount of $200 that was invested over the time period.

The investor actually has a positive return for the period due to the fact that more money was invested during the best year. The return that results is referred to as the dollar-weighted return. In equation form, the return for our example would be calculated as follows:

\[
\frac{100}{(1 + r)^0} + \frac{100}{(1 + r)^1} = \frac{225}{(1 + r)^2}
\]

\[r = 8.11\%
\]

The dollar-weighted return is a positive average of 8.11 percent per year.\(^1\) Even though the market was down, this investor, as a result of dollar-cost averaging, actually had a positive average return. This is the benefit of volatility -- it allows investors to purchase more shares at relatively lower prices. Not all volatility is bad, particularly if a dollar-cost averaging investment approach is being used.

DCA and the lost decade

Given the potential benefit of DCA, the question now becomes whether or not the lost decade was truly lost, or if some investors happened to find return during this period. To examine this issue, I have collected monthly closing dividend adjusted closing prices for the S&P 500 from Jan. 3, 2000, to Jan. 4, 2010, to capture the period of time most commonly associated with the lost decade terminology. I report these statistics in Table 1, which includes arithmetic and geometric average returns on a monthly and yearly basis. I have also included a dollar-weighted

\[^1\] The dollar-weighted return is also known as the internal rate of return, or IRR. This can be found using any financial calculator or Excel: CF\(_0\)=-100, CF\(_1\)=-100, and CF\(_2\)=225. Compute IRR. This approach is consistent with Chittenden, Moon and Toles (2010).
average return, which assumes that an investor makes an equal investment in the S&P 500 each month over the full time period.

The monthly arithmetic average return is 0.03 percent, while the geometric average is minus 0.08 percent -- thus a lost decade. This empirically illustrates the earlier example that shows the geometric (or compounded) average is always less than the arithmetic average when volatility is present. This is the downside of volatility. However, for a DCA investor, the monthly average return is 0.04 percent (or about 5 percent cumulative over the entire period). This is not large, but it does illustrate that DCA enables the investor to offset the negative impact of volatility on compounded returns by taking advantage of the buying opportunities created. Although it wasn't the best time for investing, maybe the decade was not quite as "lost" as the term suggests.

**Behavioral concerns**
Capturing the benefit of volatility requires investors to stand firm in their investment strategies. However, due to psychological biases (see Nofsinger, 2011), it is often hard for investors to do this. For example, it is well-documented that retail investors are often "late to the game," buying at the high points and selling at the low points. The largest monthly mutual fund outflow in recent years occurred in November 2008, which immediately followed the Lehman Brothers collapse and associated market fall. While investors should have continued to stand firm and invest at lower prices to benefit from the volatility, a herd mentality prevailed as they fled to perceived quality.

**Applications for financial planners and investors**
What does all this mean for financial planners and investors? First, while dollar-cost averaging has been systematically disparaged in favor of lump-sum investing, it is important to realize that most investors do not, in reality, face this choice. Due to monthly accumulation, most are inherently DCA investors. While lump-sum investing is dominant in stable, upward-sloping markets, more recent times (such as the lost decade) have revealed the benefit of such an approach. Specifically, DCA allows investors to offset the negative impact of volatility on compounded returns by creating opportunities to buy at relatively lower prices. The result is a positive impact on dollar-weighted return.

It appears that market volatility may remain high going forward. To the extent that this occurs, DCA will continue to be valuable, as increased volatility (even in up markets) makes DCA a relatively attractive approach. However, financial planners must play the role of psychologist, as failure to stay consistent in the face of volatility eliminates any benefit -- i.e., investors ending up "buying high and selling low" instead of the opposite. One of a planner's most valuable functions is to convince clients of such an approach.
References


Table 1: Standard & Poor's 500 index, return characteristics 2000-2009

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<thead>
<tr>
<th></th>
<th>Monthly</th>
<th>Annual</th>
</tr>
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<tbody>
<tr>
<td>Arithmetic average</td>
<td>0.03%</td>
<td>0.34%</td>
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<tr>
<td>Geometric average</td>
<td>-0.08%</td>
<td>-0.96%</td>
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<tr>
<td>Dollar-weighted average</td>
<td>0.04%</td>
<td>0.46%</td>
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</tbody>
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Figure 1: Standard & Poor’s 500 index, closing prices