Econ 219B
Psychology and Economics: Applications
(Lecture 9)

Stefano DellaVigna

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Outline

1. Intro to Behavioral Asset Pricing
2. (Limited) Arbitrage
3. Noise Traders
4. Event Studies
5. Event Study: Iraq War

1 Introduction to Behavioral Asset Pricing

- Asset Pricing I: Trading of financial assets given prices
  - When to buy?
  - Which assets?

- Asset pricing II: Determination of prices
  - Price level?
  - Response to new information?

- Asset Pricing is 95 percent about the second set of issues

1.1 Asset Pricing I

- Brief overview of anomalies in Asset Pricing I (from Barberis and Thaler, 2004)

  1. **Underdiversification.**

     (a) Too few companies.

     – Investors hold an average of 4-6 stocks in portfolio.

     – Improvement with mutual funds

     (b) Too few countries.

     – Investors heavily invested in own country.

     – Own country equity: 94% (US), 98% (Japan), 82% (UK)

     – Own are: own local Bells (Huberman, 2001)

(c) Own company

– In companies offering own stock in 401(k) plan, substantial invesment

2. **Naive diversification.**

– Investors tend to distribute wealth ‘equally’ among alternatives in 401(k) plan (Benartzi and Thaler, 2001)

– More on this in Section on Persuasion

3. **Excessive Trading.**

– Trade too much given transaction costs (Odean, 2001)

– More on this in Section on Overconfidence

4. **Disposition Effect in selling**

   – Investors more likely to sell winners than losers

   – Covered in Section on Reference Dependence

5. **Attention Effects in buying**

   – Stocks with extreme price or volume movements attract attention (Odean, 2003)

   – More on this in Section on Attention

- Explanations?
  - Tendency to trust familiar things
  - Persuasion: Tendency to trust (implicit) advice of others
  - Overconfidence
  - Reference Dependence
  - Attention

1.2 Asset Pricing II

- Investor preferences
  - Risk Aversion (CRRA)
  - Habit Formation
  - Loss Aversion

- Trading environment

- Derive pricing of financial assets:
  - CAPM
  - APT

  - Multi-Factor Model

- Bad news: for this, need to take asset-pricing course

- Good news: two fundamental themes

  1. Arbitrage and Limits thereof

  2. Event Studies

2 Arbitrage

- Arbitrage:
  - Individuals attempt to maximize individual wealth
  - They take advantage of opportunities for free lunches
- Implications of arbitrage: ‘Strange’ preferences do not affect pricing
- For Asset Pricing II, no need to worry about behavioral stories
- (Still need to worry for Asset Pricing I)
- Is it true?

- Fictitious example:
  - Asset A returns \$1 tomorrow with $p = .5$
  - Asset B returns \$1 tomorrow with $p = .5$
  - Arbitrage –$>$ Price of A has to equal price of B
  - If $p_A > p_B$,
    * sell A and buy B
    * keep selling and buying until $p_A = p_B$
  - Viceversa if $p_A < p_B$

- Problem: Arbitrage is limited (de Long et al., 1991; Shleifer, 2001)

- In Example: can buy/sell A or B and tomorrow get fundamental value

- In Real world: prices can diverge from fundamental value

- Real world example. Royal Dutch and Shell
  - Companies merged financially in 1907
  - Royal Dutch shares: claim to 60% of total cash flow
  - Shell shares: claim to 40% of total cash flow
  - Shares are nothing but claims to cash flow

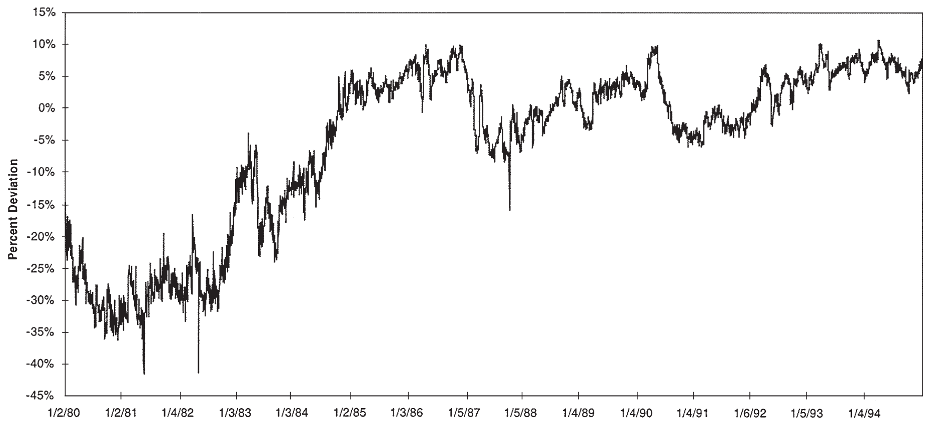


Fig. 1. Log deviations from Royal Dutch/Shell parity. Source: Froot and Dabora (1999).

Netherlands, are a claim to 60% of the total cash flow of the two companies, while Shell, which trades primarily in the UK, is a claim to the remaining 40%. If prices equal fundamental value, the market value of Royal Dutch equity should always be 1.5 times the market value of Shell equity. Remarkably, it isn't.

Figure 1, taken from Froot and Dabora's (1999) analysis of this case, shows the ratio of Royal Dutch equity value to Shell equity value relative to the efficient markets benchmark of 1.5. The picture provides strong evidence of a persistent inefficiency. Moreover, the deviations are not small. Royal Dutch is sometimes 35% underpriced relative to parity, and sometimes 15% overpriced.

This evidence of mispricing is simultaneously evidence of limited arbitrage, and it is not hard to see why arbitrage might be limited in this case. If an arbitrageur wanted to exploit this phenomenon – and several hedge funds, Long-Term Capital Management included, did try to – he would buy the relatively undervalued share and short the other. Table 1 summarizes the risks facing the arbitrageur. Since one share is a good substitute for the other, fundamental risk is nicely hedged: news about fundamentals should affect the two shares equally, leaving the arbitrageur immune. Nor are there

Table 1
Arbitrage costs and risks that arise in exploiting mispricing

Example	Fundamental risk (FR)	Noise trader risk (NTR)	Implementation costs (IC)
Royal Dutch/Shell	×	√	×
Index Inclusions	√	√	×
Palm/3Com	×	×	√

- Price of Royal Dutch should be 60/40=3/2 price of Shell

- p_{RD}/p_S differs substantially from 1.5 (Fig. 1)

- Plenty of other example (Palm/3Com)

- What is the problem?
  - Noise trader risk, investors with correlated valuations that diverge from fondamental value
  - In the long run, convergence to cash-flow value
  - In the short-run, divergence can even increase

3 Noise Traders

- DeLong, Shleifer, Summers, Waldman (*JPE* 1990)

- Shleifer, *Inefficient Markets*, 2000

- Fundamental question: What happens to prices if:

  – (Limited) arbitrage

  – Some irrational, correlated investors

- First paper on Market Reaction to Biases

- *The* key paper in Behavioral Finance

The model assumptions

A1: arbitrageurs risk averse and short horizon

$\longrightarrow$ Justification?

* Short-selling constraints

(per-period fee if borrowing cash/securities)

* Evaluation of Fund managers.

* P/A problem for fund managers.

A2: noise traders (Kyle 1985; Black 1986)

misperceive future expected price at t by

$$\rho_t \overset{i.i.d.}{\sim} \mathcal{N}(\rho^*, \sigma_\rho^2)$$

misperception *correlated* across noise traders

$\longrightarrow$ Justification?

* fads and bubbles (Internet stocks, biotechs)

* pseudo-signals (advice broker, financial guru)

* behavioral biases / misperception riskiness

What else?

- μ arbitrageurs, $(1 - \mu)$ noise traders

- OLG model
  - Period 1: initial endowment, trade
  - Period 2: consumption

- Two assets with identical dividend r
  - safe asset: perfectly elastic supply
    $\Longrightarrow$ price=1 (numeraire)
  - unsafe asset: inelastic supply (1 unit)
    $\Longrightarrow$ price?

- Demand for unsafe asset: λ^a and λ^n, with $\lambda^a + \lambda^n = 1$.

- CARA:

$$U(w) = -e^{-2(\gamma w)} \text{ (w wealth when old)}$$

$$E\left[U(w)\right] = \int_{\infty}^{\infty} -e^{-2\gamma w} \cdot \frac{1}{\sqrt{2\pi\sigma^2}} \cdot e^{-\frac{1}{2\sigma^2}(w-\overline{w})}$$

$$= -e^{-2\gamma(\overline{w}-\gamma\sigma_w^2)}$$

$$\Downarrow$$

$$\max E\left[U(w)\right] \quad \underset{\text{pos. mon. transf.}}{\curvearrowright} \quad \max \overline{w} - \gamma\sigma_w^2$$

Arbitrageurs:

$$\max(w_t - \lambda_t^a p_t)(1 + r)$$

$$+\lambda_t^a (E_t[p_{t+1}] + r)$$

$$-\gamma\, (\lambda_t^a)^2\, Var_t(p_{t+1})$$

Noise traders:

$$\max(w_t - \lambda_t^n p_t)(1 + r)$$

$$+\lambda_t^n (E_t[p_{t+1}] + \rho_t + r)$$

$$-\gamma\, (\lambda_t^n)^2\, Var_t(p_{t+1})$$

(Note: Noise traders know how to factor the effect of future price volatility into their calculations of values.)

f.o.c.

Arbitrageurs: $\frac{\partial E[U]}{\partial \lambda_t^a} \overset{!}{=} 0$

$$\lambda_t^a = \frac{r + E_t[p_{t+1}] - (1+r)p_t}{2\gamma \cdot Var_t(p_{t+1})}$$

Noise traders: $\frac{\partial E[U]}{\partial \lambda_t^n} \overset{!}{=} 0$

$$\lambda_t^a = \frac{r + E_t[p_{t+1}] - (1+r)p_t}{2\gamma \cdot Var_t(p_{t+1})}$$

$$+ \quad \frac{\rho_t}{2\gamma \cdot Var_t(p_{t+1})}$$

Interpretation

- Demand for unsafe asset function of:
  - $(+)$ expected return $(r + E_t[p_{t+1}] - (1 + r)p_t)$
  - (-) risk aversion (γ)
  - (-) variance of return $(Var_t(p_{t+1}))$
  - $(+)$ overestimation of return ρ_t (noise traders)

- Notice: noise traders hold more risky asset than arb. if $\rho > 0$ (and viceversa)

- Notice: Variance of prices come from noise trader risk. "Price when old" depends on uncertain belief of next periods' noise traders.

Impose general equilibrium: $\lambda^a + \lambda^n = 1$

Price

$$p_t = 1 + \frac{\mu(\rho_t - \rho^*)}{1+r} + \frac{\mu\rho^*}{r} - \frac{2\gamma\mu^2\sigma_\rho^2}{r(1+r)^2}$$

Interpretation

- Term 1: Variation in noise trader (mis-)perception
- Term 2: Average misperception of noise traders
- Term 3: Compensation for noise trader risk

- Special cases:
  - $\mu = 0$ (no noise traders)
  - $\gamma \to 0$ (no risk aversion)

Relative returns of noise traders

$$\Delta R = R^n - R^a = (\lambda_t^n - \lambda_t^a)\left[r + p_{t+1} - p_t (1 + r)\right]$$

$$E(\Delta R) = \rho^* - \frac{(1+r)^2 (\rho^*)^2 + (1+r)^2 \sigma_\rho^2}{2\gamma\mu\sigma_\rho^2}$$

- Noise traders hold more risky asset if $\rho^* > 0$
- Return of noise traders can be higher if $\rho^* > 0$ (and not too positive)

Welfare

- Sophisticated investors have higher utility
- Noise traders may have higher returns (if $\rho^* > 0$)
- Noise traders do not necessarily disappear over time

- Three fundamental assumptions

1. (a) OLG: no last period; short horizon

   (b) fixed supply unsafe asset (a cannot convert safe into unsafe)

   (c) Noise trader risk systematic

- Noise trader models imply that biases may affect market prices (Asset Pricing II)
  - Reference Dependence
  - Attention
  - Persuasion

- Here:
  - Biased investors
  - Non-biased investors

- Elsewhere:
  - Investors (biased)
  - CEOs (smart)

- Also:
  - Consumers (biased)
  - CEOs (smart)

- Later Section in our course

4 Event Studies

- MacKinley (JEL, 1997)

- Examine the impact of an event into stock prices:

  - merger announcement –> Mergers good or bad?

  - earning announcement –> How is company doing?

  - change of CEO –> Was CEO good or bad?

  - election of Bush/Gore –> Test quid-pro-quo parties-firms

  - Iraq war (later in class) –> Effect of war

- How does one do this?

- Three main methodologies:

  1. Regressions

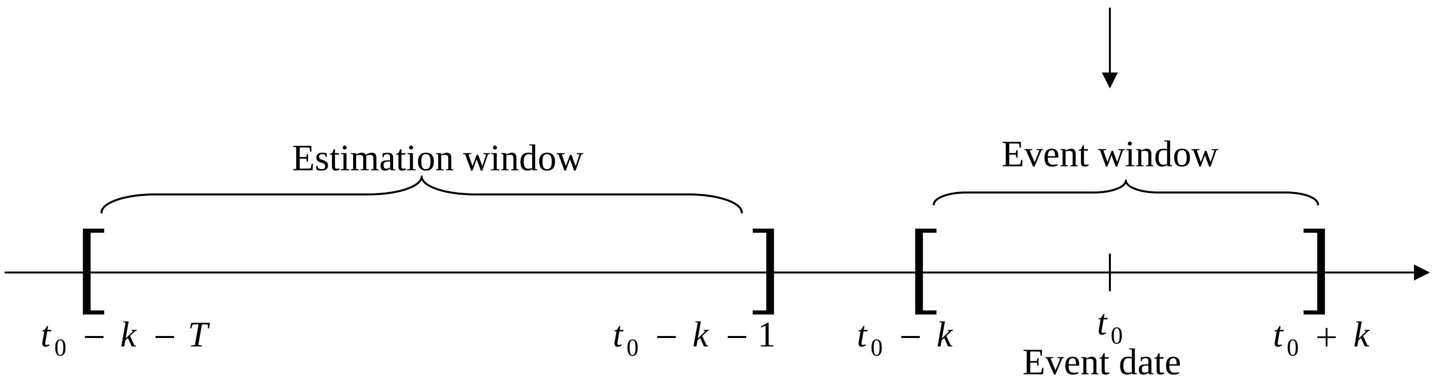
  2. Deciles

  3. Portfolios

- In any case, dependent variable is stock return $r_{t,k}^{(h,H)}$

- Correct returns for correlation with market

Event study (cont'd)



Methodology

Market model

$$r_t = \alpha + \beta r_t^M + e_t$$

- Estimate market model in <u>estimation</u> window

$$\longrightarrow \quad \hat{\alpha}, \hat{\beta}, \hat{\theta}$$

- Predict e_t in <u>event</u> window

$$e_t = r_t - \hat{\alpha} - \hat{\beta} r_t^M - \hat{\theta} S_t$$

- Can do at different horizons:

1. Short-term event Study
   - Examine reaction of stock price of company k to news over short horizon: (0,0) or (-1,1) usually
   - Immediate market reaction to new information

2. Long-term event Study
   - Examine reaction of stock price of company k to news over longer horizon: (3,60), 1-year later
   - Long-term performance following event
   - Better capture the real value for companies of new information
   - Can help identify mispricing (noise traders)

- **Methodology 1.** Run regression:

$$r_{t,k}^{(h,H)} = A + \phi d_{t,k} + \varepsilon_{t,k}$$

- Variable $d_{t,k}$ is measure of event for company k at time t Example: earnings announcement

- (h, H) is horizon: (0,0) for short-term, (3,60) long-term, etc.

- Examples:

  1. Short-term response to earning surprises s:

  $$r_{t,k}^{(0,1)} = A + \phi s_{t,k} + \varepsilon_{t,k}$$

  2. Response to changes in probability of Iraq War

Table 3 (Continued). Short-term Stock Price Response to an Earnings Announcement

	Panel C: The dependent variable is the abnormal return in event time from 0 to +1					
	(1)	(2)	(3)	(4)	(5)	(6)
Earnings Surprise	3.4663 (0.0867)***	2.1282 (0.3275)***	2.4701 (0.4764)***	1.9717 (0.3107)***	2.3354 (0.4058)***	2.2721 (0.3741)***
Earnings Surprise * Friday	-1.1280 (0.2836)***	-0.9761 (0.2860)***	-0.7377 (0.3074)**	-0.8085 (0.2423)***	-0.4649 (0.2273)**	-1.0979 (0.3409)***
Earnings Surprise * Thursday						-0.2990 (0.2569)
Earnings Surprise * Wednesday						-0.2645 (0.2609)
Earnings Surprise * Tuesday						0.1757 (0.2579)
Controls		X	X	X	X	X
Earnings Surprise * Controls		X	X	X	X	X
Companies w/ Friday and Non-Friday Events			X		X	
Company Fixed Effects				X	X	
Clustering by Day	X	X	X			X
R^2	0.0325	0.0368	0.0404	0.0446	0.0477	0.0371
N	*N* = 95666	*N* = 95413	*N* = 41957	*N* = 95413	*N* = 41957	*N* = 95413

Notes: From 1995 to 2003 publicly traded stocks in CRSP are matched to earnings announcements recorded in Compustat and I/B/E/S. In event time, day 0 is the day of the earnings announcement. The abnormal return for each stock is the beta-adjusted return adjusted using the market model. If a period contains more than one day, the abnormal return is the sum of the abnormal return for each constituent day (this measure is not a buy-and-hold return). The earnings surprise for a particular quarterly announcement is the difference between actual earnings for the quarter recorded by I/B/E/S and the median analyst forecast included in the I/B/E/S detail file during the 30 days before the quarterly earnings announcement scaled by the stock price 5 trading days before the announcement. Any variable that appears in an interaction term is also included in levels, but the estimated coefficients are suppressed. Robust standard errors clustered by day of announcement are in parentheses unless otherwise indicated. The set of additional control variables includes the market capitalization deciles, year dummies, and month dummies. Announcements that appear to be made on Saturday or Sunday are excluded from this analysis.
* significant at 10%; ** significant at 5%; *** significant at 1%

- **Methodology 2.** Create deciles/groups (Fama-French)

- Compute average return by decile/group with s.e.

- Example: Earnings announcement (DellaVigna and Pollet, 2004):

  - Quantile 1 $d^1_{t,k}$: Bottom 20% of negative earnings surprises

  - Quantile 6 $d^6_{t,k}$: Earnings surprise = 0, etc.

- Equivalent to running regression:

$$r_{t,k}^{(h,H)} = \sum_{j=1}^{11} \phi_j d_{t,k}^j + \varepsilon_{t,k}$$

- Example (sort of): Diamond extraction in Angola (Guidolin and La Ferrara, 2005)

Figure 1a: Response To Earnings Surprise From -30 To -3

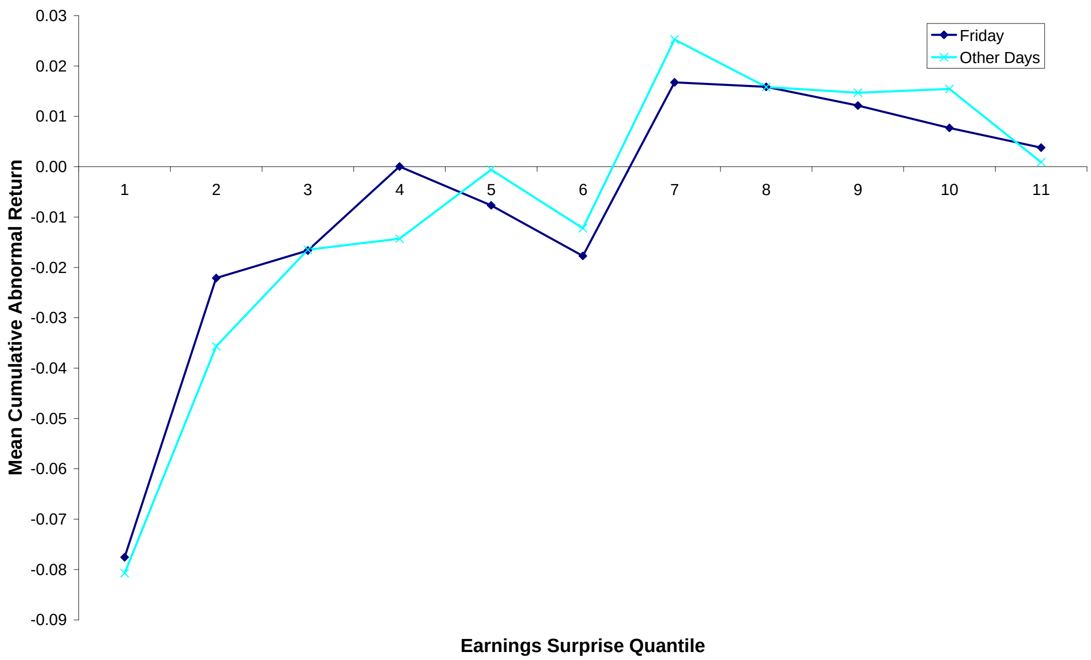
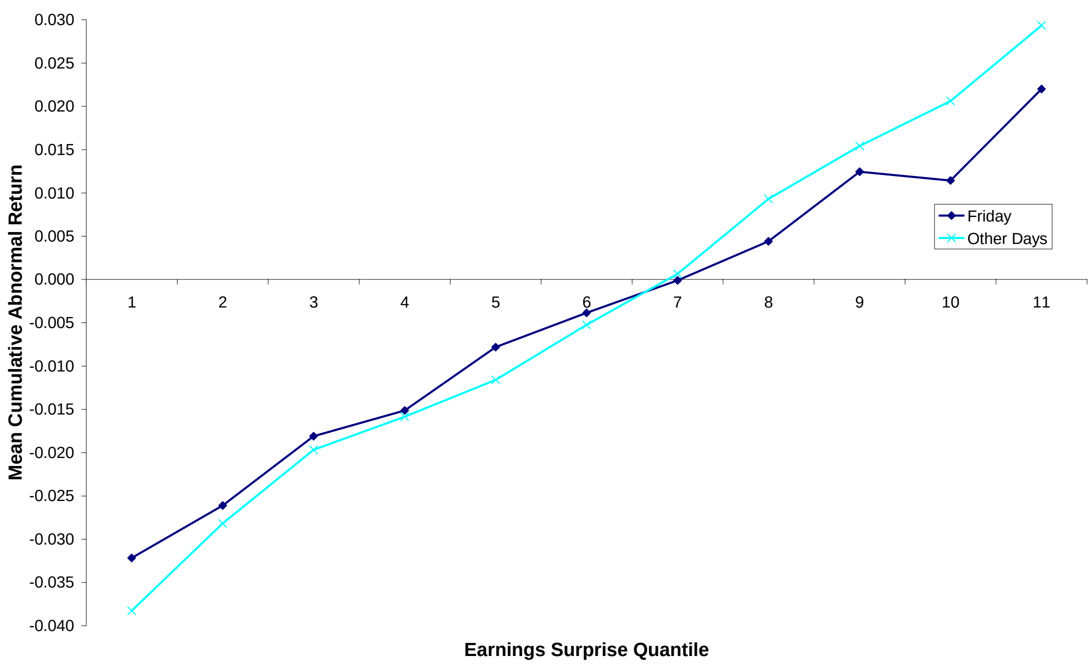


Figure 1b: Response To Earnings Surprise From 0 To +1



Notes: The cumulative abnormal return for each stock is the raw buy-and-hold return adjusted using the estimated beta from market model. Quantiles 1 through 5 contain earnings announcements for five quintiles of negative earnings surprises and quantiles 7 through 11 contain earnings surprises for 5 quintiles of positive earnings surprises. Quantile 6 contains all announcements with an earnings surprise equal to zero. Let F(q) be the mean on Fridays and NF(q) be the mean on Other Days for quantile q, then F(11)-F(1)-[NF(1)-NF(11)] is statistically different from 0 at the 1% level in Figure 1b.

Figure 1c: Response To Earnings Surprise From +3 To +75

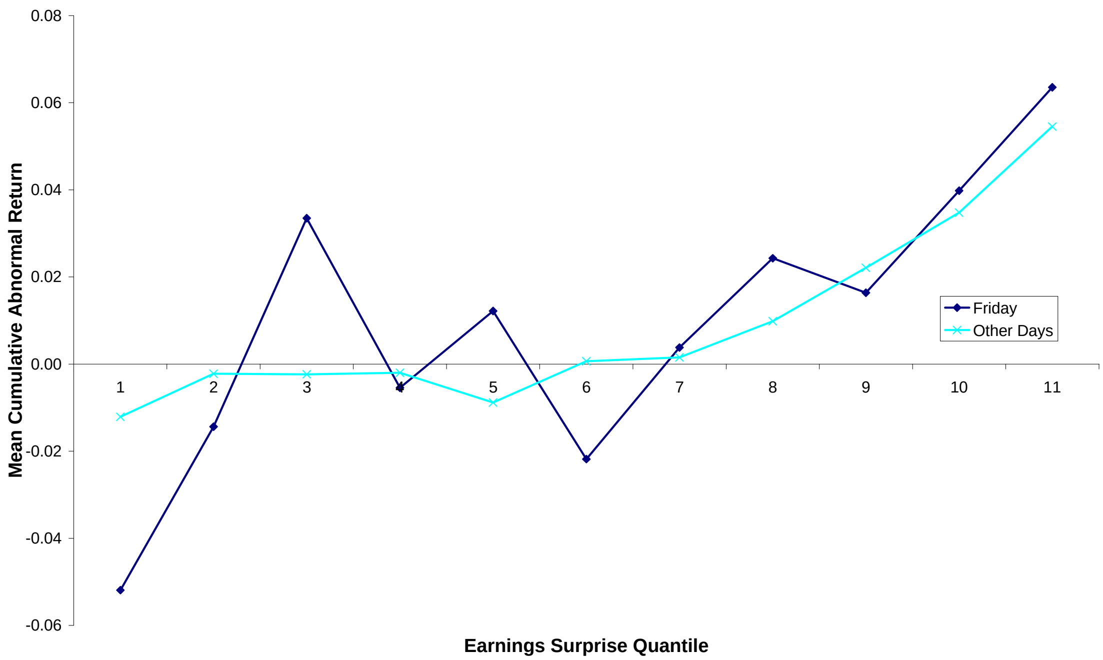
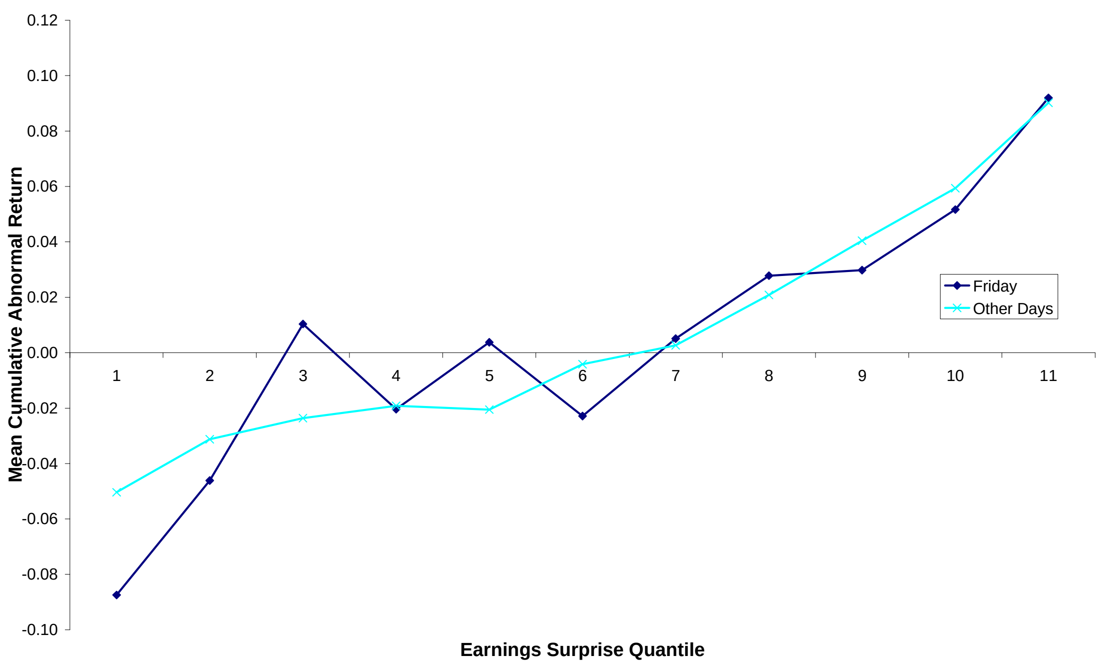
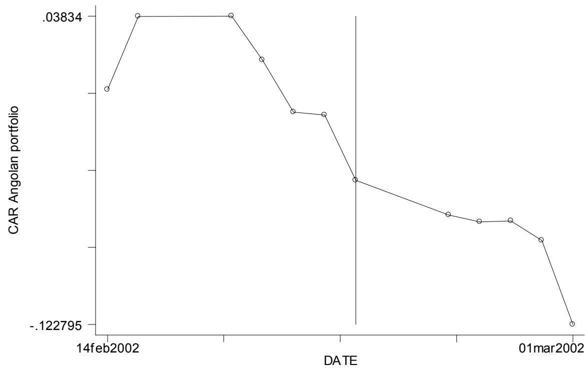


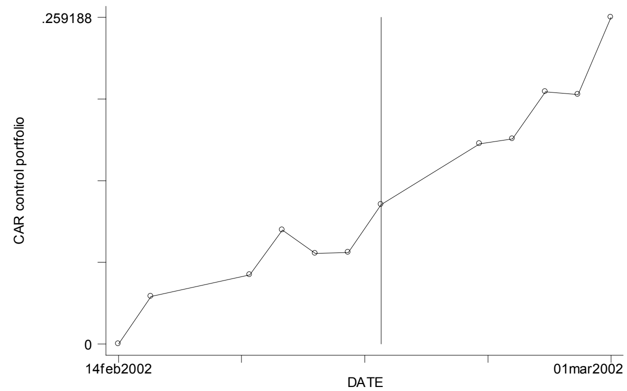
Figure 1d: Response To Earnings Surprise From 0 To +75



Notes: The cumulative abnormal return for each stock is the raw buy-and-hold return adjusted using the estimated beta from market model. Quantiles 1 through 5 contain earnings announcements for five quintiles of negative earnings surprises and quantiles 7 through 11 contain earnings surprises for 5 quintiles of positive earnings surprises. Quantile 6 contains all announcements with an earnings surprise equal to zero. Let F(q) be the mean on Fridays and NF(q) be the mean on Other Days for quantile q, then F(11)-F(1)-[NF(1)-NF(11)] is statistically different from 0 at the 1% level in Figure 1c but it is not statistically different in Figure 1d.

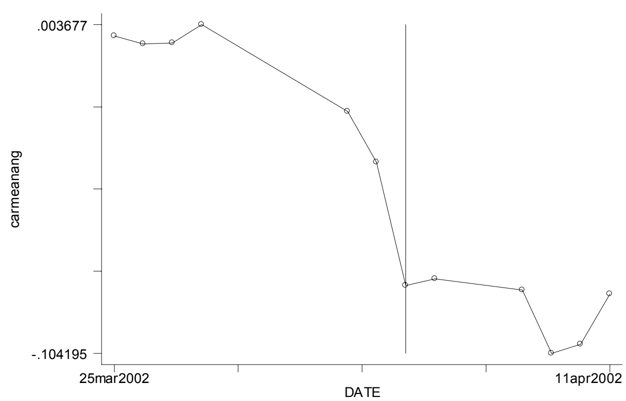


(a) Angolan portfolio

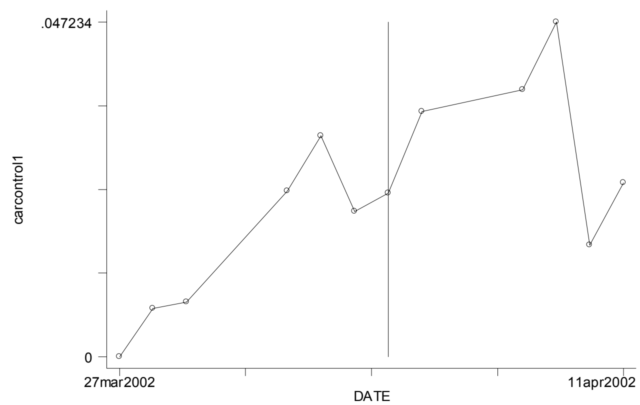


(b) Control portfolio

Figure 1: Savimbi's death



(a) Angolan portfolio



(b) Control portfolio

Figure 2: Cease fire

- **Methodology 3.** Form portfoliosx

- Aggregate stocks of a given category into one portfolio

- Compute daily or monthly returns of portfolio

- Idea: can you make money with this strategy??!

- Examples:

  – Firm size.

    * Form portfolio of companies by decile of size

    * Hold for one/2/10 years

    * Does a portfolio of small companies outperform a portfolio of large companies?

- Momentum
  * Form portfolio of companies by measure of past performance
  * Do stocks with high past returns outperform other stocks?

- Details:

  – Run regression of raw portfolio returns on market returns as well as other factors:

  $$r_t^{small} = \alpha + \beta r_{t,m} + \beta_2 r_{t,2} + \beta_3 r_{t,3} + \varepsilon_{t,k}$$

  – Standard Fama-French factors:

    * control for market returns $r_{t,m}$

    * control for size 'factor' $r_{t,2}$

    * control for book-to-market 'factor' $r_{t,3}$

  – Idea: Do you obtain outperformance of an event beyond things happening with the market, with firms size, and with book-to-market?

  – Difference from methodology 2: Only one observation for time period (day/month)

- Comparison:

  1. **OLS Regression**
     - Introduce controls
     - Use continuous variable

  2. **Deciles.**
     - Simplicity
     - Naturally non-linear specification

  3. **Portfolio**
     - Get rid of cross-sectional correlation
     - Estimate returns from trading strategy

5 Event Study: Iraq War

- Wolfers and Zitzewitz (2004)

- Example: apply event studies to policy choices

- Andrew

Using Markets to Inform Policy: The Case of the Iraq War

Justin Wolfers and Eric Zitzewitz

this paper brought to you by:

Andrew Hayashi

Outline

A. Introduction/Motivation
B. Preview of Results
C. Background
D. Empirical Strategy
E. Results
F. Backing out Beliefs about Severity
G. Discussion

Introduction/Motivation

- Information embedded in market prices
- Capture harder to assess costs and benefits (GE effects)
- Understand consequences of prospective policy decision in real time
- News DOES matter for explaining stock variation vs. Cutler et.al. (1989)

…motivation

- Timing: are political events really news when they happen? Can't answer w/out financial instrument to capture news value
- Improve efficiency of financial markets themselves by pricing risk in publicly observable market, improve efficiency of including non-war value component in stock prices by resolving war uncertainty
- Use Saddam Security to explain changes in financial prices due to probability of war

What They Do

I. Use `Saddam Security' prices to capture probability of war
II. Estimate effect of change in probability of war on prices of oil and financial assets
III. Explain the magnitude of these effects in terms of market beliefs about the severity of war

Preview of Results

- In lead-up to war:
  - Cov(spot oil price, prob. war)>0
  - Cov(equity prices, prob. War)<0
- A 10% increase in the probability of war increases spot oil prices by 1$ per barrel
- Effects temporary and negative in the long run

…preview of results

- With a 10% increase in the probability of war, the S&P falls 1.5%
- Magnitude of this covariance captures the expected effects of war
- The expected severity of the war has a negative skew:
  - 70% likely that the S&P will decline 0 to -15%
  - 20% likely decline will be -15% to -30%
  - 10% chance of bigger declines

Background

- `Saddam Security'
  - Paid 10$ if ousted by time t, focus on June 30 security
  - Traded on liquid *Tradesports* market by Wall Street types. *Tradesports* takes a 0.4% commission
  - Prices reflect probability of war if assume
    - Saddam controls Baghdad unless war imminent
    - If war undertaken by winter, successful by end of June

Empirical Strategy

- Prediction market security (SS) pays p = 1 iff war occurs, financial asset worth η without war and $\eta+\beta$ with.
- Heterogeneous beliefs about parameters
- Changes in the financial asset are given by

$$\Delta P_t^{fin} = \overline{\beta} \cdot \Delta \overline{p}_t + \Delta \overline{\eta}_t$$

- Δp_t is the change in market price, interpreted as a change in average belief about war probability
- Wolfers and Zitzewits run OLS on this difference model, manipulating the length of differences, the price on the LHS

…strategy

Oil Prices

- OLS change in spot market prices on change in SS using first differences, 5, 10 and 20 day differences to reduce bias from slow response of SS market

Financial Markets

- Use S&P on LHS to determine effects on equity market

Concerns

- Bias if news about severity correlated with news about likelihood
- Endogeneity: financial markets affect war likelihood?
- SS market slower to include info than financial markets, and SS traders use financial markets for info – attenuation bias
- Measurement error from bid-ask bounce

…strategy

IV

- Use Saddameter as instrument for SS
- Deal with endogeneity, measurement
- First stage results: $\beta = 0.9$ (0.08), so bias from SS traders responding to financial markets <10%

Table 1. Oil and stock price changes and Saddam Security changes

		Spot oil price[a] ($ per barrel)			Ln(S&P 500)		
Specification	N	Adj. R^2	Coeff.	Std. Err.[b]	Adj. R^2	Coeff.	Std. Err.
First differences[c]	147	0.078	5.38***	(1.88)	0.02	-0.035	(0.038)
Including leads	143	0.086			0.02		
T			5.62***	(1.99)		-0.036	(0.040)
T+1			2.39	(1.45)		-0.012	(0.035)
T+2			2.00	(1.10)		-0.060*	(0.030)
Total effect			10.01***	(2.15)		-0.109	(0.069)
Instrumental variables[d]	79		12.03*	(6.87)		-0.442*	(0.211)
Long differences							
5 day	139	0.385	11.24***	(2.08)	0.075	-0.145***	(0.057)
10 day	129	0.608	10.49***	(2.32)	0.197	-0.197***	(0.067)
20 day	109	0.779	13.09***	(2.79)	0.300	-0.185***	(0.055)

Results

- Effects disappear in medium run, in long run, negative effect on oil prices of approx. $1.50 per barrel
- 10% increase in war prob. associated with 1.1.% decline in S&P, a large effect inexplicable solely in terms of modest effects on oil in medium run --- changes in earnings expectations not discount rate, since war correlated with *reduction* in risk free rate
- War discount captures beliefs about average impact of war

Expected Distribution of War Outcomes

- Hard to explain large negative effect on S&P
- Use put options to capture beliefs that S&P will fall below level x, measuring expectations about severity of war
- State prices: price of S&P = 600 is price of security paying $1 if S&P equals 600 when option expires

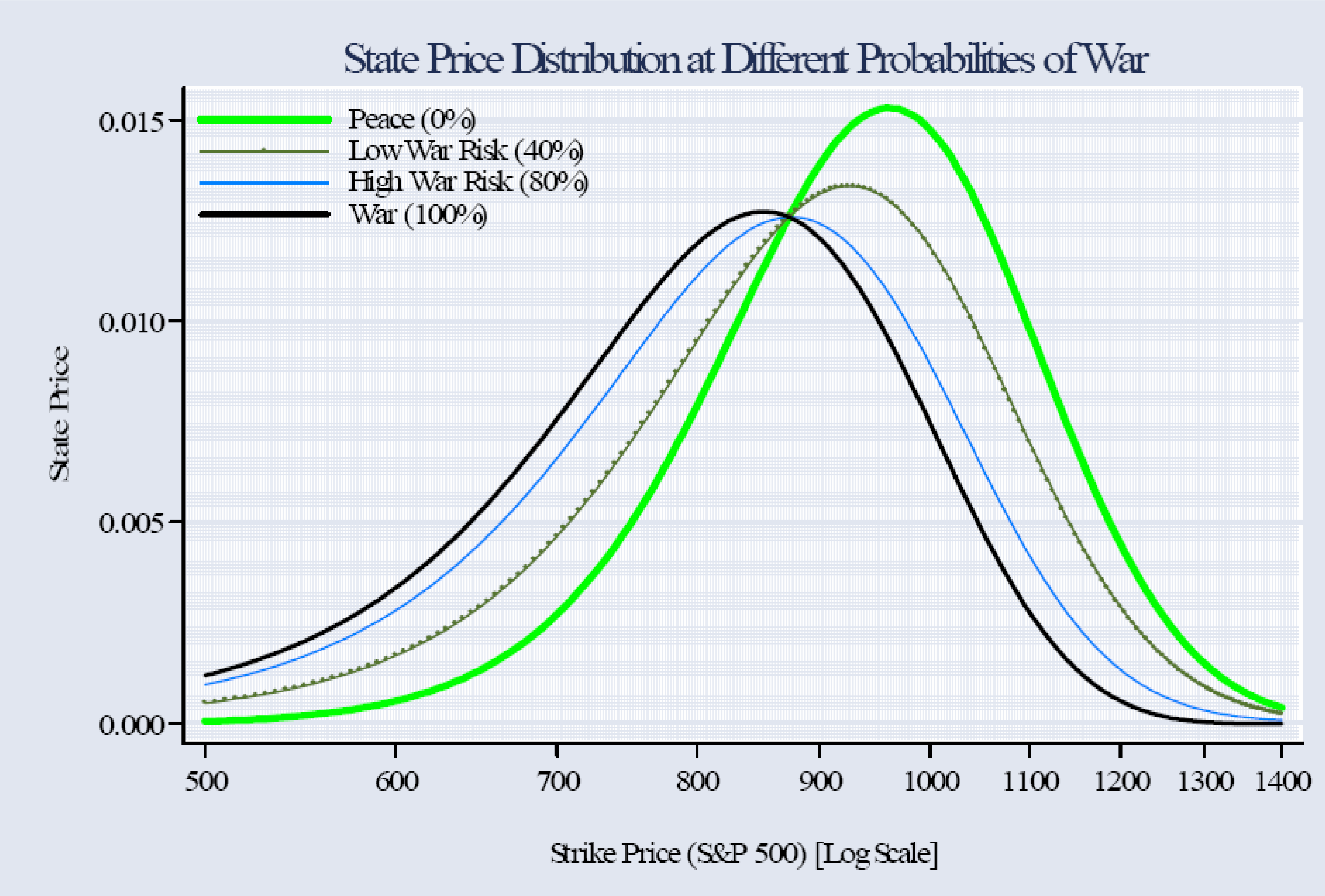
…expected war outcomes results

- Estimate state prices using method from before

$$\Delta p_t(s) = u'(s) \cdot [f(s,1) - f(s,0)] \cdot \Delta p_t^{saddam} + \varepsilon_t$$
$$\Delta p_t(s) = [p(s,1) - p(s,0)] \cdot \Delta p_t^{saddam} + \varepsilon_t$$

- Where f(s) is prob. of state s (future level of S&P 500) and p(s) the state price
- Distribution of state prices can be interpreted as expectation about probability distribution of future S&P levels
- Skewed distribution with 30% probability of >15% fall in S&P

Figure 6


State Price Distribution at Different Probabilities of War
Peace (0%)
Low War Risk (40%)
High War Risk (80%)
War (100%)
State Price
0.015
0.010
0.005
0.000
500
600
700
800
900
1000
1100
1200
1300
1400
Strike Price (S&P 500) [Log Scale]

Extensions

- Check cross section impacts of war across industries and countries
- Vary with sector and country characteristics in a `sensible way'
  - Eg. war bad for airlines and investment sensitive sectors
  - Eg2. war bad for countries more exposed to international capital movements, oil dependent, war participants

Criticism and Future Research

- Functional form linear in probabilities. Is this appropriate?
- Correlation of severity with probability beliefs likely
- Are SS really `quantifying' the news content of the political narrative?
- Doesn't resolve question of response of markets to news, begs the question with SS– do event studies of price of SS around `news'? (Figure 1)