# Momentum Strategy - Connor DePeter

Portfolio Return T-Test Results

| Measure | Top Portfolio | Bottom Portfolio | UMD Portfolio |
|---|---|---|---|
| Statistic | 7.9209405 | 1.8251813 | 6.0010220 |
| p.value | 0.0000000 | 0.0682442 | 0.0000000 |
| Estimate | 0.0161061 | 0.0049356 | 0.0111705 |

The momentum strategy is based on the Up-Minus-Down (UMD) factor, which suggests that stocks that have performed well in the recent past will continue to rise and stocks that have fallen recently will continue to decline. This analysis tested the historical performance of the momentum strategy by sorting the past 12-month return of each stock whose share price remained above $5 for the full year into deciles, and making an ‘Up’ and ‘Down’ Portfolio from an equal weighting of the top and bottom deciles, respectively, and an UMD Portfolio by longing the Up Portfolio and shorting the Down Portfolio. The forward returns of these three portfolios, starting at each month, were then calculated for the next 1, 3, 6, 12, and 60 months.

The results show strong evidence of the momentum factors efficacy. A one-month holding period had an average return of 1.6% for the Up portfolio versus 0.5% for the Down portfolio. This outperformance persisted for every holding period from one month to three years; the Down portfolio outperformed on average for the five year holding period. Over the entire time period, 1927-2019, the Up portfolio outperformed over 70% of the time when held for a year or less. However, these portfolios demonstrated strong mean-reversion trends; as the holding period increased from one month to five years, the annualized holding period returns of the Up portfolio fell from 21% to 13%, while the annualized returns of the Down portfolio rose from 6% to 14%. This suggests that the momentum effect holds for the near-term after portfolio formation but that both the winners and losers experience similar returns over the long term.

Table 1. Average Percentage Return by Holding Period

| Holding Period | Up Portfolio | Down Portfolio | UMD Portfolio |
|---|---|---|---|
| 1 Month | 1.610613 | 0.4935603 | 1.117053 |
| 3 Months | 4.672292 | 1.6645085 | 3.007783 |
| 6 Months | 8.946242 | 3.6228933 | 5.323348 |
| 1 Year | 16.424669 | 10.4016726 | 6.022996 |
| 3 Year | 46.167403 | 43.7308542 | 2.436549 |
| 5 Years | 85.545924 | 94.0723457 | -8.526422 |

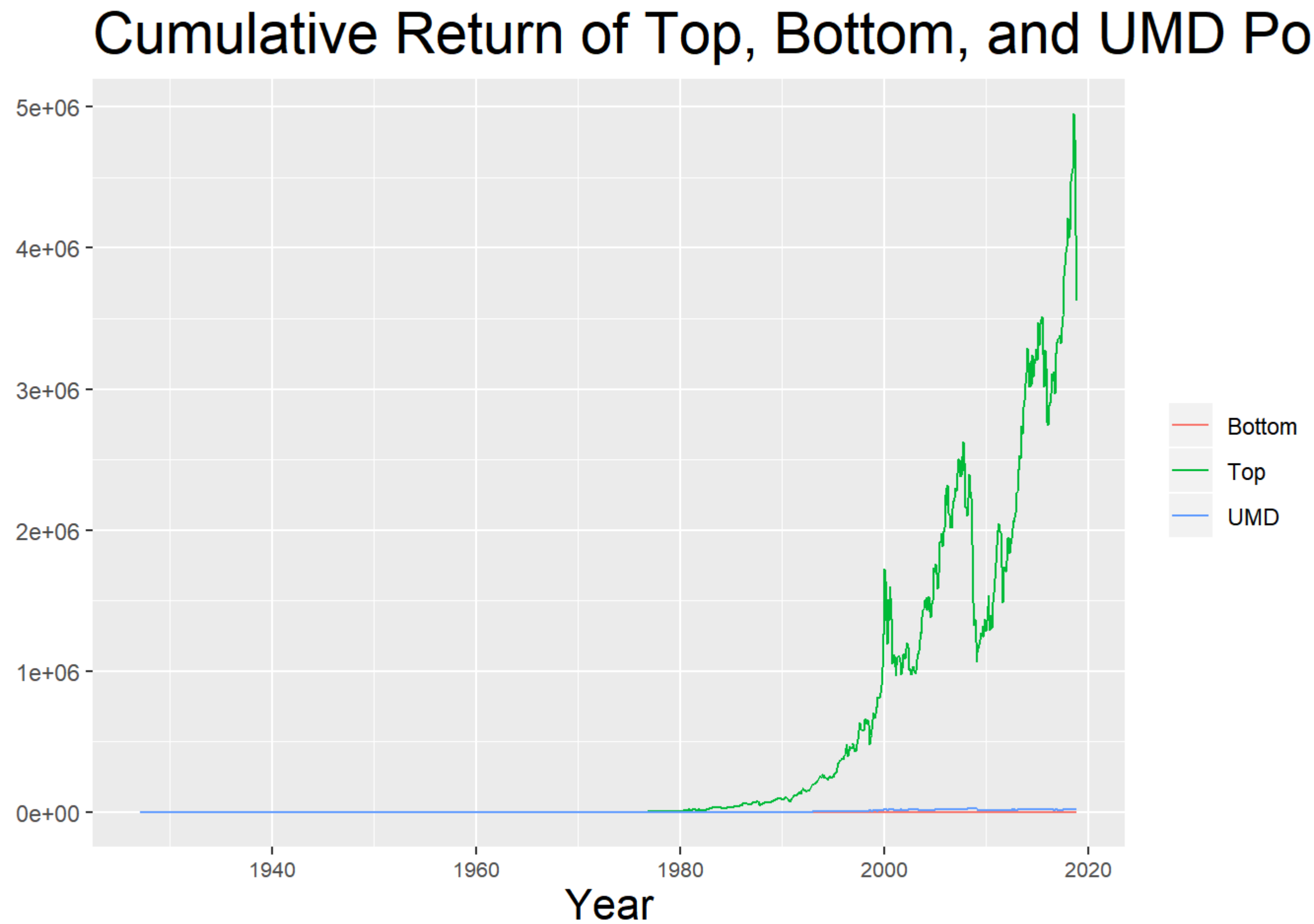


Table 2. Fama-French Five Factor Regression Results

| Measure | Top Portfolio | Bottom Portfolio | UMD Portfolio |
|---|---|---|---|
| Intercept | 0.01706 | 0.00282 | 0.01424 |
| p-value | 2.863e-10 | 0.3427 | 1.836e-10 |

A regression analysis was performed on the momentum strategy (Table 2, above) and found that the results are statistically different from 0, indicating that the factor is a legitimate source of alpha and not merely noise in the data. The UMD portfolio had positive outperformance versus the market and the Fama-French Five Factor model, although the 'Minus-Down' aspect contributed little to the overall results. Both the Up and Down portfolios had positive returns, on average, over every holding period, so the difference between the two was less than the return of simply holding the Up portfolio; the short position in the Down portfolio was a net detractor from total returns, with all of the outperformance being contributed by the Up portfolio. However, the short position in the Down portfolio is what allowed this strategy to be self-funding. Despite lowering the total returns, shorting the Down portfolio enabled the UMD portfolio to achieve market-beating returns with minimal initial equity investment, so the return on capital of the momentum strategy would actually be much higher than indicated, assuming one can recieve reasonable terms and costs on the borrowed money.

Largest Annual Declines, UMD Portfolio

| Year | UMD_Portfolio | Up_Portfolio | Down_Portfolio |
|---|---|---|---|
| 2009 | -0.5597783 | 0.0629173 | 1.0127764 |

| Year | UMD_Portfolio | Up_Portfolio | Down_Portfolio |
|---|---|---|---|
| 1932 | -0.5475929 | 0.0409041 | -0.0505786 |
| 1938 | -0.3843705 | 0.2244991 | 0.3630874 |
| 1933 | -0.2992952 | 0.7601547 | 1.0373112 |
| 2016 | -0.2520866 | 0.2043248 | 0.5545127 |

The five largest annual declines for the UMD Portfolio are shown in the table above. These years are primarily after, or during the later stages of, a crisis or recession. Both the Up and Down Portfolios performed well during these years, with the Down Portfolio significantly outperforming Up. This, combined with the timing, suggests that the stock market was experiencing a rapid recovery after falling drastically, with the stocks that performed worst over the past year having the strongest recovery. This information can be used to adjust the Momentum strategy; during a recession, the portfolio should tilt away from the top decile and towards the bottom decile in anticipation of a strong reversal when the recession ends.

Rolling forward 3-year returns were calculated for each month, and it was found that the UMD Portfolio experienced negative returns in 44% of the rolling 3-year windows. This is consistent with the earlier findings that the likelihood and magnitude of the top decile outperforming the bottom decreased consistently as the holding period lengthened.