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The Universal Effects of Compounding and Leveraged Funds

Compounding is a universal mathematical concept that affects the returns of investments. It is important for all investors to understand how compounding affects returns in different market conditions—upward-trending, downward-trending and volatile. For leveraged fund investors, it is particularly important to understand that the effect of compounding on leveraged funds is significantly magnified and can cause gains and losses to occur much faster and to a greater degree.

Compounding with unleveraged investments:

Let's take a look at how compounding affects unleveraged returns in upward-trending, downward-trending and volatile markets.



When "10 + 10 = 21"

In an upward-trending market, compounding can result in longer-term returns that are greater than the sum of the individual daily returns.

An investor who starts with \$100 in an investment that grows 10% a day for two consecutive days would have \$121, or a 21% gain. This is greater than the sum of the individual day returns, or 20%.



When "-10 + -10 = -19"

In a downward-trending market, compounding can also result in longer-term returns that are less negative than the sum of the individual daily returns.

An investor who starts with \$100 in an investment that declines 10% a day for two consecutive days would have \$81, or a -19% return. This is less negative than the sum of the individual day returns, or -20%.



When "10 + -10 = -1"

In a volatile market, compounding can result in longer-term returns that are less than the sum of the individual daily returns.

An investor who starts with \$100 in an investment that rises 10% on one day and declines 10% the next would have \$99, or a -1% return. This is less than the sum of the individual day returns or 0%.

Glossary

- **Compounding** – the cumulative effect of applying gains/losses and income from one time period to the principal, plus the gains/losses and income from a previous period.
- **Unleveraged investment** – Any investment that does not apply leverage to magnify returns. (e.g., index funds, savings accounts, stocks, bonds, mutual funds)
- **2x leveraged fund** – A fund designed to provide twice (200%) the daily return of an index or other benchmark. (These funds do not attempt to produce the return during any period other than a day. Results for longer than one trading day will likely differ from the return of twice the index over the longer period.)
- **Volatile market** – A market characterized by price swings where values go up-and-down and/or down-and-up.

Note: All examples use extreme and simplified hypothetical market movements, and are for illustrative purposes only. Actual market movements can be meaningfully different. Examples do not reflect the impact of expenses or taxes which would lower the results shown.

The use of leverage and/or aggressive investment techniques, such as through the use of futures or other financial instruments, may expose funds to dramatic gains and losses as well as impact correlation of returns. The funds do not limit the frequency of purchases and exchanges which may increase expenses including taxes which can negatively impact performance. Read the prospectus carefully before you invest.

Compounding with leveraged (2x) investments: “The same but more”

Now let’s take a look at how compounding affects leveraged fund returns in upward-trending, downward-trending and volatile markets. **Compounding in leveraged funds can result in gains or losses that occur much faster and to a greater degree.**



When “ $20 + 20 = 44$ ”

In an upward-trending market, compounding can result in longer-term leveraged returns that are greater than two times the return of the unleveraged investment.

An investor who starts with \$100 in a leveraged fund that grows 20% a day (2 x 10% index gain) for two consecutive days would have \$144, or a 44% gain. This is greater than two times the 21% compound gain of the unleveraged investment.



When “ $-20 + -20 = -36$ ”

In a downward-trending market, compounding can also result in longer-term leveraged returns that are less negative than two times the return of the unleveraged investment.

An investor who starts with \$100 in a leveraged fund that declines 20% a day (2 x 10% index decline) for two consecutive days would have \$64, or a -36% return. This is less negative than two times the 19% compound loss of the unleveraged investment.



When “ $20 + -20 = -4$ ”

In a volatile market, compounding can result in leveraged longer-term returns that are less than two times the return of the unleveraged investment.

An investor who starts with \$100 in a leveraged fund that rises 20% one day (2 x 10% index gain) and declines 20% the next (2 x 10% index decline) would have \$96, or a -4% return. This is four times less than the -1% compound return of the unleveraged investment (see sidebar). Compounding can also result in returns that are in the opposite direction of the underlying index during periods of unusual volatility.

In summary

The effect of compounding can help returns in upward- and downward-trending markets and hurt in volatile markets, assuming all other variables remain the same. Investors should recognize that over time this effect can be magnified significantly in leveraged funds. The use of leverage generally increases the risk of investing in the funds. Leveraged funds are not suitable for all investors. **Investors should actively monitor their holdings consistent with their strategies, as frequently as daily.**

Does compounding affect the returns of conventional index funds? If so, why don’t I see it?

Over time, compounding can make returns of an indexed investment either greater than or less than the simple sum of the individual daily returns. However, this effect is not easy to see by merely comparing the return of the investment versus the return of the index.

The reason? Conventional indexes such as the S&P 500 and the Dow Jones Industrial Average have the effect of compounding incorporated into their returns.

Why aren’t the longer-term returns of a 2x leveraged fund normally two times the return of its underlying index?

The impact of compounding on a 2x leveraged fund is generally greater than twice the impact of compounding on an equivalent unleveraged investment. As a result, the longer-term return of a leveraged fund can be significantly greater than or less than two times the return of its underlying index for the time period.

For instance, the leveraged fund return in the volatile market example on this page (third example) results in a 4% loss, a much greater loss than two times the 1% loss in the unleveraged volatile market example on page one (third example).

Investing involves risk including possible loss of principal. Carefully consider the investment objectives, risks, charges and expenses of ProFunds and ProShares before investing. This and other information can be found in the funds’ prospectuses. For a ProFunds mutual fund prospectus, call 888-PRO-5717 or visit www.profunds.com. For a ProShares ETF prospectus, call 866-PRO-5125 or visit www.proshares.com. Read the prospectuses carefully before investing, and seek the advice of your financial adviser or broker/dealer representative. “ProFunds Group” includes ProFunds mutual funds and ProShares ETFs. ProFunds are distributed by ProFunds Distributors, Inc. ProShares are distributed by SEI Investments Distribution Co., which is not affiliated with ProFunds Group.

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