



# CRA Insights: Financial Markets

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August 2014

## Measuring price impact with investors' forward-looking information

To argue claims regarding class certification, loss causation, or damages, parties to securities litigation often rely on analysis of the price impact of particular news through an event study. In an event study, the economic expert typically uses a statistical model to assess the portion of the stock price reaction that is due to such news and not due to market factors or noise. In this article we describe a novel way to implement this statistical model that more readily incorporates investors' forward-looking views, while maintaining a solid basis in economic theory.

### Traditional approaches

The usual statistical model used in an event study is based on the premise that observed price changes are due to news in the marketplace and random variability commonly known as noise. This model (also known as market model) describes and estimates how investors expect a stock price to react to changes in market, industry, and selected firm-specific factors. Such a model produces an estimate of a stock's expected return. The remainder of any observed price change is known as excess return and may be attributed to known firm-specific news or to noise.

If the excess return for the event analyzed exceeds a threshold based on typical return fluctuations, it is considered statistically significant. When this is the case, the economic expert is likely to opine that the excess return is due to potentially identifiable news rather than to noise. If the excess return does not exceed that threshold, the expert cannot determine that the price changed for a reason other than noise.

Traditional approaches estimate the market model using a sample of stock returns. Traditional approaches derive estimates based on historical data for a period prior to the events being studied, or alternatively, based on data surrounding the event. The reliability of these traditional approaches, however, can be affected by changes in investors' perceptions of future conditions. For example, a market model estimated with historical data might incorrectly assess an excess return as statistically significant because it is high relative to its historical threshold level, although it is not actually significant because volatility had recently and substantially increased.

### A forward-looking approach

Investors constantly revise their views on firms, industries, and the market. They change their views on risk, measured as the variability of returns. A market model that could incorporate the most up-to-date information will reflect these contemporaneous investor views more precisely than a model based on a sample from past or future time periods. Stock option data can provide such up-to-date information about

investor expectations. In fact, option data can be used to calibrate a market model for an event study using forward looking information, with limited or no use of historical or in-sample data.<sup>1</sup>

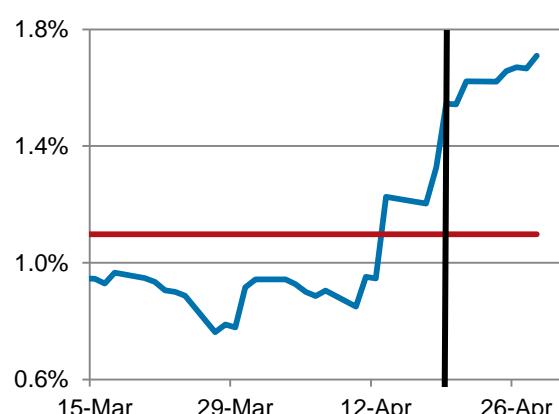
A forward-looking methodology can produce results that diverge from the results of traditional approaches in two ways. First, the statistical significance of excess returns may change if forward-looking estimates of return volatility differ from historical or other sample-based estimates. Second, the measured excess returns may be materially affected if, for example, the forward-looking market model incorporates a different relationship between stock and market returns. The following two examples illustrate these effects.

### Example: Statistical significance of excess return

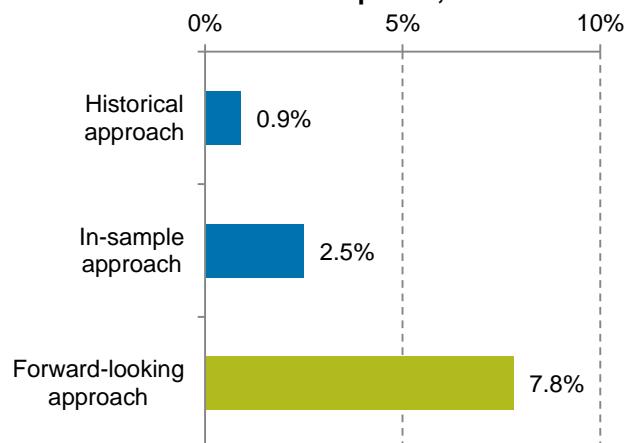
April 17, 2006 was the first alleged disclosure date in a class action lawsuit against UnitedHealth.<sup>2</sup> Figure 1 presents variability benchmarks around this date: one based on the whole prior year of returns (in red) and the other based on each date's prior 22 trading days (in blue). This chart shows that returns had been more volatile at and around this date than during the previous year. As a result, establishing the statistical significance of a given daily return based on the previous year of returns tends more towards accepting returns as abnormal than based on a more contemporaneous assessment of variability.

This intuition is corroborated by Figure 2, which shows the p-value of the excess return on April 17 under different approaches. A p-value below 5% indicates statistical significance at the commonly accepted 95% confidence level.<sup>3</sup> UnitedHealth's excess return on that day looks statistically significant under traditional approaches. However, the market's view that UnitedHealth's volatility increased was reflected in option prices in the prior weeks. Taking this forward-looking information into account, the excess return on April 17 is not statistically significant at the 95% confidence level, as shown in Figure 2.<sup>4</sup>

**Figure 1: Standard deviation of UnitedHealth excess returns**



**Figure 2: P-value of UnitedHealth excess return on April 17, 2006**



<sup>1</sup> For more information, please refer to our paper "Event studies using forward-looking information" <http://ssrn.com/abstract=2215096>.

<sup>2</sup> In re UnitedHealth Group Incorporated PSLRA Litigation, Civ. No. 0:06-cv-01691, USDC Minnesota, filed 12/08/2006.

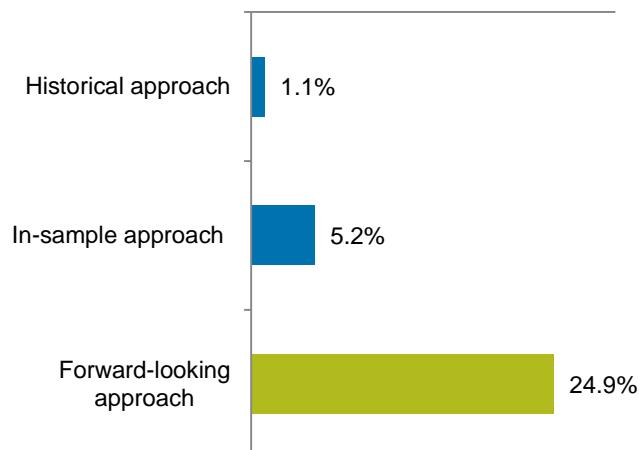
<sup>3</sup> Lower p-values mean higher statistical significance because they increase confidence in rejecting the hypothesis that an excess return occurred by chance.

<sup>4</sup> Based on models that control for the returns of the S&P 500 and an industry peer index. The results under the historical and in-sample approaches in this note are based on estimation windows spanning one year prior to the date being studied and two years surrounding it, respectively.

## Example: Estimate of excess return

This example illustrates a situation where a forward-looking approach leads to a considerably different estimate of the magnitude of the price impact of the analyzed event. On September 29, 2008 Morgan Stanley announced it was selling a 21% stake in the firm to Mitsubishi UFJ for \$9 billion. This announcement coincided with other news affecting the financial services industry and the overall market. For example, on that date the US House of Representatives rejected the Troubled Asset Relief Program legislation, Citigroup purchased Wachovia, and the Federal Reserve doubled swap lines with the European Central Bank. Figure 3 shows Morgan Stanley's estimated excess return on that day under three different approaches. While all measure a positive excess return, the forward-looking approach produces a substantially higher excess return because the market's forward-looking views reflected that Morgan Stanley's value was more correlated with the market and its industry at that time compared to historical periods.<sup>5</sup>

Figure 3: Morgan Stanley excess return on September 29, 2008



## Selecting an appropriate method

A forward-looking approach has the potential to incorporate information that is contemporaneous and thus more relevant to evaluating investors' reaction to news. This method offers another tool in the expert's toolbox: it does not replace the traditional event study methods, but instead provides additional analytical options. The forward-looking approach should be considered:

- when the events being studied occur on or around periods of significant changes in firm, industry or market risk,
- when the results under traditional methods are particularly sensitive to the market model's estimation period, or
- as a robustness test / confirmatory evidence for results obtained through traditional methods.

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<sup>5</sup> Because the market and industry benchmarks declined on September 29, 2008, this higher sensitivity results in a larger portion of loss-inducing returns attributable to market and industry factors, and, correspondingly, a larger firm-specific excess return.

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