

Event Study

Question: Whether an economic event has immediately impact on the asset price.

Outline:

1. Event Definition
2. Selection Criteria
3. Normal and Abnormal Returns
4. Estimation Procedure
5. Hypothesis Testing Procedure
6. Cross-sectional Models
7. Interpretation and Conclusions

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Event Study – Example

Impacts of Stock Repurchase on Stock Price

RQ: Whether stock repurchase announcement have any impacts on stock return.

Objectives:

1. To reveal the *existence* of *abnormal return* of the stock before, during, and after the announcement of stock repurchase.
2. To study the *determinants the abnormal returns* of the stock caused by stock repurchase.
3. *To analyze the factors that have impacts on the decision of the firms to implement stock repurchase strategy.*

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1. Definition of Event

Stock Repurchase is defined as the day that firms announce their stock repurchase.

2. Selection Criteria

Determine selection criteria for the inclusion of a given firm in the study, such as SET SET50 or Banking Sector.

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3. Normal & Abnormal Returns

Abnormal Return = Actual Return - Normal Return

Actual Return Determination $R_{it} = \frac{P_t}{P_{t-1}} - 1$

Normal Return Determination

1. Constant-Mean-Return Model $R_{it} = \mu_i + \xi_{it}$

2. Market Model $R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$

where R_{mt} is return of market portfolio

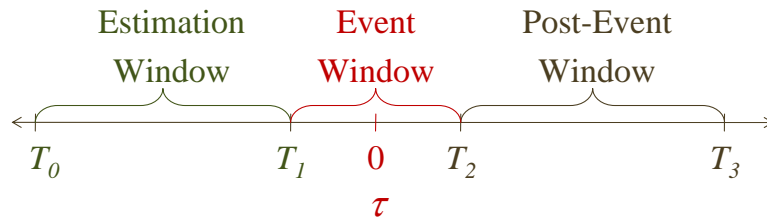
In practice, the market portfolio is usually determined broad-based stock index, such as SET or SET50 index.

3. Other Models – Multifactor models, market-adjusted-return model.

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4. Estimation Procedures

Time Line for Event Study:



$\tau = 0$ as the event date.

$\tau = T_1 + 1$ to T_2 as the event window.

$\tau = T_0 + 1$ to T_1 as the estimation window.

$\tau = T_2 + 1$ to T_3 as the post-event window.

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4. Estimation Procedures

1. Estimate market model using estimation window data – obtain $\hat{\alpha}_i$ and $\hat{\beta}_i$.
2. Determine Abnormal Return (AR) in event windows and post-event windows using the estimated result of estimated market model

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$$

3. Compute Average Abnormal Return (AAR), Cumulative Abnormal Return (CAR), and Cumulative Average Abnormal Return (CAAR).
4. Compute statistical test.

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5. Hypothesis Testing Procedure

1. Parametric Tests – t-test
2. Power of event-study test
3. Nonparametric Tests – Sign test

6. Cross-sectional Models

Cross-sectional model is used to analyze whether there exists impacts of characteristics specific to the event observation on the magnitude of abnormal return.

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Event Study – Example (cont.)

Determining Abnormal Return

Actual Return vs Normal Return (Market model)

$$R_{jt} = \frac{P_t - P_{t-1}}{P_{t-1}} \quad \hat{R}_{jt} = \hat{\alpha}_j + \hat{\beta}_j R_{mt}$$

where $R_{mt} = \frac{SET_t - SET_{t-1}}{SET_{t-1}}$

Abnormal Return = Actual Return - Normal Return

$$AR_{js} = R_{js} - \hat{\alpha}_j - \hat{\beta}_j R_{ms}$$

Cumulative Abnormal Return $CAR_{jT} = \sum_{t=T_1}^{T_2} AR_{jt}$

Variance of CAR

$$S_{jT}^2 = \hat{\sigma}_j^2 \left[1 + \frac{T^2}{N} + \frac{T^2 \left(\bar{R}_{mT} - \bar{R}_m \right)^2}{\sum_{t=1}^N (R_{mt} - \bar{R}_m)^2} \right]$$

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Event Study – Example (cont.)

1st Obj. -- Hypothesis Testing

H_0 : Abnormal Return = 0 or $\mu_{CAR} = 0$

This hypothesis can be tested by using t-test.

If reject H_0 , it means that there exists abnormal return. If not, there is no abnormal return.

$$t = \frac{1}{\sqrt{n}} \sum_{j=1}^n \sum_{t=T_1}^{T_2} \left(\frac{AR_{jt}}{S_{jT}} \right)$$

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Event Study – Example (cont.)

2nd Obj. -- Hypothesis Testing

The model: $CAR_j = \beta_0 + \beta_1 DE_j + \beta_2 PE_j + \beta_3 PRE_j + \varepsilon_j$

Where

CAR_j = Cumulative Abnormal Return of stock j from $t = 0$ to $+20$

DE_j = Debt-Earning Ratio of Stock j

PE_j = Price-Earning Ratio of Stock j

PRE_j = CAR from $t = -20$ to -1 of stock j

ε_j = Stochastic error term

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Event Study – Example (cont.)

3rd Obj. -- Hypothesis Testing

The model: $Y_{it} = f(PE_{it}, ROA_{it}, NP_{it})$

Where

$Y_{it} = 1$ if stock repurchase at time t

$= 0$ if no stock repurchase at time t

PE_{it} = Price-Earning Ratio at time t

ROA_{it} = Return on Asset at time t

NP_{it} = Net Profit at time t

$f(.)$ is Logistic Distribution Function

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