Law on the Market? Abnormal Stock Returns and Supreme Court Decision-Making

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james ming chen
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Law on the Market? Abnormal Stock Returns and Supreme Court Decision-Making

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blog | jurisdynamics.blogspot.com
Thank you very much for allowing us to present our work
Workshop on Judicial Behavior: Daniel Katz on Court Decisions and Stock Prices

11/8
Wednesday, November 8, 2017 @ 4:00pm - Wednesday, November 8, 2017 @ 5:30pm
Room VI
1111 East 60th Street, Chicago, Illinois 60637

Open to the Law School community

Prof. Daniel Katz will present his paper "Law on the Market? Abnormal Stock Returns and Supreme Court Decision-Making." This paper, and another paper by Daniel Katz for background, are both attached to the workshop announcement.

Please contact Theresa Yuan for any additional questions.

Download the paper

Download the background paper

Thank you very much for allowing us to present our work
I would like to start with a quick overview of some allied work before getting to the paper for today ...
In allied work, we have explored **judicial prediction** from a variety of different angles ...
The Three Forms of (Legal) Prediction
The Three Forms of (Legal) Prediction

Experts, Crowds, Algorithms
In so much as prediction is the task in question ... #MachineLearning is the method du jour
It is not necessarily ML alone but rather some ensemble of experts, crowds + algorithms
Professor Katz noted that in the long term … “We believe the blend of experts, crowds, and algorithms is the secret sauce for the whole thing.”


Artificial intelligence can predict Supreme Court decisions better than some experts.

Artificial intelligence prevails at predicting Supreme Court decisions

By Matthew Hutson | May 2, 2017, 1:45 PM

“See you in the Supreme Court!” President Donald Trump tweeted last week, responding to lower court holds on his national security policies. But is taking cases all the way to the highest court in the land a good idea? Artificial intelligence may soon have the answer. A new study shows that computers can do a better job than legal scholars at predicting Supreme Court decisions, even with less information.
predicting the decisions of the Supreme Court of the United States

#SCOTUS
ESSAY

THE SUPREME COURT FORECASTING PROJECT: LEGAL AND POLITICAL SCIENCE APPROACHES TO PREDICTING SUPREME COURT DECISION MAKING

Theodore W. Ruger, Pauline T. Kim, Andrew D. Martin, & Kevin M. Quinn

This Essay reports the results of an interdisciplinary project comparing political science and legal approaches to forecasting Supreme Court decisions. For every argued case during the 2002 Term, we obtained predictions of the outcome prior to oral argument using two methods—one a statistical model that relies on general case characteristics, and the other a set of independent predictions by legal specialists. The basic result is that the statistical model did better than the legal experts in forecasting the outcomes of the Term’s cases: The model predicted 75% of the Court’s affirm/reverse results correctly, while the experts collectively got 59.1% right. These results are notable, given that the statistical model disregards information about the specific law or facts of the cases. The model’s relative success was due in large part to its ability to predict more accurately the important votes of the moderate Justices (Kennedy and O’Connor) at the center of the current Court. The legal experts, by contrast, did best at predicting the votes of the more ideologically extreme Justices, but had difficulty predicting the central Justices. The relative success of the two methods also varied by issue area, with the statistical model doing particularly well in forecasting “economic activity” cases, while the experts did comparatively better in the “judicial power” cases. In addition to reporting the results in detail, this Essay explains the differing methods

Theodore W. Ruger, Pauline T. Kim, Andrew D. Martin, Kevin M. Quinn

Columbia Law Review
October, 2004
APPENDIX B
LEGAL EXPERT PARTICIPANTS*

Rachel E. Barkow, New York University School of Law
David J. Barron, Harvard Law School
Anthony J. Bellia Jr., University of Notre Dame Law School
Yochai Benkler, Yale Law School
James F. Bennett, Bryan Cave LLP, Saint Louis, Missouri
Paul Schiff Berman, University of Connecticut School of Law
Stefanos Bibas, University of Iowa College of Law
John H. Blume, Habeas Assistance and Training Project / Cornell Law School
Mary Ann Bobinski, University of Houston Law Center
Beth S. Brinkmann, Morrison & Foerster LLP, Washington, D.C.
Rebecca L. Brown, Vanderbilt University School of Law
Daniel J. Capra, Fordham Law School
Erwin Chemerinsky, University of Southern California Law School
Jesse H. Choper, University of California at Berkeley School of Law
Thomas Colby, George Washington University Law School
David D. Cole, Georgetown University Law Center
Brannon P. Denning, Cumberland School of Law
Neal E. Devins, William & Mary School of Law
Laura Dickinson, University of Connecticut School of Law
Michael C. Dorf, Columbia Law School
Christopher R. Drahozal, University of Kansas School of Law
Rochelle Cooper Dreyfuss, New York University School of Law
Theodore Eisenberg, Cornell Law School
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Katherine Hunt Federle, Ohio State University Michael E. Moritz College of Law
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Charles Fried, Harvard Law School
Kenneth S. Geller, Mayer, Brown, Rowe & Maw, Washington, D.C.
Heather K. Gerken, Harvard Law School
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Melissa Hart, University of Colorado School of Law
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Robert M. Lawless, University of Nevada, Las Vegas School of Law
Douglas Laycock, University of Texas School of Law
Richard J. Lazarus, Georgetown University Law Center

* Expert affiliations listed are as of the date of publication.
From the 68 Included Cases for the 2002-2003 Supreme Court Term

Case Level Prediction: 58% experts

Justice Level Prediction: 67.4% experts
these experts probably overfit
they fit to the noise
and
not the signal
The Florida Bar Journal

The Tyranny of Hunches: Using Analytics to Give Your Firm a Strategic Advantage
by Ed Walters

Page 46

Law firms are amazing organizations. They are full of very smart people; they utilize incredible amounts of information, and, as businesses, they generate a lot of money. And yet, for many client decisions — including some bet-the-company decisions on behalf of clients — the most important source of information for law firms is the hunch.

After practicing law for a short time, I became a business owner, and now our company employs four law firms to do our legal work. As a consumer, this hunch-based mode of decisionmaking drives me crazy. I would wager that many clients feel the same way about hunches.

Experience — as a Hunch
How much is my case worth? Where is it most advantageous to file suit? What is this judge like, and how is she likely to rule in this case? How long will it take to reach a disposition? What is my likely exposure? What will the legal fees be? Should I accept this
if this were finance this would be trading worse than S&P500
66% of fund managers can't match S&P results

That hot-shot mutual fund manager you’re betting on to make you rich might be generating returns that fall far short of the benchmark stock index the fund tracks.

Last year, for example, when the Standard & Poor’s 500-stock index posted a paltry total return of 1.4% with dividends included, 66% of “actively managed” large-company stock funds posted smaller returns than the index, according to the latest SPIVA U.S. Scorecard released Wednesday by S&P Dow Jones Indices. In Wall Street-speak, that means two out of three fund managers “underperformed” the stock benchmark they are measured against. The longer-term outlook is just as gloomy, with 84% of large-cap funds generating lower returns than the index over the past five years.
Armed With An Index Fund, Warren Buffett Is On Track To Win Hedge Fund Bet

March 10, 2016 · 5:12 AM ET
Heard on Morning Edition

#BuffetChallenge
Only a Market Crash Can Stop Warren Buffett From Winning This $1 Million Bet

It would take a massive stock-market crash for Buffett to lose the wager.

It was a $1 million bet: Could hedge funds outperform index funds over a decade?

Warren Buffett said no in 2007. Now it looks like the billionaire investor was right.

His chosen index fund, the Vanguard 500 Index Fund Admiral Shares, climbed 66% from the start of the bet through the end of 2015, compared with a gain of 22% for a basket of hedge funds selected by asset manager Protégé Partners, including fees.
like many other forms
human endeavor
law is full of
noise predictors ...
from a pure forecasting standpoint
the best known SCOTUS predictor is
Jacob Berlove, 30, of Queens, is the best human Supreme Court predictor in the world. Actually, forget the qualifier. He’s the best Supreme Court predictor in the world. He won FantasySCOTUS three years running. He correctly predicts cases more than 80 percent of the time. He plays under the name “Melech” — “king” in Hebrew.
the law version of superforecasting
Crowds
not enough crowd based decision making in institutions
Noise: How to Overcome the High, Hidden Cost of Inconsistent Decision Making

by Daniel Kahneman, Andrew M. Rosenfield, Linnea Gandhi, and Tom Blaser

FROM THE OCTOBER 2016 ISSUE

Harvard Business Review
“Software developers were asked on two separate days to estimate the completion time for a given task, the hours they projected differed by 71%, on average.

When pathologists made two assessments of the severity of biopsy results, the correlation between their ratings was only .61 (out of a perfect 1.0), indicating that they made inconsistent diagnoses quite frequently.

Judgments made by different people are even more likely to diverge.”
FantasySCOTUS is the Supreme Court Fantasy League. Thousands of attorneys, law students, and other avid Supreme Court followers make predictions about cases before the Supreme Court.

Its free to participate and fun to play so sign up today and complete to win up to $10,000 in prizes!

- Predict case outcomes and justice votes.
- Make predictions at any time up to decision release.
- Create custom leagues, public or private
- View real-time, aggregate predictions for cases.
- Compete for prizes up to $10,000!

Click Here to Sign up for FREE!
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Click Here to Sign up for FREE!
Meet Our Team

Josh Blackman
FantasySCOTUS Founder

Mike Bommarito
Chief Executive Officer, LexPredict

Daniel Martin Katz
Chief Strategy Officer, LexPredict
We can generate Crowd Sourced Predictions

<table>
<thead>
<tr>
<th>Case Number</th>
<th>Case Name</th>
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**Prediction Statistics**

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<td>Cases Remaining</td>
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<td></td>
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<td>Justice Accuracy Rate 52.35%</td>
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https://fantasycotus.lexpredict.com/case/list/
not all members of crowd are made equal
we maintain a ‘supercrowd’ which is the top $n$ of predictors up to time $t-1$

(i.e. a Condorcet Jury)
the ‘supercrowd’ outperforms the overall crowd (and even the best single player)
Crowdsourcing accurately and robustly predicts Supreme Court decisions

From 2011-2017
7000+ players
600,000+ predictions

Brief Aside
About Crowd Sourced Prediction
#LegalCrowdSourcing
Neil Gorsuch was #1 on our Fantasy Platform 12 Days after Donald Trump was elected President (i.e Nov 20)

(most pundits did not identify as a serious candidate him until mid-January 2017)
Fantasy justice

Predicting Donald Trump’s pick for the Supreme Court

If humankind couldn't predict Mr Trump, perhaps it can predict what Mr Trump will do

Fans have fantasy sports, Supreme Court nerds have FantasySCOTUS

Richard Wolf, USA TODAY
Published 1:13 p.m. ET Jan. 26, 2017 | Updated 4:22 p.m. ET Jan. 26, 2017

Predicting Gorsuch

February 4, 2017 | Monica Bay, CodeX Fellow

Stanford University

Neil Gorsuch
Algorithms

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0174698
Our algorithm is a special version of random forest (time evolving)
# Path constants
DATA_PATH='.data/
SCDB_RELEASE="2015_01"

# Model constants
SCDB_OUTCOME_MAP=None

def get_raw_scdb_data(scdb_path=None):
    
    Get raw SCDB data in pandas.DataFrame.
    
    # Get path
    if not scdb_path:
        scdb_path = os.path.join(DATA_PATH,
                                  "SCDB_0JusticeCentered_Citation.csv".format(SCDB_RELEASE))

    # Load and return
    raw_scdb_df = pandas.read_csv(scdb_path, encoding = "ISO-8859-1")

    # Get outcome data
    outcome_map = get_outcome_map()
    raw_scdb_df.loc[:, "case_outcomeDisposition"] = outcome_map.loc[:,raw_scdb_df.loc[:,"caseDisposition"
    .apply(lambda row: get_outcome(row["vote"], row["caseDisposition"], axis=1))

    return raw_scdb_df

def get_outcome_map():
    
    Get the outcome map to convert an SCDB outcome into an affirm/reverse/other mapping.

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---
We call this a ‘general’ model of #SCOTUS Prediction.
Not just interested in accuracy over a short time window
A locally tuned model will typically lead to **overfitting** as the dynamics shift.
We want a model that is robust to a large number of known dynamics ...
Current Version of #PredictSCOTUS

1816-2015
243,882 Justice Votes
28,009 Case Outcomes

Fig 1. Case and Justice Accuracy 1816-2015 (by Term) Time series of the accuracy of our prediction model at both the case level (left pane) and justice level (right pane)
Experts, Crowds, Algorithms
The learning problem is to discover how to blend streams of intelligence.

**ensemble method**

**ensemble model**

- expert forecast
- crowd forecast
- algorithm forecast
ensemble method

learning problem is to discover how to blend streams of intelligence

via back testing we can learn the weights to apply for particular problems

- expert forecast
- crowd forecast
- algorithm forecast
All of this is the path which led us to this paper ...
Law on the Market? Abnormal Stock Returns and Supreme Court Decision-Making

Daniel Martin Katz1, Michael J. Benvenuto 2, Tyler Shelling3, James Ming Chu4

1Illinois Institute of Technology—Chicago Kent College of Law
2Columbia—The Samuels Center for Legal Informatics
3Michigan State University College of Law

Abstract

What happens when the Supreme Court of the United States decides a case impacting one or more publicly-traded firms? While many have observed anecdotal evidence linking decisions or oral arguments to abnormal stock returns, few have rigorously or systematically investigated the behavior of equities around Supreme Court actions. In this research, we present the first comprehensive, longitudinal study on the topic, spanning over 45 years and hundreds of cases and firms. Using both intraday and interday data around decisions and oral arguments, we evaluate the frequency and magnitudes of statistically-significant abnormal return events after Supreme Court action. On a per-case basis, we find 0.8% and 7.6% stocks that exhibit abnormal returns after decision. In total, across the cases we examined, we find 19 out of the 211 cases (9%) exhibit an average abnormal return of 4.4% over a two-month window with an average F-statistic of 2.8. Finally, we observe that abnormal returns following Supreme Court decisions materialize over the span of hours and days, not minutes, yielding strong implications for market efficiency in this outcome. While we cannot conclude ex ante substantive legal impact from mere versions of beliefs, we do find strong evidence that there is indeed a “law on the market” effect as measured by the frequency of abnormal return events, and that these abnormal returns are not immediately incorporated into prices.

Keywords: event study, supreme court, market efficiency, abnormal returns, litigation, judicial decision making

Prepares submitted to arXiv - Version 8.0
May 16, 2017
When we would present this work on #SCOTUS Prediction folks would ask us “why do I care about marginal improvements in prediction?”
Well at a very minimum — if you could predict the cases you could perhaps trade on them in the relevant securities market ...
In other words, given our ability to offer forecasts of judicial outcomes, we wondered if this information could inform an event-driven trading strategy?
Law on the Market? Evaluating the Securities Market Impact of Supreme Court Decisions*

Daniel Martin Katz1, Michael J. Bonnardito II, Tyler Soellinger2, and James Ming Chen3

1 Illinois Institute of Technology - Chicago Kent College of Law
2 University of Michigan, Center for the Study of Complex Systems
3 Michigan State University College of Law

\[
AR_t = \alpha_t - \beta_t R_{mt} \\
\text{CAR}((\tau_1, \tau_2)) = \sum_{t=\tau_1}^{\tau_2} AR_t
\]
We call this idea “Law on the Market” LOTM
“Law on the Market”
LOTM
A Motivating Example

Myriad Genetics
NASDAQ: MYGN
Market Cap of ~$3 billion+
Myraid Genetics

“Myriad employs a number of proprietary technologies that permit doctors and patients to understand the genetic basis of human disease and the role that genes play in the onset, progression and treatment of disease.”
Myraid Genetics

“Myriad was the subject of scrutiny after it became involved in a lengthy lawsuit over its controversial patenting practices” which including the patenting of human gene sequences ....
June 13, 2013

Supreme Court Offers this Decision

June 13, 2013
~10:05am
Myriad Genetics Stock Jumps On Supreme Court Ruling

By AMY REEVES, INVESTOR'S BUSINESS DAILY
Posted 06/13/2013 11:48 AM ET

Shares of Myriad Genetics (MYGN) popped nearly 11% to a four-year high in morning trading Thursday after the U.S. Supreme Court issued a mixed ruling on whether its genetic products could be patented.

The court ruled on a suit first filed against Myriad in 2009, arguing that the company couldn't patent certain genes it had isolated for a test of women's susceptibility to breast cancer, on the grounds that genes are "products of nature" and therefore cannot be patented. The court agreed when it came to the BRCA genes Myriad had identified, saying that these had been discovered rather than invented. On the other hand, the court said Myriad could keep its patents on cDNA because those were created in the lab and were significantly different from the natural version.

The ambiguous verdict was apparently better than investors had feared, because the previously flat stock bolted above 36 after the news broke in the late morning. The move bolstered the recovery in the stock's IBD Relative Strength Rating, which was down in the 40s two months ago but got a boost after Myriad's Q3 earnings as well as a celebrity endorsement last month.
In early afternoon trading Thursday, Myriad shares were up 5.4 percent, or $2.36, at $35.73.
Final Media Reports

Court: Human genes cannot be patented

By Bill Mears, CNN Supreme Court Producer
updated 8:21 PM EDT, Thu June 13, 2013

Supreme Court compromise on gene patents

STORY HIGHLIGHTS

- Unanimous ruling a compromise; court says synthetic material, cDNA, can be patented
- Actress Angelina Jolie drove attention to the issue involving breast cancer
- Issue was whether "products of nature" can be patented

Washington (CNN) — The Supreme Court unanimousl
Thursday that human genes cannot be patented.

But in something of a compromise, all nine justices said 
naturally occurring isolated biological material itself is 
a synthetic version of the gene material may be patented.

Legal and medical experts believe the decision will hav

The news media waited for rulings outside the Supreme Court building on Thursday morning.

By ADAM LIPTAK
Published: June 13, 2013 | 574 Comments

WASHINGTON — Human genes may not be patented, the Supreme Court ruled unanimously on Thursday. The decision is likely to reduce the cost of genetic testing for some health risks, and it may 

Myriad Genetics whipsawed on Supreme Court gene ruling

By Jose Pagliery @Jose_Pagliery June 13, 2013: 6:51 PM ET

NEW YORK (CNNMoney)
The genetics industry is in for a shake-up following Thursday's U.S. Supreme Court ruling that human genes can't be patented but synthetic ones can. And shares of Myriad Genetics, one of the industry's biggest players, went on a wild ride following the decision.
Figure 1: Myriad Genetics (MYGN) cumulative abnormal returns from June 13-14, 2013
Figure 1: Myriad Genetics (MYGN) cumulative abnormal returns from June 13-14, 2013
Figure 1: Myriad Genetics (MYGN) cumulative abnormal returns from June 13-14, 2013
2:15pm
MYGN is Off its Daily Peak but still up

Figure 1: Myriad Genetics (MYGN) cumulative abnormal returns from June 13-14, 2013
Day 1 Close
MYGN
is Off Nearly 10% from Open
and 20% from Daily High

Figure 1: Myriad Genetics (MYGN) cumulative abnormal returns from June 13-14, 2013
Day 2 the Sell Off Continues

Figure 1: Myriad Genetics (MYGN) cumulative abnormal returns from June 13-14, 2013
A Good Time to Buy an Option :)
Figure 6: Two Day Cumulative Abnormal Returns for Obamacare Cases
The national news media mostly got it right on Thursday in reporting the Supreme Court's decision to uphold President Obama's health care overhaul. But the cable news networks CNN and Fox News Channel initially got it wrong, causing consternation behind the scenes.

In the rush to get the news out, both networks initially reported that the Supreme Court had struck down the law's individual mandate, when in fact, in a 5-to-4 vote, the court had upheld the mandate as a tax.

"The mandate is gone," Shannon Bream, a Fox News correspondent, announced at 10:08 a.m. as a graphic flashed on the screen that called it unconstitutional. A moment later, one of the Fox anchors, Megyn Kelly, cautioned that Ms. Bream might be wrong.
So these examples represent a form of existence proof ...
But perhaps they are rare and anachronistic cases ...?
One obvious challenge is the prospect that this information is already incorporated into the price of the relevant security.

#EfficientMarketHypothesis
#Fama
#EMH
In allied fields of human endeavor, there are fairly rapid market responses to changes in the information environment.
This all presupposes a rigorous information and modeling environment — that is historically lacking for questions of legal prediction

#QuantitativeLegalPrediction
#LegalAnalytics #FinLegalTech
Theoretical + Empirical Questions
Market Incorporation Hypothesis

Are judicial decisions already reflected in the share price?

(If this were true - we would rarely see market move post decision)
Theoretical + Empirical Questions

How General Are These Specific Examples?

(In other words, is this a general phenomenon?)
What is the nature of the signal incorporation environment?

(In other words, what are the dynamics associated with does the market response?)
Methods
(1) Coding / PreProcessing

(2) Candidate LOTM Events

(3) Formal Evaluation Using CAPM (market model of returns)

(4) Evaluate Speed of Incorporation and Related Informational Dynamics
(1) Coding / PreProcessing

We reviewed and coded 1,363 total cases decided over the period in questions.

We asked a simple question - could this case plausibly impact a publicly traded security?
(2) Candidate LOTM Events

1,363 total cases reviewed in our sample, we identified 211 candidate LOTM cases *plausibly* affecting one or more firms or sectors.

(these included parties to the case but also third parties)
All Data & Code is Available Here

^Other than the WRDS Data which is *not* open source but can be obtained from Wharton
https://wrds-web.wharton.upenn.edu/wrds/

https://github.com/mjbommar/law-on-the-market
(3) Formal Evaluation Using CAPM (market model of returns)
Abnormal Returns

We want to isolate the effect of the event from other general market movements.

Common approach is to use index as baseline and seek to identify statistically significant deviations from that baseline.
Appendix A. Appendix

A model of normal returns (i.e., expected returns unconditional on the event but conditional on other information) must be specified before an abnormal return can be defined. There are a variety of different approaches to establishing expected returns including the market model, constant expected returns model, etc.\textsuperscript{8} We focus upon the simplest approach presented in the literature and for the reasons outlined in supra Section 4.1. Our data and implementing code are available on Github \textsuperscript{9} and we encourage other researchers in future work to consider any alternative specification of their choosing.

In the literature, there have been various approaches used to estimate abnormal returns including \{[51]\} and \{[7]\}. We believe that \{[9]\} presents the most useful summary of the formalization we leverage in this study. Therefore, for the ease of the reader we highlight that formalization below.

“For any security \(i\) the market model is:

\[ R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \]

\[ E(\varepsilon_{it} = 0) \quad var(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2 \] (1)

where \(R_{it}\) and \(R_{mt}\) are the period-\(t\) returns on security \(i\) and the market portfolio, respectively, and \(\varepsilon_{it}\) is the zero mean disturbance term. \(\alpha_i, \beta_i\) and \(\sigma_{\varepsilon_i}^2\) are the parameters of the market model.”

The market model is used to relate the return of a security to the return
of some broader market portfolio. The market model is typically preferable to the constant mean return model because it partials out (controls for) the portion of the return that is attributable to broader market conditions. For our purposes, we follow the standard practice and use the S&P 500 index as our market portfolio.

As highlighted in infra Section 4.1, we divide time into three windows: an estimation window \((T_0, T_1]\), an event window \((T_1, T_2]\) with event time \(\tau\) s.t. \(T_1 \leq \tau \leq T_2\), and a post-event window \([T_2, T_3]\). In this specific implementation, our estimation window constitutes the two days prior to our event with price data aggregated to five minute intervals.

We use the simplest specification, ordinary least squares (OLS), to fit the parameters of the market model during the estimation window.\(^{10}\) The properties of the OLS estimators are as follows:

\[
\hat{\beta}_i = \frac{\sum_{\tau=T_0+1}^{T_1} (R_{i\tau} - \hat{\mu}_i)(R_{m\tau} - \hat{\mu}_m)}{\sum_{\tau=T_0+1}^{T_1} (R_{m\tau} - \hat{\mu}_m)^2} \quad (2)
\]

\[
\hat{\alpha}_i = \hat{\mu}_i - \hat{\beta}_i \hat{\mu}_m \quad (3)
\]

\[
\hat{\sigma}^2_{\varepsilon_i} = \frac{1}{L_1 - 2} \sum_{\tau=T_0+1}^{T_1} (R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau})^2 \quad (4)
\]
Formalization of CAPM in Appendix A

\[ R_{it} \text{ and } R_{mt} \text{ are the return in the event period } \tau \text{ for the } i^{th} \text{ security and the market respectively. The properties of } \hat{\mu}_i \text{ and } \hat{\mu}_m \text{ are as follows:} \]

\[ \hat{\mu}_i = \frac{1}{L_1} \sum_{\tau = T_0 + 1}^{T_1} R_{i\tau} \quad \hat{\mu}_m = \frac{1}{L_1} \sum_{\tau = T_0 + 1}^{T_1} R_{m\tau} \]

Using the parameter estimates outlined above we can now measure abnormal returns using the following approach:

\[ \hat{AR}_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau} \quad (5) \]

As noted in [9] “the abnormal return is the disturbance term of the market model calculated on an out of sample basis. Under the null hypothesis, conditional on the event window market returns, the abnormal returns will be jointly normally distributed with a zero conditional mean and conditional variance \( \sigma^2(\hat{AR}_{i\tau}) \).” The properties of \( \sigma^2(\hat{AR}_{i\tau}) \) are as follows:

\[ \sigma^2(\hat{AR}_{i\tau}) = \sigma_{e_i}^2 + \frac{1}{L_1} \left[ 1 + \frac{(R_{m\tau} - \hat{\mu}_m)^2}{\hat{\sigma}_m^2} \right] \quad (6) \]

Our null hypothesis \( H_0 \) is that the event in question (i.e., a decision of the Supreme Court of the United States) does not impact the returns associated with our LOTM candidate stocks. Testing \( H_0 \) the distribution properties of the sample abnormal return of a given observation in the event window is given by:

\[ \hat{AR}_{i\tau} \sim N(0, \sigma^2(\hat{AR}_{i\tau})) \quad (7) \]

Finally, we must aggregate abnormal returns to create our overall point estimate of cumulative abnormal returns (CAR) during our event window. The CAR from \( \tau_1 \) to \( \tau_2 \) is the sum of the included abnormal returns:

\[ C\hat{AR}_i(\tau_1, \tau_2) = \sum_{\tau = \tau_1}^{\tau_2} \hat{AR}_{i\tau} \quad (8) \]
Implementation

`evReturn`  
*Estimating Abnormal Return from Event Analysis*

**Description**
Conduct an event analysis and estimate abnormal returns over time and across firms.

**Usage**
```r
evReturn(y, firm, event.date, y.date = "date",  
index = "sp500", event.win = 3, est.win = 250, digits = 4, ...)
```

**Arguments**
- `y`: a data frame object with one column for date, return series by firms, a return series for a stock market index, and a return series for a risk free asset.
- `firm`: a character vector of firm names; this is the name of the return series in `y`.
- `event.date`: event dates for each firm as specified in `firm`; this should be a numerical vector and can match the values in `y$y.date`; if event dates are the same for all the firms, this can be specified as a single number.
- `y.date`: a character value for the column name of date in `y`.
- `index`: a character value for the column name of index in `y`.
- `event.win`: the one-side width of event window in days; the default value of 3 corresponds to a 7-day window (i.e., `3 + 1 + 3`).
- `est.win`: the width of estimation window in days.
- `digits`: number of digits used to format outputs.
- `...`: additional arguments to be passed.

**Package `erer`**

**Title**  
Empirical Research in Economics with R

**Version**  
2.2

**Date**  
2010-11-15 (first built); 2014-8-10 (last)
From a methods standpoint, our approach is to estimation is extremely standard.

(The Higher Frequency data is the interesting part of the paper)
Nearly every event study in law, and the vast majority of analysis in finance, leverages data with at most daily frequency.

Interday studies, however, face a difficult and unavoidable tradeoff: either a researcher must rely upon relatively few data points, or they must collect data over longer durations in order to generate a sufficient statistical sample.
This Paper Leverages 5 Minute Data -5 Days, +5 Days much higher frequency than most papers in literature
SOME RESULTS
Summary

Results
Some Additional Cases
(4) Evaluate Speed of Incorporation and Related Informational Dynamics
Speed of Information Incorporation
This is very slow ... 
Perhaps the real action is in the options market?
### Relationship Between Oral Argument and Decision

<table>
<thead>
<tr>
<th></th>
<th>Day</th>
<th>Week</th>
<th>Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\rho(A, D)$</td>
<td>0.081724</td>
<td>-0.043022</td>
<td>0.060645</td>
</tr>
<tr>
<td>$\rho_s(A, D)$</td>
<td>0.031031</td>
<td>-0.015607</td>
<td>0.043728</td>
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<tr>
<td>$\rho(A,</td>
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<td>0.085366</td>
</tr>
<tr>
<td>$\rho(</td>
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<td>0.122116</td>
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<tr>
<td>$\rho_s(</td>
<td>A</td>
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<td>0.061151</td>
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Table 1: Correlation between excess return around oral argument windows $A$ and post-decision abnormal return $D$. $\rho$ is the Pearson product-moment coefficient and $\rho_s$ is the Spearman correlation coefficient.
(1) We follow the convention (Fama French) and use log returns.

(2) If you believe in Fama French than we give you the Pearson but we also show the non-parametric as well (aka Spearman).

(3) Pearson and Spearman offer a similar story.

Table 1: Correlation between excess return around oral argument windows $A$ and post-decision abnormal return $D$. $\rho$ is the Pearson product-moment coefficient and $\rho_s$ is the Spearman correlation coefficient.
No Clear Directional Effect

Some Level of is magnitude / volatility based impact

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</table>
Yet only as a precursor to future movement (volatility) but not the direction of that future movement.

From a trading standpoint, this counsels a volatility straddle but the case for more direct options is less clear.
In conclusion, we believe that this research raises many questions and justifies a range of future work in the area.
Future Work

Higher and Lower Order Analysis

Real Trading Strategy Analysis

Other Classes of Litigation Events

8k’s and Docket Arbitrage

Litigation Reserves, etc.
Real Trading Strategy Analysis

Not Enough to be Able to Predict ...

Need to track real or synthetic trades
Other Classes of Litigation Events
8k’s and Docket Arbitrage
AIG Unloads Asbestos Liabilities; Buffett Gets 'Float'

By Erik Holm
Updated April 21, 2011 12:01 a.m. ET
Warren Buffett’s Berkshire Hathaway Inc. agreed to take on $3.5 billion in potential asbestos liabilities from American International Group Inc., removing some uncertainty from AIG’s books as the insurer prepares for a large share sale.

New litigation funding company will advance money to corporate defendants

TRIALS & LITIGATION
POSTED APR 08, 2013 01:38 PM CDT
BY DEBRA CASSENS WEISS

There’s a new entrant in the litigation funding market that will focus on commercial and big-bucks matters.

The new company, Gerchen Keller Capital, includes former lawyers from Gibson Dunn & Crutcher and Bartlit Beck Herman Palenchar & Scott, report the Wall Street Journal (sub. req.) and the National Law Journal. It plans to finance corporate defendants as well as plaintiffs, recovering its investment and a bonus when its side wins.

Kent Gardiner, chairman of Crowell & Moring in Washington, D.C., has represented more than a dozen large companies in litigation financing cases, the Wall Street Journal says. “I think you would find a notable percentage of the Fortune 100 have engaged in some kind of funded litigation,” he tells the newspaper. “Overwhelmingly, the impetus has been very, very tight legal budgets.”

Gerchen Keller Capital is headed by Adam Gerchen, a former portfolio manager at a hedge fund with a Harvard law degree, the stories say. The company gets its capital from individual and institutional investors.

Litigation Finance For Defendants

Litigation finance: it’s not just for plaintiffs, as finance columnist Michael McDonald explains.

By MICHAEL MCDONALD, PHD
Mar 28, 2017 at 5:31 PM
Other Classes of Litigation Events

Litigation Funding and Reserves

Exhibit I—Excerpts From Financial Accounting Standards Board Accounting Standards Codification 450, Contingencies
Law on the Market? Abnormal Stock Returns and Supreme Court Decision-Making

daniel martin katz
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