Should I Include Leveraged ETFs In My Portfolio?

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1 Introduction

In finance, leveraging means obtaining an exposition to an asset that surpasses one's stake. For instance, with a x2 (or "2:1") leveraged ETF (LETF), an investment of 1 euro grants 2-euro worth of exposition to the underlying asset of the LETF.

The Lifecycle Investing study showed that adopting a leveraged position on stocks may be interesting for retirement planning in a first section of one's career. The goal of such leveraging is to increase the expected returns given that, at that stage of life, one's total portfolio is overwhelmingly dominated by bond-like assets (futures savings from wages) thus causing one's exposition to risky assets to be far below what one's level of risk aversion (or utility function) recommends.

Fundamentally, several methods make this possible, of which borrowing (e.g., mortgage loans, margin loans) is the most obvious one. But those methods also include more sophisticated schemes involving stock options (namely box spreads on future contracts).

In this study, we will explore the intricacies of one LETF – Amundi ETF Leveraged MSCI USA Daily UCITS ETF - EUR, whose ticker is "CL2" – which is designed to provide, at the scale of each trading day, a x2, long exposition to the performance of the MSCI USA index (Net Return).

- This LETF uses short-term, interbank borrowing to turn an investor's 1 euro stake into 2 euros of exposition. This gymnastic is solely managed by the fund.
- The fund is eligible to the Plan Epargne en Action (PEA) even though the index it tracks is entirely focused on the US. That is because it uses a *total return swap* between (i) a set of eligible assets (assets based in the European Union) it owns and (ii) the actual set of stocks in the MSCI USA Index owned by another company.
- And CL2 also happens to be capitalizing which allows dividends to compound without reduced tax interference and grants the investor full control on their fiscal events.

These characteristics make CL2 and similar LETFs the easiest solution to gain leverage on stocks in France.

Nonetheless, this form of leverage implies certain additional risk factors compared to the equivalent, but unleveraged, scenario (namely a classic long, unleveraged, buy-and-hold strategy on ESE – a popular ETF tracking the S&P 500 index which is similar to the MSCI USA index):

- the cost of the borrowing carried out by the fund evolves unpredictably over time and has a direct, negative impact on the perfomance of the LETF;
- the daily rebalancing (daily reset of the leverage) increases the negative impact of the underlying index's volatility on the performance of the LETF – this negative impact is called beta slippage. LETFs with a daily rebalancing are only marketed for detention periods of 1 trading day at most because funds want to discourage investors from exposing themselves to the daily rebalancings.

Those weaknesses can make LETFs greatly underperform equivalent unleveraged ETFs (e.g., CL2 vs. ESE) if borrowing costs and/or volatility are high.

The choice of an investment essentially rests on its expected risk-adjusted return or, in other words, on the amount of return it will provide for each unit of volatility (risk). Compared to unleveraged ETFs like ESE, the risk-adjusted return of LETFs like CL2 are more vulnerable to the underlying index's volatility and require borrowing costs not being too high (while unleveraged ETFs are not directly affected by interest rates). Hence, while LETFs are easy to *use*, the *choice to invest* in them is much more complex. That is what we will explore herein.

2 Materials

The time series used in this study are listed in Table 1.

Table 1: Metarials of the study

Time series	Source
MSCI USA index (Net, USD)	https://www.msci.com/indexes/index/984000
Euro Short-Term Rate (ESTER)	https://www.boursorama.com/bourse/taux/cours/1xESTER/
USD/EUR	https://finance.yahoo.com/quote/USDEUR=X/
CL2	https://finance.yahoo.com/quote/CL2.PA/

3 Understanding beta slippage

Let's first have a look at a putative 2× leveraged investment without rebalancing. That corresponds to a situation where one invested €100 and got €200 worth of the asset (an index fund) thanks to borrowing (i.e., with a €100 loan), for instance. For the sake of this example, we will consider a constant daily return of 2% on the index fund and ignore borrowing costs and fees. Figure 1 shows that the cumulative return of the 2× leveraged investment is constantly equal to the cumulative return of the index fund multiplied by two.

Figure 1: Leverage without rebalancing

We also notice on Figure 1 that the daily returns gradually converge: the one of the index fund was set to a constant 2%, but that translates to a daily return on the leveraged investment that starts at 4% and converges asymptotically to 2%. This is because, while the value of the initial €200 worth of index fund shares grows by 2% daily, the value of the debt stays constant. As the total value of the position (= value of the asset) increases, the debt (= €100) becomes negligible relative to the steadily growing equity (= position - debt). Hence, in the limit of infinitely many trading days, the leverage – which is is the position to equity ratio (Equation 1) – approaches 1 and the daily returns asymptotically appproach 2%, like the unleveraged, underlying index fund. Equation 2 demonstrates this (with R_t = daily return).

$$leverage = \frac{position}{equity} = \frac{position}{position - debt} \tag{1}$$

$$R_t = \frac{200(1.02)^t - 200(1.02)^{t-1}}{200(1.02)^{t-1} - 100} \tag{2}$$

$$= \frac{200(1.02)^{t-1} \cdot (1.02 - 1)}{200(1.02)^{t-1} - 100}$$

$$= \frac{200(1.02)^{t-1} \cdot 0.02}{200(1.02)^{t-1} - 100}$$

$$= \frac{(1.02)^{t-1} \cdot 0.02}{(1.02)^{t-1} - 0.5}$$

$$\lim_{t \to \infty} R_t = \lim_{t \to \infty} \frac{(1.02)^{t-1} \cdot 0.02}{(1.02)^{t-1} - 0.5}$$

$$= \frac{0.02 \cdot \infty}{\infty} = 0.02$$

A key information here is the fact that, unless the underlying asset doesn't change in value, leverage needs rebalancing in order to stay at a constant level. Without it, the level of leverage decreases when the returns are positive and it increases when the returns are negative.

But what is rebalancing exactly? It basically consists is readjusting the level of leverage after it has diverged because of the positive or negative evolution of the price of the asset. Keeping in mind Equation 1, in the case above where the leverage has decreased at the end of day 2 due to a 2% return (Equation 3), rebalancing would consist in borrowing more which reduces the *equity* term (Equation 4), in buying more shares without borrowing to increase the *position* (Equation 5), or in selling the 2% return to bring both the *position* and the *equity* back to their initial values (Equation 6).

$$\text{leverage}_{\text{day 2}} = \frac{200 \times 1.02}{200 \times 1.02 - 100} = \frac{2.04}{1.04} \approx 1.96 \tag{3}$$

$$\text{leverage}_{\text{day 2}} = \frac{200 \times 1.02}{200 \times 1.02 - 102} = \frac{2.04}{1.02} = 2 \tag{4}$$

$$\text{leverage}_{\text{day 2}} = \frac{200 \times 1.02 + .04}{200 \times 1.02 - 100} = \frac{2.08}{1.04} = 2 \tag{5}$$

$$\text{leverage}_{\text{day 2}} = \frac{200 \times 1.02 - 200 * 0.02}{200 \times 1.02 - 100 - 200 * 0.02} = \frac{2}{1} = 2 \tag{6}$$

LETFs with daily rebalancing automatically manage this rebalancing after the end of each trading day. Figure 2 draws the comparison between never rebalancing and rebalancing once a day. We can see that the daily rebalanced LETF keeps a steady daily return equal to two times the daily return of index fund, unlike the decaying daily return of the non-rebalanced investment. Hence, everyday, daily-rebalanced LETFs allow the same "bet" to be made. We also observe that if the LETF is held more than one day, its cumulative return exceeds two times the cumulative return of the index fund. That is thanks to compounding: the returns from day D are accounted for in the leverage on day D+1 and so on, basically.

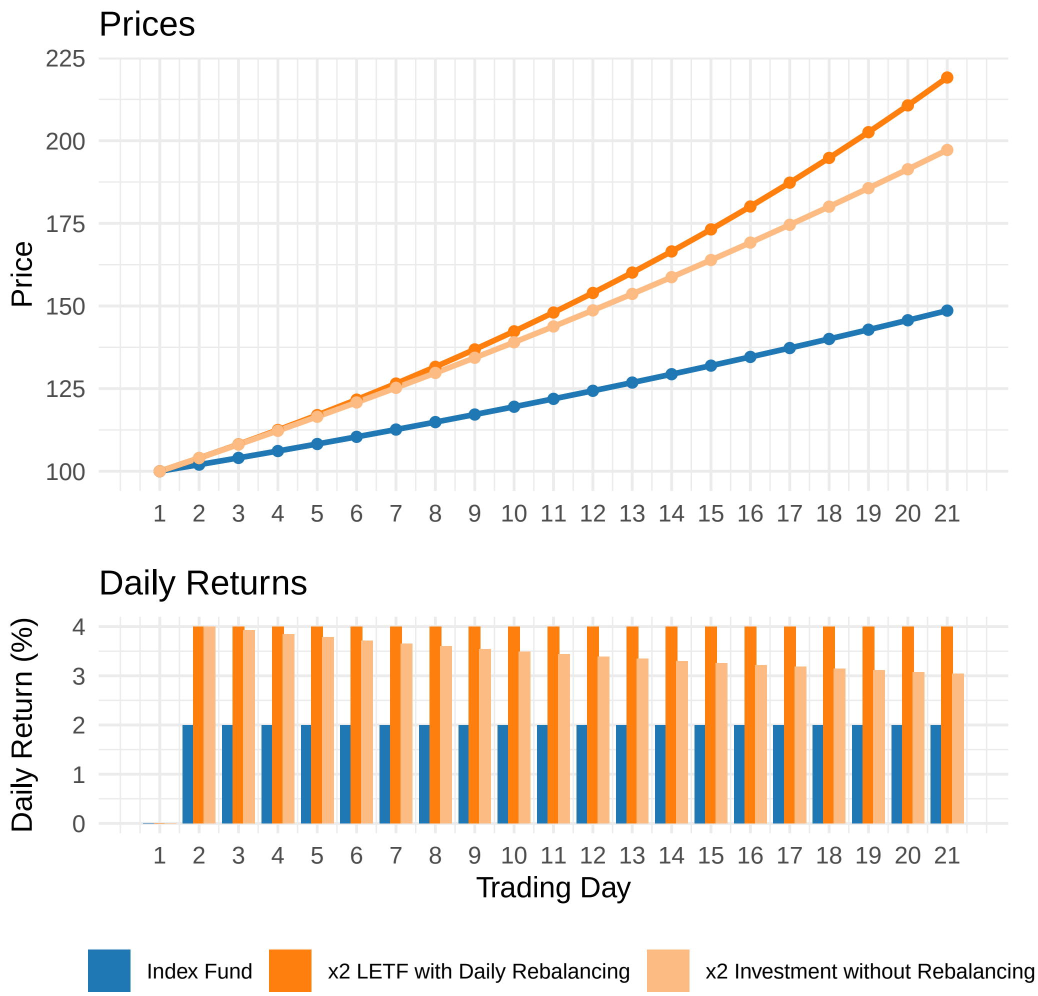

Figure 2: Leverage with or without rebalancing in an upward market

Of course, when the returns are negative, leverage expands the losses (Figure 3). Note that this is not symmetric relative to Figure 2: the LETF leads to less losses than the unbalanced, leveraged investment. This is due to the daily rebalancing: over time, a $2 \times 2\% = 4\%$ daily loss corresponds to a decreasing absolute sum of money lost.

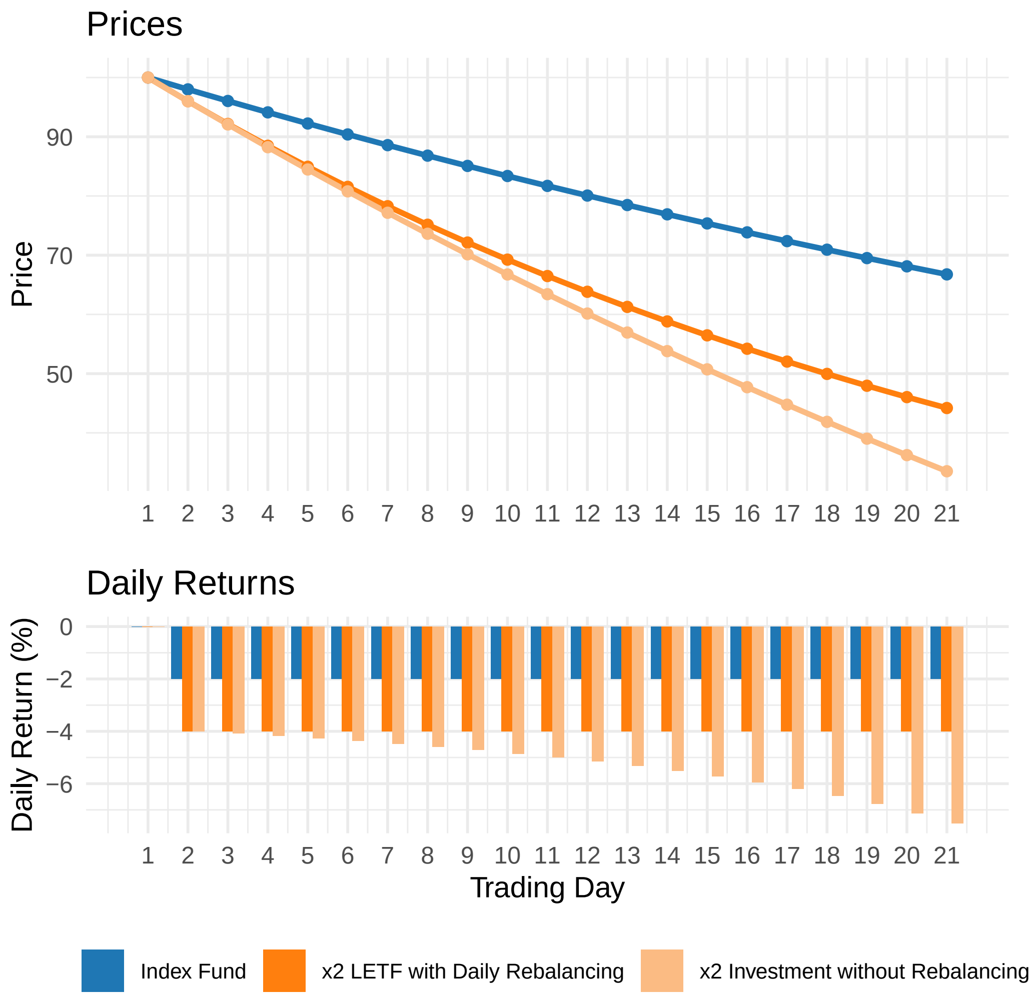

Figure 3: Leverage with or without rebalancing in a downward market

But when volatility is introduced, a new phenomenon appears. Let's take an example.

- index, market agrees on \$100 but with some fluctuations around that valuation.
- 10% drop means \$100 down to \$90
- to go back to the initial \$100, we need a 11.1% increase

with leverage:

- 100 -20% gives 80%
- 80 +22.2% gives \$97.78

I.e. the multplicative factor that was enough to bring the index back to €100 (1.111), when multiplied by two (1.222), is not enough to bring back the 2× LETF back to $100. That's because the LETF lost more worth and, after the 10%/20% drop, one percent of the index is worth .9 cents while 1% of the 2× LETF is worth only .8 cents.

Figure 4, index value goes sideways but with volatility above and below its 100 center point. Don't stay centered on 100, though. This drift is beta slippage.

Figure 4: To name

And that's accentuated by the level of leverage

Figure 5: To name

4 Borrowing cost

5 Reconstructing the past price action of CL2

6 Forward simulations of CL2

7 Conclusions

Maybe.

8 Appendix

This `qmd` took 0 minutes to render. It was rendered in the following environment:

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R version 4.5.1 (2025-06-13)
Platform: x86_64-pc-linux-gnu
Running under: Ubuntu 24.04.2 LTS

Matrix products: default
BLAS: /usr/lib/x86_64-linux-gnu/openblas-pthread/libblas.so.3
LAPACK:
/usr/lib/x86_64-linux-gnu/openblas-pthread/libopenblasp-r0.3.26.so;
LAPACK version 3.12.0

attached base packages:
[1] stats graphics grDevices datasets utils methods base

other attached packages:
[1] patchwork_1.3.1 lubridate_1.9.4 readxl_1.4.5 plotly_4.11.0
[5] ggplot2_3.5.2 quantmod_0.4.28 TTR_0.24.4 xts_0.14.1
[9] zoo_1.8-14 data.table_1.17.6

loaded via a namespace (and not attached):
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[5] compiler_4.5.1 renv_1.1.4 tidyselect_1.2.1 tidyr_1.3.1
[9] scales_1.4.0 yaml_2.3.10 fastmap_1.2.0 lattice_0.22-7
[13] R6_2.6.1 labeling_0.4.3 generics_0.1.4 curl_6.4.0
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