

Assignment 4, ECON 270

Allan Timmermann

1 Merger Announcement Event Study

You are asked to undertake an event study of the effect of merger announcements on the stock price of target firms. To this end, return data of 10 mergers is posted on the course web site under M&A Data with announcement dates listed in the file `tensamples.xls`.

For each target, i , determine the normal returns of the target firm using the market model

$$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it}.$$

Usually we subtract the risk-free rate from the stock returns, but you can ignore it here since it is very small on a daily basis.

Let the announcement date be day 0. Choose the estimation period to go from $t = -125$ to $t = -26$, while the event period goes from day $t = -25$ to day $t = 25$. Estimate the abnormal returns of target i , $\hat{\varepsilon}_{it}$,

$$\hat{\varepsilon}_{it} = r_{it} - \hat{\alpha}_i - \hat{\beta}_i r_{mt}.$$

Compute the cumulative abnormal returns (CAR_{it}) of target i on event day t as follows:

$$CAR_{it} = \sum_{\tau=-25}^t \hat{\varepsilon}_{i\tau}$$

(i) Plot CAR_{it} against t for each firm, i .

Compute the cross-sectional average of the cumulative abnormal return (CAR_t):

$$CAR_t = \frac{1}{10} \sum_{i=1}^{10} CAR_{it}$$

(ii) Plot CAR_t against t . Discuss and interpret your findings in relation to the efficient market hypothesis.

2 Analyzing Hedge Fund Performance

The file `Hedgefunds.xls` (available on the course web site) contains data on the HEDG dedicated short bias hedge fund index and the HEDG Event driven hedge fund index. The HEDG indexes are provided by Tremont/Credit Suisse First Boston and contain data back to 1994. The aim of this exercise is to analyze the performance of the hedge funds in these indexes.

The Event Driven index is described as follows:

This strategy is defined as "special situations" investing designed to capture price movement generated by a significant pending corporate event such

as a merger, corporate restructuring, liquidation, bankruptcy or reorganization. There are three popular sub-categories in event-driven strategies: risk (merger) arbitrage, distressed/high yield securities, and Regulation D.

Risk (Merger) Arbitrage

Specialists invest simultaneously long and short in the companies involved in a merger or acquisition. Risk arbitrageurs are typically long the stock of the company being acquired and short the stock of the acquirer. By shorting the stock of the acquirer, the manager hedges out market risk, and isolates his exposure to the outcome of the announced deal. In cash deals, the manager needs only long the acquired company. The principal risk is deal risk, should the deal fail to close. Risk arbitrageurs also often invest in equity restructurings such as spin-offs or "stub trades".

Dedicated short bias is described as follows:

Dedicated short sellers were once a robust category of hedge funds before the long bull market rendered the strategy difficult to implement. A new category, short biased, has emerged. The strategy is to maintain net short as opposed to pure short exposure. Short biased managers take short positions in mostly equities and derivatives. The short bias of a manager's portfolio must be constantly greater than zero to be classified in this category.

(i) Over the sample period, how large were the average returns of the dedicated short hedge funds?

(ii) How large was their (annualized) Sharpe ratio? Is this a good measure of risk for such funds?

(iii) To correct for exposures to risk factors, regress returns on the dedicated short bias hedge funds on the market excess return, SMB and HML. Are the funds succeeding in being short in the market index?

(iv) How large was these hedge funds' risk-adjusted performance (alpha)? How do you interpret this evidence?

Next turn to the Event-driven hedge fund returns.

(v) Compute the risk-adjusted return performance for these funds over the sample period, including the market excess returns, SMB, HML as well as the lagged market (excess) returns and the 'down market' return ($\min(0, R_{mt} - R_{ft})$).

(vi) How sensitive are Event-driven hedge fund returns to the market and lagged market returns? Are their coefficients significant?

(vii) Are these funds' returns different in down markets?

(viii) Is alpha significant? What do you conclude from this evidence?

(ix) Based on your analysis would the Short Bias or Event-driven hedge funds be appropriate portfolio assets for a fund with considerable holdings of US stocks?

3 Power of Test for Abnormal Performance

Returns for a mutual fund are generated by the equation

$$R_t = \alpha + \beta R_{mt} + \varepsilon_t, \varepsilon_t \sim IIN(0, \sigma^2),$$

where R_t is the excess return on the fund, β is its beta, R_{mt} is the excess return on the market portfolio, and ε_t is the residual in period t .

(i) Suppose that $\alpha = -0.1$ and it is known that $\beta = 1, \sigma = 1.5$. Assuming that the size of the test is 5%, plot the power of the test

$$H_0 : \alpha = 0$$

against the alternative

$$H_1 : \alpha < 0$$

as a function of the number of time periods (T) used in the test.

(ii) For monthly data the parameter values in (i) correspond to a fund that underperforms by 1.2 percent per year. How many months of data (T) do we need to have a 25/50/75/90 percent chance of identifying the fund as an underperformer?