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Hedging the time-varying risk exposures of momentum returns

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Momentum returns have time-varying exposures to the three Fama and French equity risk factors. In particular factor loadings are higher when the factor returns during the ranking period are higher. In this study we look at momentum returns after hedging these time-varying exposures to the Fama and French factors. We find that specifically taking into account the conditional nature of the time-variation in factor loadings is the best way to hedge. The hedged momentum returns are higher, less risky, more stable over time and vary less over different market conditions. Determining momentum betas based on estimated individual stock betas leads to systematic biases and hence is less effective in hedging.

1. Introduction

Momentum is a strategy that ranks stocks on past performance, buys the past winners and sells the past losers.[2] Kothari and Shanken (1992) and Grundy and Martin (2001) show that the resulting momentum returns have time-varying exposures to the market and all three Fama and French (1992, 1993) equity risk factors respectively. In this study we show that an ex-ante feasible hedging strategy accounting for these time-varying exposures outperforms the standard momentum strategy. The hedged returns are larger, less risky, more stable over time and vary less over market and economic conditions. The results weaken the crash risk explanation of momentum returns in Daniel and Moskowitz (2011) and Daniel, Jagannathan and Kim (2012) as the average of the twelve worst one-month losses is reduced by 60%. We show that the way of hedging is important. Taking into account the momentum's conditional factor exposures outperform both hedging based on the momentum's unconditional factor exposures and hedging based on the individual loadings of the constituents of the momentum strategy. We also find that it is crucial to account for all three Fama and French factors, not just the market which has been the focus of recent studies.

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[2] See Jegadeesh and Titman (1993, 2001), amongst others.

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1.1. Time variation in the returns and exposures of the momentum strategy

The average factor exposures of momentum to the Fama and French factors are all negative. For example the full-sample market beta is −0.25. These factor exposures, however, vary substantially over time. If the market returns are positive (negative) during the ranking period, the market beta of the zero-investment momentum strategy is 0.45 (−0.62). When subsequently the market reverses in the investment period the strategy will lose due to its adverse loading on the market factor. Moreover, if all three Fama and French factors move in the opposite direction in the investment period compared to the ranking period, momentum on average loses 3.6% per month. On the contrary, momentum earns 3.5% when the factors move in the same direction. These time varying exposures of momentum also result in variation of the returns over the business cycle: during the second half of recessions momentum loses 2.1% per month on average, while it earns 1.5% per month in the second half of expansions.

The reason for the time variation in the exposures is as follows: Consider the simplified case that stock returns are governed by their market beta, the market return and a residual return. If during the ranking period the market return is positive, the momentum strategy tends to buy high beta stocks and sell low beta stocks. The resulting positive beta exposure then positively contributes to the momentum return if in the investment period the market return is positive again. In contrast, if during the investment period the market return is negative, this positive beta exposure negatively contributes to the return. In short, when the market factor moves in the same direction in both ranking and investment period, it is beneficial for the momentum return. If, however, the market factor moves in the opposite direction in the investment period it is detrimental for the momentum returns. The same arguments hold for the size and book-to-market factors.

1.2. Hedging the time-varying exposures of momentum

We investigate three different ways to hedge the time-varying risk exposures of momentum. First we use the common approach regressing historical momentum returns for a specific window on the three Fama and French (1993) factors. This mostly corrects for the long-term negative factor loadings of momentum. This is a rather naive strategy as it assumes the current momentum portfolio has the same factor loadings as the past momentum portfolios, while the constituents of the strategy change rapidly over time. As a consequence this hedging method still has strong time-varying factor exposures. Therefore we consider two hedging methods that do take into account the current factor exposures of momentum. First, we use individual historical betas of the constituents of the momentum portfolio to estimate the exposures. Second, we capture the time-varying patterns in the momentum exposures by regressing momentum returns on the Fama and French equity risk factors conditional on the factor returns in the ranking period of the momentum strategy, as proposed by Grundy and Martin (2001).

Hedging based on either individual stock betas or the conditional factor model reduces the volatility of the momentum strategy by about 25%. When all three Fama and French factor returns show a reversal from the ranking to the investment period, the hedge based on individual betas gains 0.6%, and the hedge based on conditional momentum loadings loses −0.4%, compared to −3.6% for the unhedged momentum strategy.

The hedge based on individual betas has an annual Sharpe-ratio of 0.47 and the conditionally hedged returns have a Sharpe-ratio of 0.71 in comparison to a Sharpe-ratio of 0.36 for unhedged momentum. These Sharpe-ratios further improve to 0.63 and 0.75 respectively if we only take off-setting positions when the estimated factor exposures are negative. These asymmetric hedges profit from the average positive factor returns and reduce the overall negative loadings on the equity risk factors.

1.3. Crash risk as an explanation for momentum profits

Daniel and Moskowitz (2011) and Daniel, Jagannathan and Kim (2012) show that the momentum strategy has many large monthly losses. As such they hypothesize that the momentum profits are a compensation for crash risk. For our data we find that the average loss equals 36.8% for the twelve months where momentum loses more than 20%. The conditional hedge reduces the losses in these months to an average loss of 14.8%. We achieve this by understanding the time-varying exposures of momentum and only using ex-ante available information. Hence these results substantially weaken the crash risk explanation of momentum profits.

1.4. Stability hedged momentum returns over the business cycle

Hedging also stabilizes the momentum returns over the different stages of the business cycle. Similar to Chordia and Shivakumar (2002) we find that momentum returns are on average higher in expansionary periods (0.90%) than in recession periods (−0.50%). For the conditionally hedged returns, however, we find average monthly returns of 1.13% and 0.46% in expansionary and recession periods, respectively. Especially in the second half of recession periods raw momentum suffers with an average return of −2.09% per month. We find that this is mainly due to reversals in the market, size and value-growth factors. Hedging reduces the (adverse) conditional loadings on the equity risk factors and thereby improves its performance in the latter stages of recessions, from −2.09% to 0.05% per month.

Hedging also improves momentum returns after down markets. Cooper et al. (2004) find substantial momentum losses after the 3-year market return is negative. The conditional hedge improves momentum returns in down markets from −1.78% per month for the unhedged strategy to 0.27%. Hence we attribute the differences between down and up markets partly to time-varying risk exposures rather than only to overreaction theories as Cooper et al. (2004) do.