Empirical Financial Economics: Part 1

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Financial Economics (ECON6043)

March 12, 2021

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Tonight's Lecture

- Introduction to event studies
- An event study on the 2016 U.S. election
- An event study on the 2011 Egyptian Arab Spring

Required Reading

- Corrado, C.J., 2011. Event studies: A methodology review. Accounting & Finance, 51(1), pp.207-234.
- Wagner, A.F., Zeckhauser, R.J. and Ziegler, A., 2018. Company stock price reactions to the 2016 election shock: Trump, taxes, and trade. Journal of Financial Economics, 130(2), pp.428-451.
- Acemoglu, D., Hassan, T.A. and Tahoun, A., 2018. The power of the street: Evidence from Egypt's Arab Spring. The Review of Financial Studies, 31(1), pp.1-42.

Section 1

The Event Study

- Financial economists are often asked to examine the effect of an economic event on the value of a firm.
- Event studies are a formalisation of the colloquial way in which we analyse stock markets:
  - "The Dow Jones Industrial Average soared more than 400 points to a record after falling bond yields and a new stimulus package spurred investors to snap up stocks that will benefit from a faster recovery from the pandemic."[2]

[2] `https://www.cnbc.com/2021/03/09/stock-market-open-to-close-news.html`: CNBC March 10, 2021

Introduction to event studies

- An event study aims to measure the effect of an economic event on the stock market value of a firm or a group of firms.
- The first event study in the literature is traced back to Dolley (1933), but Ball and Brown (1968) and Fama et al. (1969) were the ones who introduced the idea to a broad audience.
- The event study is now a mainstay of financial economics, and is used in court cases to show evidence of market manipulation.

The basic idea

- First identify a significant event that is expected to affect the firm's future operations in some way.
- Get data on stock price changes for those firms around that date (before and after—called the window)
- Calculate abnormal or excess returns on the stock prices of interest.
- Test whether excess returns are unusually high/low in the period following the event.
- Include firm characteristics that might explain the abnormal returns.

Complications

- On the fact of it, this is a very simple empirical approach.
- However, each step carries a large number of concerns.
- Can you begin to identify any?

A simple example

- Consider a single security-event date study.
- For example, a merger, earnings announcement or CEO change might affect a single firm alone.
- We need to disentangle the effects of:
  - This firm-specific information on stock prices
  - Any market-wide information on stock prices
- Notice that the event study is about how *information* is baked into stock market prices.

A simple example

- Let day-0 ($t = 0$) be the date of the announcement.
- This means days $t = \ldots, -3, -2, -1$ are the days leading up to the announcement and days $t = 1, 2, 3, \ldots$ are the days following the announcement.
- A naive event study would simply compare the company's stock returns R_0 on the event date with stock returns observed in the "control period" leading up the event date.
- **Problem:** This naive comparison does not allow us to disentangle the effects of firm-specific and market-wide information.

A simple example

- Consider using a more sophisticated approach that uses a market model to adjust the company's returns to eliminate the influence of the market on returns.

$$R_t = \alpha + \beta RM_t + \varepsilon_t$$

- Where R_t is the company return at time t and RM_t is the market return at time t.
- The expected return on the company's stock on day-0, conditional on market returns is

$$E(R_0|RM_0) = \hat{R}_0 = \alpha + \beta RM_0.$$

- This is the predicted value from the regression.
- To adjust actual returns for market-induced changes, we measure:

$$A_0 = R_0 - \hat{R}_0 = \varepsilon_0$$

A simple example

- With some measure of abnormal returns in hand, we can now make a more sophisticated comparison.
- We measure abnormal returns on the event date, and compare it to abnormal returns in some period preceding the event.
- Often that period is measured as 250 trading days, ending 6 days before the event date.
- Notice that from our regression we assume the distribution of abnormal returns is normally distributed with mean zero.
- We then run a standard test (e.g. t-test) with the null hypothesis that there is no abnormal performance.

Rationality

- The main usefulness of the event study approach is that it requires us to only measure changes in the *price* of the firm's shares over a short period of time.
- The alternative is to measure the effect of the event of the firm's fundamentals (profits, investment, sales, etc.) over a long period of time.
- The main assumption required to use share prices is that all important information will be immediately reflected in share prices.
- This requires use to assume that market participants are rational and markets are efficient.

Empirical Issues

- How do we identify events that are relevant enough to be studied?
- How do we identify the event window: how long do with think it will take for information to be assimilated into asset prices?
- How do we identify which firms should be included in our study?
- How do we measure abnormal returns?
- How much data (how long) do we estimate our abnormal returns model on?
- How do we test abnormal returns, given skewness and kurtosis?

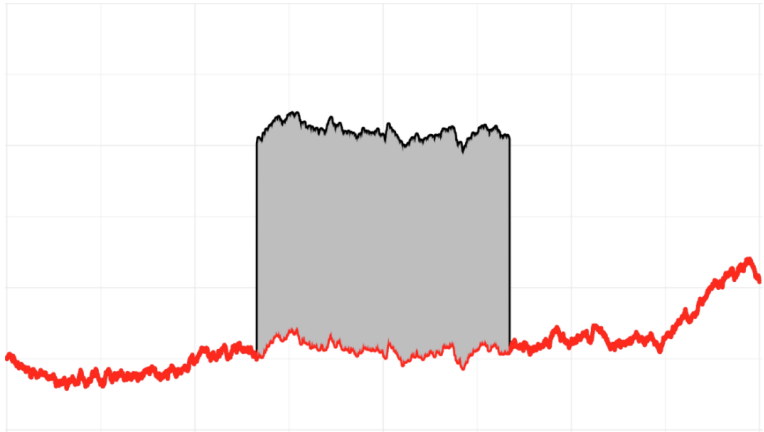
Measuring Abnormal Returns

- R_i does not adjust for market factors at all
- $R_i - R_M$ does not adjust for basic beta risk
- $R_i - \alpha - \beta R_M$ does not adjust for the risk-free rate
- $R_i - R_f - \alpha - \beta(R_M - R_f)$ is an incomplete adjustment for risk (e.g. Fama and French), while α captures special circumstances in the pre-event data.
- $R_i - \alpha - \sum \beta_j F_j$ captures a wider range of risks, but not all.
- Matched firm returns: choosing similar but untreated firms.

More event study

- We can combine a number of different events (e.g. lots of companies' earnings announcements), this is called a stacked event study
- We can consider intra-day data
- The best part of event studies is that it provides us with great charts that give compelling evidence.

An example of an event study graphic



Section 2

Company stock price reactions to the 2016 election shock

Wagner, Zeckhauser and Ziegler (2018)

- A significant event: Donald J Trump's election on November 8, 2016.
- A new president often heralds a change in policy, but this is different.
- First, there was a large difference in policy positions between the candidates.
- Second, Trump's election was unexpected (between 17% and 28% chance on betting markets).
- Third, a Republican congress meant that a Republican president could pass legislation.

Corporate tax policy

- Candidates were very different on corporate tax policy.
- Given a Republican House of Representatives, Hilary Clinton could not make tax changes even if she wanted to.
- Trump proposed a tax cut from 35% to 15%.
- House Republicans proposed a tax cut from 35% to 20%.
- (NB: After the fact we now know that we got a tax cut to 21%)

Asset price changes

- "If the market responds optimally to an election outcome, the change in the market price of any asset will reflect both the difference in its expected discounted payoff between the two possible outcomes and the ex ante probability that that outcome occurs"
- This assumption is at the centre of their event study analysis.
- Do we have concerns about it?

Asset price changes

- The price before the election is a weighted average of the price outcomes

$$P = \pi_C P_C + \pi_T P_T$$

  - π_C is the probability of Clinton winning and π_T is the probability of Trump winning
  - P_C is the expected price in the case where Clinton wins and P_T is the expected price in the case where Trump wins.

- Given that Trump won, the change in price from P to P_T is given by:

$$\begin{aligned}\Delta P = P_T - P &= P_T - \pi_C P_C - \pi_T P_T \\ &= (1 - \pi_T) P_C - (1 - \pi_T) P_T \\ &= (1 - \pi_T)(P_C - P_T)\end{aligned}$$

Empirical strategy

- The authors use the Russell 3000—an index of the 3000 largest stocks traded on the U.S. stock markets.
- They examine different windows: on the day, from two days to ten days out; cumulative returns to December 30, and even into 2017.
- They calculate abnormal returns using the CAPM model and using the Fama-French three-factor model.
- To estimate these two models, they use data from Oct 1, 2015 to Sept 30, 2016.
- They include explanatory variables from firm's financial statements.

An initial look at abnormal returns

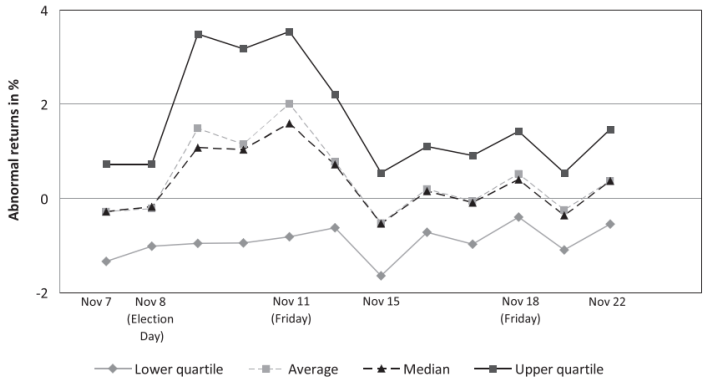


Fig. 1. Abnormal stock returns around the Presidential election on November 8, 2016. This figure shows the equally weighted average, median, and quartiles of CAPM-adjusted returns the day before the election, the day of the election, and the ten trading days after the election.

Corporate tax rates

- This event has the disadvantage of implying changes in a range of potential policies.
- It also is disadvantaged because we're unsure of what the eventual change would be.
- There's also the concern that maybe we still weren't sure that Trump would actually keep his promise or be able to pass the tax cuts.
- For various reasons firms pay different *effective tax rates*, measured in this paper by the **cash ETR**:
  - Percent cash taxes paid relative to current year pretax income
- **The first prediction is that firms which pay higher tax rates should benefit more from Trump's election.**

The regression actually estimated

Panel C:		*Fama–French-adjusted returns*		
Cash ETR	0.027***	0.050**	0.063**	0.100***
	(3.08)	(2.25)	(2.31)	(3.04)
Ln(Market value of equity)	−0.155***	−1.521***	−0.402**	−0.679***
	(−3.04)	(−8.81)	(−1.98)	(−2.64)
Percent revenue growth	−0.009**	−0.003	−0.015	−0.013
	(−2.07)	(−0.24)	(−1.14)	(−0.74)
Profitability	0.014	0.085*	-0.000	0.003
	(1.37)	(1.88)	(-0.00)	(0.05)
Constant	0.386	11.799***	2.399	3.784
	(0.81)	(7.58)	(1.25)	(1.57)
Observations	1966	1960	1948	1924
R-squared	0.074	0.153	0.103	0.082
Industry FE	Yes	Yes	Yes	Yes

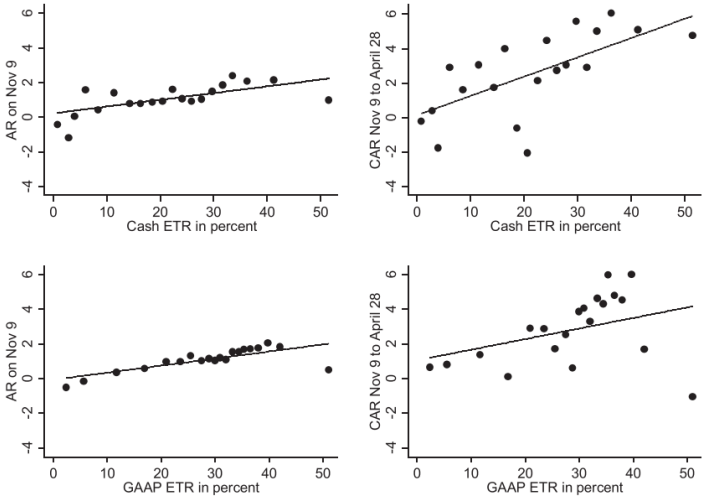


Fig. 3. Binned scatter plots of cash ETR (top two panels) and GAAP ETR (bottom two panels) against CAPM-adjusted abnormal returns on November 9, 2016 (left panels) and Cumulative Abnormal Returns (CARs) from November 9 to April 28, 2017 (right panels). The plots control for Fama–French 30 industry fixed effects. The sample includes Russell 3000 firms.

Summary

- These results suggest that there is a strong relationship between the effective tax rate and abnormal returns, all the way out to April 28, 2017.
- This relationship is observed whether they use raw returns, CAPM-adjusted returns, or the Fama-French-adjusted returns.
- The graphical evidence is also compelling, considering alternative measures of the effective tax rate too.
- This is only one of their findings, but it is certainly compelling.

Section 3

The Power of the Street

Acemoglu, Hassan, and Tahoun (2017)

- These authors consider a very different event: Egypt's Arab Spring.
- The Arab Spring was a series of protests that forced the country's dictatorial president to resign.
- Part of the reason for the protests was the corruption that benefited those closely connected to president Hosni Mubarak's party, the NDP.
- The author's study this rent-seeking behaviour by examining the impact of street protests on politically-connected firms.

The research question

- The first hypothesis the authors seek to examine is whether street protests affect the value of politically-connected firms on the stock market relative to non-connected firms.
- The second hypothesis the authors seek to examine is whether the size of street protests themselves differentially affected the returns for politically connected firms relative to non-connected firms.

Empirical Strategy

- They use data on 177 firms on the Egyptian Stock Exchange
- To calculate excess returns, they use:
  - Egyptian stock market returns
  - World stock market returns
  - A measure of general unrest in the country
- To define a firm as politically-connected, they identify whether a principal shareholder was listed as a prominent NDP member on an activist-created list posted online.
  - They also identify military-connected and Islamic-connected firms.
- They measure the number of protestors using newspaper articles.
- They use social media activity (Twitter) to measure mobilization for street protests, support for political opposition, and the cohesiveness of the opposition.

Estimation Approach

- As most studies do, they consider cumulative returns over a 9-day period after Mubarak's resignation.
- Their approach is slightly different:
  - The typical approach is to estimate excess returns first, then run the event study
  - Instead, they include the factors (market returns and unrest) directly in the estimating equation:

$$R = \text{firm} + \sum \gamma_i \cdot \text{firm type} + \sum \beta_j \cdot \text{factors} + \varepsilon$$

- The coefficients of interest are the γ's, particularly the one where firm type is politically-connected firms.

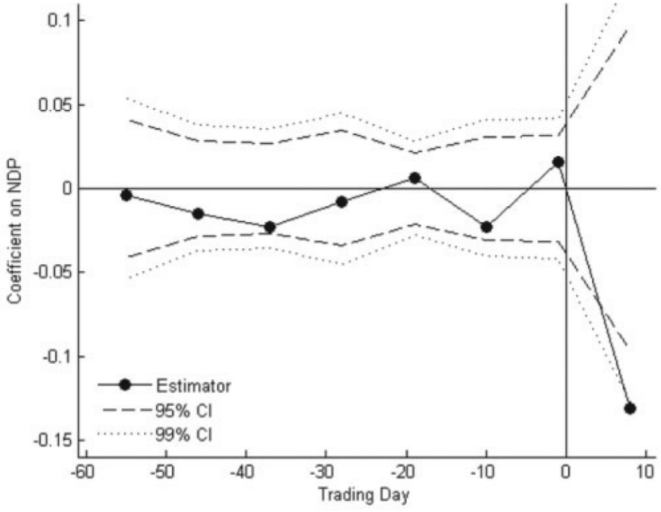
Table 2
Mubarak's fall

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				CR[0,8]			*CAR[0,8]*
NDP	−0.086*	−0.131**	−0.142**	−0.131**	−0.142**	−0.200***	−0.145**
	(0.049)	(0.049)	(0.059)	(0.046)	(0.054)	[−0.099,0.101]	(0.056)
Military	0.048*	0.032	0.075**	0.032	0.035	0.053	0.051
	(0.028)	(0.030)	(0.021)	(0.026)	(0.033)	[−0.066,0.082]	(0.035)
Islamic	−0.031	−0.064	−0.058	−0.064	−0.090	−0.159***	−0.125*
	(0.054)	(0.051)	(0.063)	(0.041)	(0.058)	[−0.107,0.130]	(0.066)
β^{World}		0.037**	0.023	0.037	0.050**		0.132**
		(0.016)	(0.023)	(0.023)	(0.013)		(0.046)
β^{Egypt}		−0.028	−0.021	−0.028	−0.093**		
		(0.018)	(0.025)	(0.023)	(0.030)		
β^{Unrest}		2.134*	0.897	2.134	1.812		11.219**
		(1.182)	(1.337)	(2.253)	(2.039)		(4.632)
Size		0.024**	0.022**	0.024**	0.016*		0.014
		(0.007)	(0.007)	(0.007)	(0.009)		(0.009)
Leverage		−0.024	−0.003	−0.024*	−0.028		0.017
		(0.017)	(0.019)	(0.014)	(0.022)		(0.027)
R^2	0.252	0.320	0.138	0.320	0.387		0.451
N	145	143	143	143	136		143
Sector fixed effects	yes	yes	no	yes	yes	no	yes
Adjusted standard errors	no	no	no	yes	no	no	no
Weights	no	no	no	no	yes	no	no
Matching estimator	no	no	no	no	no	yes	no

Preliminary Results

- In all cases they find a negative and statistically significant effect of Mubarak's fall on returns for NDP politically connected firms, relative to non-connected firms.
- In magnitude terms, column (2) is their baseline, which says that the loss of connections to the Mubarak regime reduced the market valuation of NDP-connected firms by 13.1 percentage points over 9 trading days.
- Column (6) uses a **synthetic matching** process to create "fake" firms which are combinations of all politically unconnected firms.
  - For each politically connected firm, they create a fake firm by taking a weighted average of other firms.
  - The weights are optimally chosen to make the pre-event returns of the fake firm look as much like pre-event returns of the politically connected firm as possible.
- In column (7) they estimate a more standard approach, calculating abnormal returns using the CAPM model for the Egpytian stock market.

Graphical Results



Estimation Approach

- They now consider whether—over time—the number of protestors each day matter for the returns on politically connected firms.

$$R = \text{sector} + \text{time} + \sum \gamma_i \cdot \text{firm type} + \sum \gamma_i^P \cdot (\text{firm type} \times \text{protestors}) + \sum \beta_j \cdot \text{factors} + \varepsilon$$

- Oddly, they cap the number of protestors observed at 500k, and then turn all protestor numbers into a standardized variable by dividing by 500k.
- They interact the standardized number of protestors with firm type.
- The coefficients γ_i^P measure the effect of the size of protests on relative stock market valuation of politically-connected firms.

Table 6
The effect of street protests on stock market valuations

	(1)	(2)	(3)	(4)
	Mubarak's fall	Military rule	Islamist rule	Post-Islamist
	Daily Log Returns × 100			
NDP × Tahrir protesters	−1.614***	−0.135	0.672*	−0.308
	(0.602)	(0.411)	(0.382)	(0.742)
Military × Tahrir protesters	−0.886	−0.889***	−0.527	−0.145
	(0.612)	(0.326)	(0.324)	(0.617)
Islamic × Tahrir protesters	1.773	0.600	0.421	−1.332*
	(1.213)	(0.382)	(0.477)	(0.815)
NDP × Rabaa protesters				−8.089
				(11.595)
Military × Rabaa protesters				−6.406
				(9.539)
Islamic × Rabaa protesters				27.850**
				(12.895)
R^2	0.610	0.331	0.421	0.423
N	5,603	43,997	27,210	1,895
Total # Tahrir protesters	1.220	5.290	4.175	1.020
Total # Rabaa protesters				0.206
Incumbent	NDP	Military	Islamic	Islamic

Main Results

- The main result of their analysis is that a protest crowd of 500,000 or more in Tahrir Square during the first phase of Egypt's Arab Spring leads to a 1.6% decline the valuation of NDP-connected firms.
- During Mubarak's fall, they measured a cumulative reduction of 1.95% attributed to street protests.
- Critically, politically connected groups which weren't actually in power (military and Islamic) don't observe the same effects during Mubarak's fall.
  - In the period of military rule, protestors affected military-connected companies
  - In the post-Islamist rule, where the authors still define the Islamists are the incumbent, protestors affected Islamic-connected companies.

Section 4

Summary

Summary

- Event studies are a critical tool for financial economists—in policy, in finance, and in research.
- Short-term stock market data is often used to examine the expected long run effects, assuming that markets are rational and prices reflect all available information.
- It is not always clear how easy such an assumption can be made in Caribbean countries.
- However, note that there have been event study approach conducted with lower-frequency data, such as monthly and quarterly data.

The End.