Lecture 8 – Event Studies in Finance

Do Analyst Recommendations Affect Stock Prices?

- Project analyses the impact of sell-side analysts' recommendations in the financial domain
    - The recommendations can be summarised into a simple recommended action
        - Known as **grades** such as *Buy, Hold* and *Sell*
        - Common for grades to be revised over time as new information emerges
- Impact of analyst recommendations vary based on different levels of market efficiency
    - Under strong market efficiency, analyst recommendations have **no impact** on stock price
        - All new information would be incorporated into prices immediately
        - Recommendations are redundant as prices would have already moved
    - Analysts can provide new information to market participants under weaker market efficiency
        - Some information are not incorporated into prices
        - Presence of information asymmetries or information acquisition costs make them better suited to collect and disseminate information about the value of a stock
    - Highly unlikely that asset prices incorporate all information
        - Mechanisms such as insider trading laws protect against this

Event Studies in Finance

- The general statistical methodology proceeds after data collection
    - Develop a hypothesis around a specific type of event
    - Define and compute asset returns associated with the event
    - Statistically evaluate the *null hypothesis* that the event does not affect asset prices

Hypothesis Development

- Begins by defining the *event* of interest
    - **Downgrade:** analyst revises their recommendation downwards
    - **Upgrade:** analyst revises their recommendation upwards
    - **Neutral:** no change in the analyst's recommendation

Previous Grade	**New Grade**		
	Buy	**Hold**	**Sell**
Buy	Neutral	Downgrade	Downgrade
Hold	Upgrade	Neutral	Downgrade
Sell	Upgrade	Upgrade	Neutral

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    - For the study, neutral recommendations are ignored (*not an event*)
- **Event:** recommendation by a *firm* on a given *day* that represents either an upgrade or downgrade of some company's stock
    - **Firm:** financial institution the analyst works for
    - **Ticker:** ticker of the company's stock
    - **Event date:** date this recommendation was released
    - **Event type:** recommendations classification (upgrade/downgrade)
- **Null hypothesis:** *"Changes in analyst recommendation have no effect on stock prices"*

Outcome Variable

- Let $\tau = 0$ represent the event date when the analyst releases a new recommendation
    - P_τ denotes the adjusted *closing* stock price on day τ
    - r_τ denotes the return from $P_{\tau-1}$ to P_τ

$$r_0 = \frac{P_0 - P_{-1}}{P_{-1}}$$

- Analysis is performed in a window surrounding the event date (choice is completely arbitrary)
    - Should repeat for different windows and verify results are consistent
    - Example uses a 5-day window from $\tau = -2$ to $\tau = 2$
- The **abnormal return** filters out the systematic component from the stock returns
    - Recall that stock returns have a systematic and an idiosyncratic component
    - Simply subtract the market return from the stock return
    - $r_{\text{mkt},\tau}$ denotes the market return for a particular τ
- **Outcome variable** is defined as the **Cumulative Abnormal Returns (CAR)**
    - For a 5-day window from $\tau = -2$ to $\tau = 2$, we have $CAR[-2,2]$

$$CAR_j = \sum_{\tau=-2}^{\tau=2} \left(r_{i,\tau} - r_{\text{mkt},\tau}\right)$$

    - j represents the event ID
    - τ denotes the *event time* variable (0 at the event date)
    - $r_{i,\tau}$ denotes the stock return for company i
    - $r_{\text{mkt},\tau}$ denotes the overall market return

Testing the Null Hypothesis

- Assuming independence, we test the hypothesis that $CAR = 0$ using a simple t-test
    - Compute the average CAR, $\overline{CAR}$ and its variance $\hat{\sigma}^2_{CAR}$ across all events $j = 1, \dots, N$

$$\overline{CAR} = \frac{1}{N}\sum_{j=1}^{N} CAR_j$$

$$\hat{\sigma}^2_{CAR} = \frac{1}{N-1}\sum_{j=1}^{N}\left(CAR_j - \overline{CAR}\right)^2$$

    - Then, compute the corresponding t-statistic to test our hypothesis

$$t = \frac{\overline{CAR}}{\hat{\sigma}^2_{CAR}/\sqrt{N}}$$

        - This follows a student t-distribution with $N - 1$ degrees of freedom
        - Converges to a standard normal distribution for a large number of events
        - Reject H_0 if the absolute value of the t-statistic is greater than 1.96 for $\alpha = 5\%$