Investor Psychology and Security Market Under- and Overreactions

Journal of Finance, December 1998.

Kent Daniel
David Hirshleifer
Avanidhar Subrahmanyam

Fin 9310 – Behavioral Finance Seminar

- April 4, 2018 -

Electronic copy available at: https://ssrn.com/abstract=3181607

Outline

1. Challenges to Behavioral Finance
2. This Paper's Goals
3. Regularities in Anomalous Price Patterns
4. The Overconfidence Theory
    - Psychological Evidence on Overconfidence and on Biased Self-Attribution
    - Model Setup
5. Model Implications
    - Reaction to Public and Private Information
    - Event Study Implications
    - Price Scaled Variables
        - Aggregate and Cross-Sectional Forecastability
    - Short and Long Horizon Autocorrelations
    - Short and Long Horizon Correlations with Information Releases
    - Corporate Finance Implications
6. Relation to Existing Theories
7. Conclusion

Electronic copy available at: https://ssrn.com/abstract=3181607

Challenges: Financial Market Anomalies

- There is now evidence of strong return predictability
- This evidence is largely responsible for the growth in interest in behavioral finance.
- However, the over-reaction/under-reaction interpretations often given to this evidence appear contradictory:

  [In the behavioral literature] ...[a]pparent anomalies are viewed one at a time, and the same authors, examining different events, seem content with over-reaction or under-reaction, and willing to infer that both warrant dropping market efficiency. (Fama 1998)

- The apparent inconsistency makes the behavioral stories appear no better than the market efficiency hypothesis:

  The market efficiency hypothesis, of course, offers a simple answer to this question – chance. Specifically, the expected value of abnormal returns is zero, but chance generates apparent anomalies that split randomly between apparent over-reaction and apparent under-reaction. (Fama 1998)

The Goal

- What do we need for a convincing behavioral theory?
- Fama (1998):

  > *The alternative has a daunting task. It must specify what it is about investor psychology that causes simultaneous under-reaction to some types of events and over-reaction to others. The alternative must also explain the range of observed results better than the simple market efficiency story; that is, [that] the expected value of abnormal returns is zero, but chance generates deviations from zero (anomalies) in both directions.*

- Also, to answer Fama and others, we need to
  - establish that there are consistent patterns in the data
  - develop as-yet untested implications of the theory.

The Evidence Against Market Efficiency

Why not stick with efficient markets?

- These anomalies are sufficiently strong and regular that they cause one to seriously question the efficient-markets paradigm:
  - High Sharpe ratios are achievable with size, value, momentum and market timing strategies (MacKinlay 1995, Campbell and Cochrane 1999).
  - Apparent lack of correlation between returns of these strategies and investors' marginal utilities (Lakonishok, Shleifer, and Vishny 1994).
  - Out-of-sample (in time and location) have strongly established these as regularities. (Davis, Fama, and French 2000, Fama and French 1998)
- Theories have analyzed why a small group of "optimizing," investors may not eliminate these patterns.
  - But, we have not established what sort of behavioral biases might be at the root of these patterns

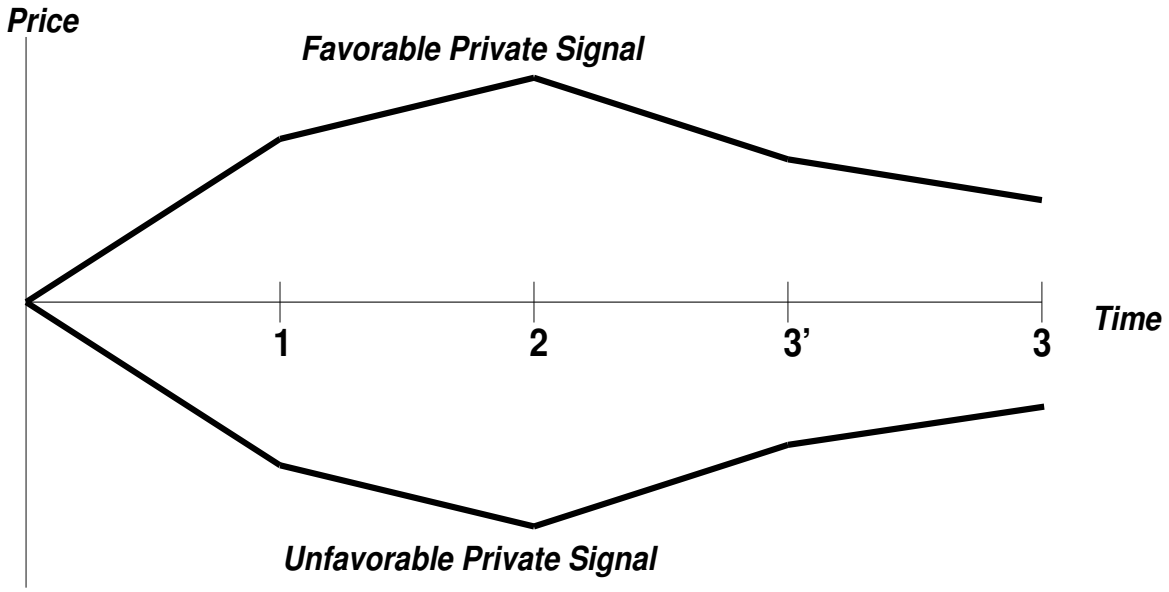
The Goals of This Paper

Based on this we have two goals in this paper:

- Catalog **regularities** among the empirical anomalies.
- Develop a behavioral model that:
  - is based upon plausible micro-foundations.
  - is parsimonious
  - has **implications** consistent with the empirical regularities.
  - has as-yet untested empirical implications.

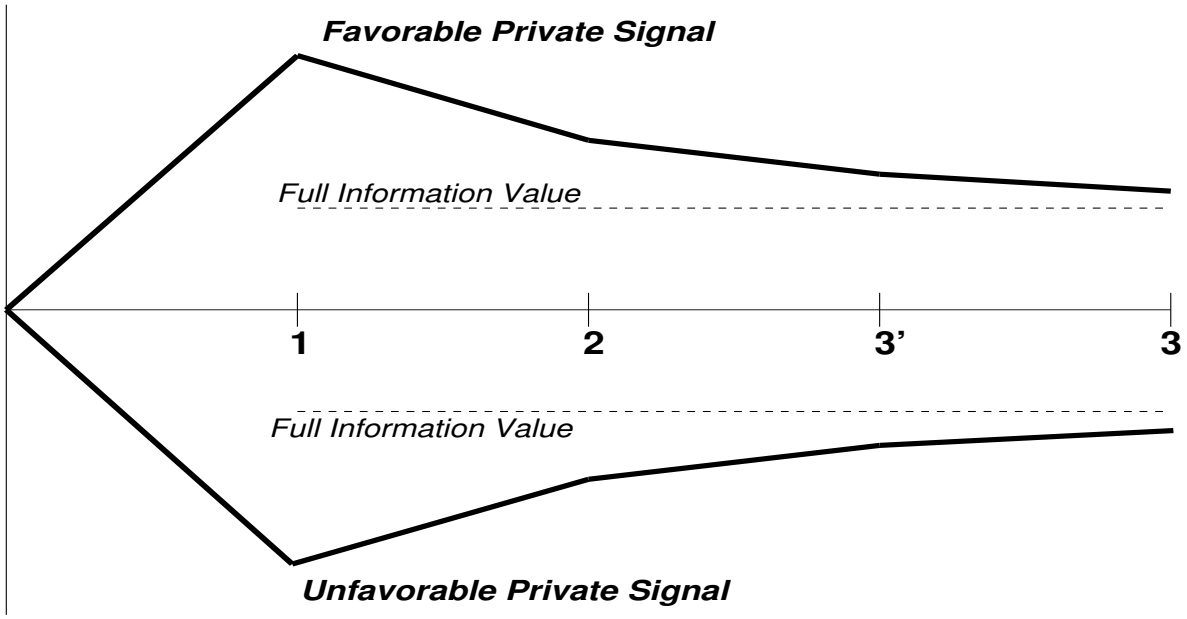
Regularities: Return Autocorrelations

- Return auto-correlations & covariances, empirically, look like:



- **Positive short-lag return autocorrelations ('momentum')**:
  - *Cross-Sectional:* Jegadeesh and Titman (1993)
  - *Aggregate:* Lo and MacKinlay (1988).
- **Negative long-lag autocorrelations (long-run 'overreaction')**:
  - *Cross-Sectional:* DeBondt and Thaler (1985, 1987), Chopra, Lakonishok, and Ritter (1992)
  - *Aggregate:* Fama and French (1988b), Poterba and Summers (1988); also Kim, Nelson, and Startz (1988), Daniel (2001)

- implying an *impulse-response function* of the form:



- This is consistent with the evidence presented in Jegadeesh and Titman (2001).

Regularities: Underreaction to Public News

Public-event-date average security returns are typically of the same sign as subsequent average long-run abnormal performance ('underreaction')

- **Seasoned Offerings:** Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995); see, however, Brav and Gompers (1997).
- **Repurchase Announcements:** Ikenberry, Lakonishok, and Vermaelen (1995).
- **Insider Trading:** Seyhun (1986), Seyhun (1988). Rozeff and Zaman (1988). Public trading strategy does not beat bid-ask and transactions costs.
- **Analysts' Buy and Sell Recommendations:** Womack (1996), Michaely and Womack (1999), Desai and Jain (1995).
- **Stock Splits:** Grinblatt, Masulis, and Titman (1984), Desai and Jain (1997).
- **Dividend Initiations and Omissions:** Michaely, Thaler, and Womack (1995).
- **Merger Announcements:** Agrawal, Jaffe, and Mandelker (1992), Agrawal, Jaffe, and Mandelker (1996), and Rau and Vermaelen (1998).
- **Venture Capital Distributions:** Gompers and Lerner (1998)

Regularities: Earnings/Return Correlations

- *Short Horizon* – Earnings surprises are positively correlated with future returns
  - **Earnings Announcements:** Bernard and Thomas (1989, 1990), Brown and Pope (1996)
  - **Earnings Forecasts:** Abarbanell and Bernard (1991, 1992), Mendenhall (1991).

- *Long Horizon* – High past growth negatively correlated with future long horizon return.
  - **Past Accounting Growth Rates:** Lakonishok, Shleifer, and Vishny (1994)

Regularities: Price-Scaled Variables

Price-Scaled Variables are postively correlated with future returns:

- *Cross-Sectionally:*
  - **E/P Ratio:** Basu (1983), Jaffe, Keim, and Westerfield (1989),
  - **B/P Ratio:** Graham and Dodd (1934), Stattman (1980), Rosenberg, Reid, and Lanstein (1985), DeBondt and Thaler (1987), Fama and French (1992);
- *Aggregate:*
  - **D/P Ratio:** Dow (1920), Ball (1978), Campbell and Shiller (1988) and Fama and French (1988a)
  - **E/P Ratio:** Fama and French (1988a)
  - **B/P Ratio:** Kothari and Shanken (1997)

Behavioral Basis for the Model

- We retain expected utility theory; all investors are Bayesian
- However, informed investors
  1. are *overconfident* about the value/precision of their private information, and
  2. update their estimate of the precision of their private information in a biased fashion (*Self-Attribution Bias*).
     - Confidence rises more when trades are confirmed than it falls when beliefs are disconfirmed.
- We make no assumptions about whether investors under- or over-react, follow trends, etc.
  - *all of these effects are an implication of overconfidence, rather than an assumption of the model*

Evidence of Overconfidence

Evidence of Overconfidence

> "...perhaps the most robust finding in the psychology of judgement is that people are overconfident."
>
> —DeBondt/Thaler (1995)

Overconfidence of Professionals in their Judgments:

• **Psychologists:**	Oskamp (1965)
• **Physicians & Nurses:**	Christensen-Szalanski and Bushyhead (1981), Baumann, Deber, and Thompson (1991)
• **Engineers:**	Kidd (1970)
• **Attorneys:**	Wagenaar and Keren (1986)
• **Negotiators:**	Neale and Bazerman (1990)
• **Entrepeneurs:**	Cooper, Woo, and Dunkelberg (1988)
• **Managers:**	Russo and Schoemaker (1992)
• **Investment Bankers:**	Stael von Holstein (1972)
• **Security Analysts & Economic Forecasters:**	Ahlers and Lakonishok (1983), Elton, Gruber, and Gultekin (1984), Froot and Frankel (1989), DeBondt and Thaler (1990), DeBondt (1991).

Evidence of Overconfidence

"...perhaps the most robust finding in the psychology of judgment is that people are overconfident."

-DeBondt/Thaler (1995)

- There is pervasive evidence of the overconfidence of professionals in their judgments
- People perceive themselves as:
  - More able than they actually are.
  - More able than average.
  - More favorably than they are viewed by others.
- Individuals underestimate their prediction error variance in experimental settings:
- In our model, investors are overconfident in their ability to generate generate private information
  - Gathering new private information through interviews with firm management, etc.,
  - Processing publicly available information
  - Note that we *do not* specify how investors process information, just that they are overconfident about the results of this processing!
- In our model, informed agents' overconfidence is manifested in their overestimation of the precision of their information.

Self-Attribution Bias

- Individuals do not *know* their ability/precision; they must estimate it.
- Behavioral evidence suggests that agents update estimates of their precision in a biased fashion:
  - People discount unfavorable information and magnify favorable information in updating beliefs about their own abilities.
- Fischoff (1982), Langer and Roth (1975), Miller and Ross (1975), Taylor and Brown (1988).
- Consistent with evidence of cognitive dissonance.
- In our model, their estimate of the precision $(1/\sigma^2)$ of their signals increases more with *confirming* information than it decreases with *dis-confirming* information.

The Overconfidence Model

- "Idealized" setting is a continuum of risk-averse agents, some of which receive information and are overconfident about it.
  - For tractability, we have two continuous masses of agents:
    1. Risk neutral overconfident informed traders (I's)
    2. Risk averse fully rational uninformed traders (U's), with exponential utility.
  - This should yield the same qualitative results as the idealized setting.
    - In Daniel, Hirshleifer, and Subrahmanyam (2001), we explore the ramifications of making both agents risk-averse, and of having a full set of risky assets.
- Further, we assume that all informed receive the same signal.

$$s_1 = \theta + \epsilon$$

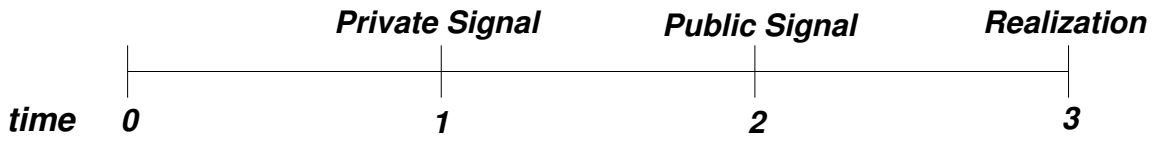
  where θ is the true firm value.
  - The same qualitative results would obtain with a continuum of *ex-ante* identical individuals who receive and are overconfident about information signals of the form

$$s_{1,i} = \theta + \epsilon + \delta_i,$$

    where δ_i is independent across risk averse individuals.
- We have two versions of the model
  - a simplified static confidence version
  - a full dynamic confidence version

The Static Overconfidence Model

Four dates:

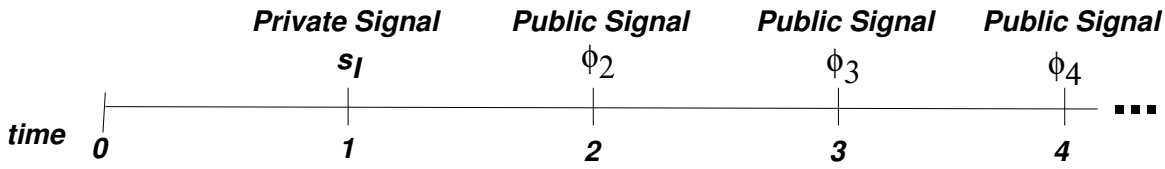


$$\theta \sim \mathcal{N}(\bar{\theta}, \sigma_\theta^2) \qquad s_1 = \theta + \epsilon \qquad s_2 = \theta + \eta. \qquad \theta$$

1. Date 0: identical prior beliefs, equilibrium allocations.
2. Date 1: I's receive a common noisy private signal about underlying security value and trade with U's.
   - I's underestimate σ_ϵ^2 (as $\sigma_C^2 < \sigma_\epsilon^2$)
3. Date 2: Noisy public signal arrives, re-trade.
4. Date 3: Conclusive public information arrives, liquidate, consume.

- Because σ_C^2 is too small, stock prices:
  - *overreact* to private information arrival
  - *underreact* to public information arrival.
- Expected future price movement is proportional to $-E[\epsilon]$

The Full (Dynamic) Confidence Model



- Again, there is a single private signal at time 1

$$\tilde{s}_I = \tilde{\theta} + \tilde{\epsilon} \qquad \tilde{\epsilon} \sim \mathcal{N}(0, \sigma_\epsilon^2)$$

- Now, at date 2 through T, a public signal $\tilde{\phi}_t$ is released

$$\tilde{\phi}_t = \tilde{\theta} + \tilde{\eta}_t$$

  where

  - $\tilde{\eta}_t \sim i.i.d.\ \mathcal{N}(0, \sigma_\eta^2)$.
  - σ_η^2 is common knowledge.

- Φ_t is the average of all public signals through time t

$$\Phi_t = \frac{1}{(t-1)} \sum_{\tau=2}^{t} \tilde{\phi}_\tau$$

  - Φ_t is a sufficient statistic for the set of all past ϕ's

- The *ad hoc* variance updating rule I's use is;

  - If $sign(s_I - \Phi_{t-1}) = sign(\phi_t - \Phi_{t-1})$ and $|s_I - \Phi_{t-1}| < 2\sigma_{\Phi,t}$ then $v_{C,t} = (1 + \overline{k})v_{C,t-1}$
  - Otherwise $v_{C,t} = (1 - \underline{k})v_{C,t-1}$

- $(1 + \overline{k})/(1 - \underline{k})$ is an index of the investor's attribution bias

Equilibrium

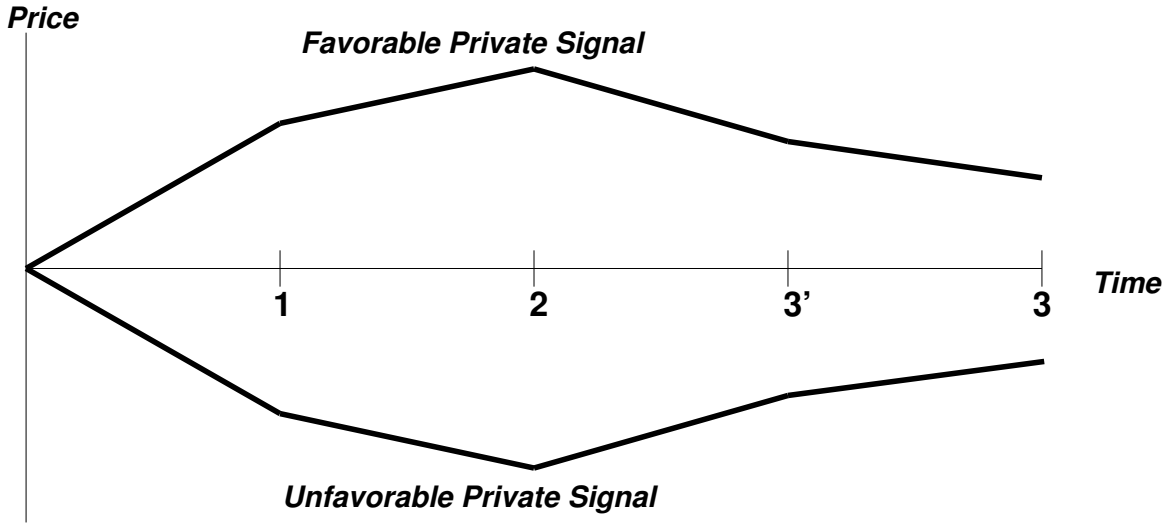
- At each date, all individuals maximize expected utility as a function of terminal wealth with respect to their beliefs.
- Prices are set such that the aggregate demands for the risky and numeraire securities at each date equal aggregate supply.
- At each date individuals can trade at the market price to modify their bundles of risky and numeraire securities.
- Individuals make decisions at each date based on their available information, including the market price, and I's overconfident beliefs about precision.
- It is common knowledge that I's believe with certainty that the noise variance of s_1 is σ_C^2 and that U's believe with certainty it is less than σ_C^2.

Model Implications

- We determine the implications of the overconfidence model for the documented equity-market anomalies:
  1. Return Autocorrelations
  2. Price-Scaled Variables
  3. Event studies
     - Selective and Non-selective events
  4. Earnings/returns correlations at varying horizons

Model Implications: Return Autocorrelations

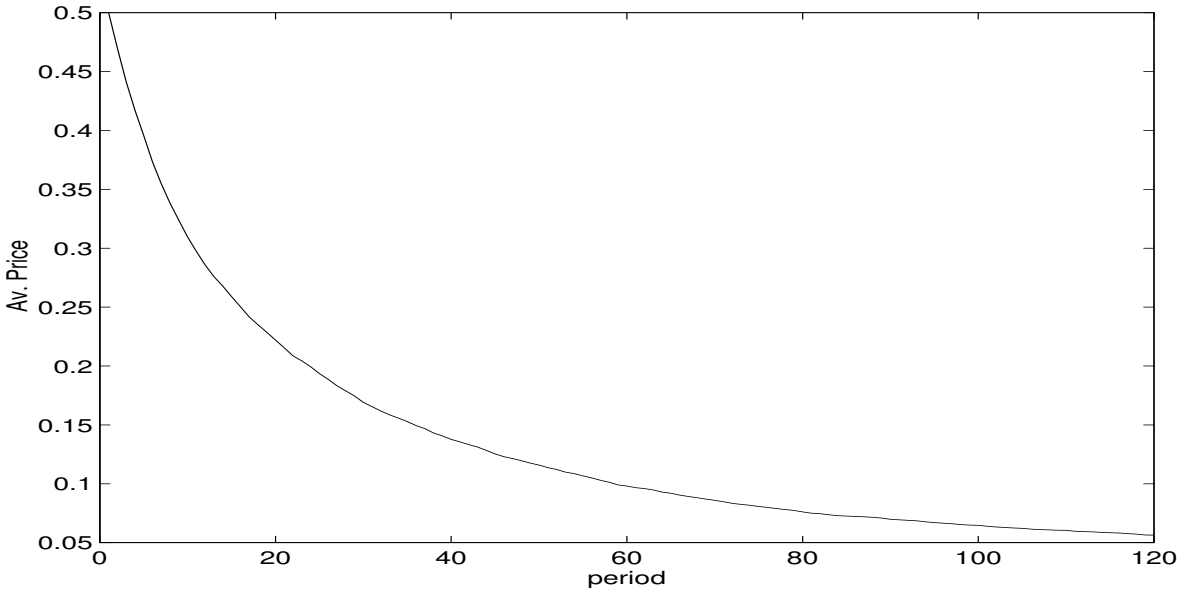
- The response of prices to private information:



- There are distinct *Overreaction* and *Correction* Phases.
- Overreaction occurs because of overconfidence in the initial signal.
- Continuing overreaction occurs because arrival of public information on average causes the confidence of the informed to grow.
  - Thus, our theory suggests that *the apparent short-term underreaction suggested by momentum can be a result of continuing overreaction.*
    - See Jegadeesh and Titman (2001).
  - Price, on average, is pushed even further in the direction of trader's initial private information.
- In the correction phase price converges to the true value of the security.

Price Movements with Static Confidence

- With just overconfidence, and no self-attribution bias, the price response to a positive private signal is:



- This plot assumes a constant information arrival rate, exponential decay.
- With this $AR(1)$ price impulse response function , returns are $ARMA(1,1)$, and autocorrelations are proportional to $-(1-\phi)\phi^{\tau}$, where ϕ is the rate of decay in the price plot above.
- Negative autocorrelations at all lags and all horizons.
- Thus, static overconfidence is consistent with long-run reversals, but not with short-run momentum.

Equilibrium of the Dynamic Model

- In equilibrium, the security price is:

$$\tilde{P}_t = E_C[\tilde{\theta}|s_I, \Phi_t].$$

  - For tractability, we assume that at each t, I revalues the security using Bayesian updating as if he knew the precision of his signal to be $\sigma_{C,t}$ with certainty.

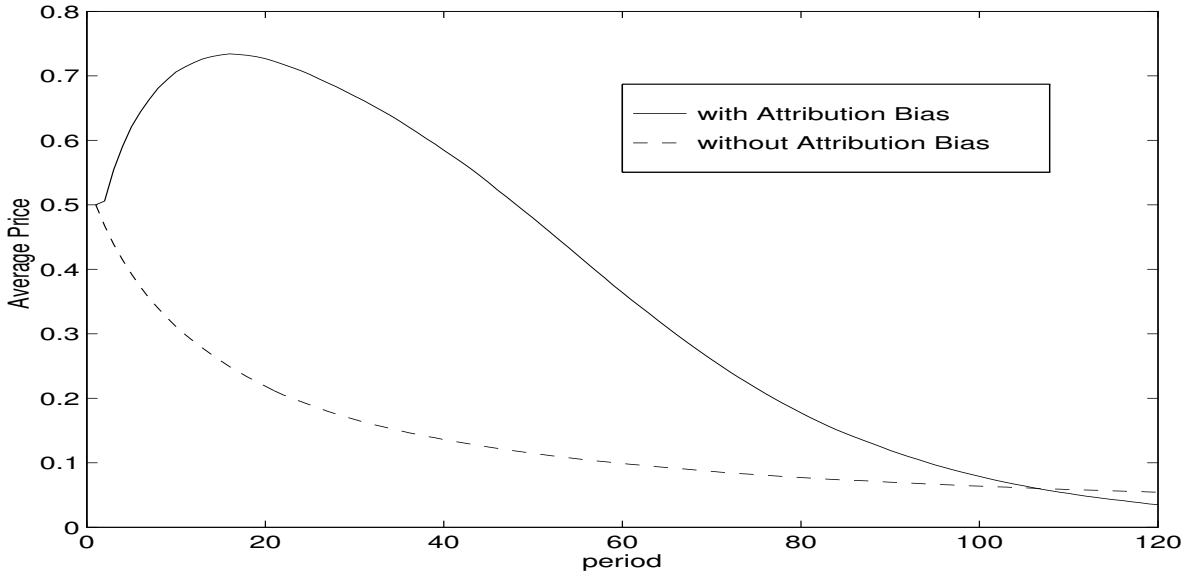
- Hard to solve analytically, so we simulate this.
- We perform 50,000 iterations, each time drawing $\tilde{\theta}$, $\tilde{s}_I$ and the set of ϕ_t's from appropriate distributions.
- The simulation parameters for the results presented here are:

$\overline{k} = 0.75$	$\underline{k} = 0.1$
$\sigma_\theta^2 = 1$	$\sigma_\epsilon^2 = 1$
$\sigma_\eta^2 = 7.5$	$T = 120$
$\sigma_{C,1}^2 = 1$	

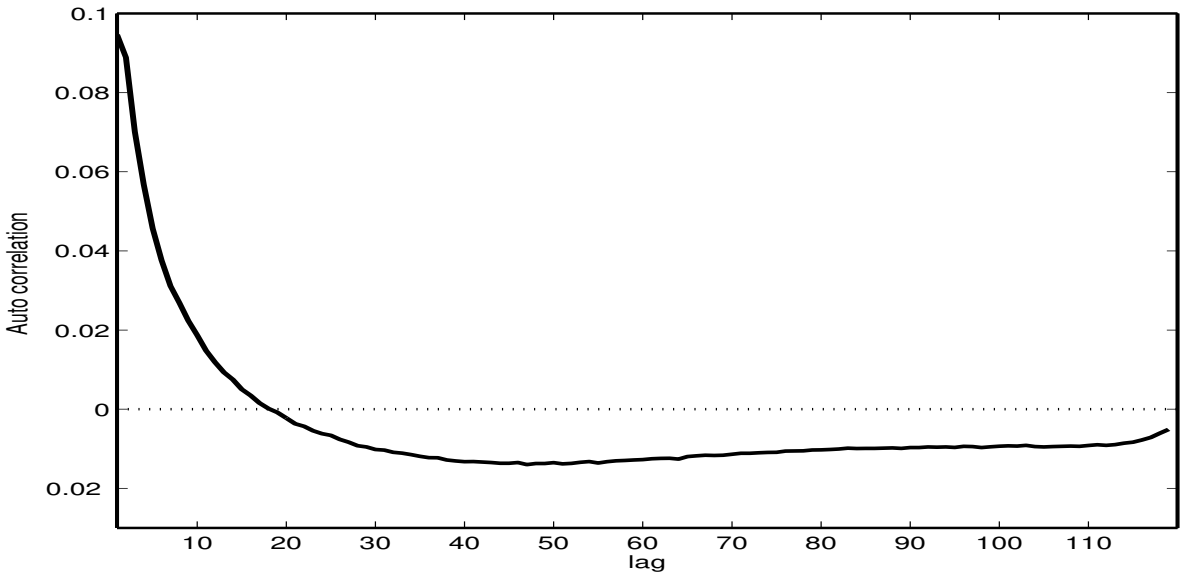
- Model not calibrated.

Simulation Results

- The (price) impulse response function for $s_I = 1$



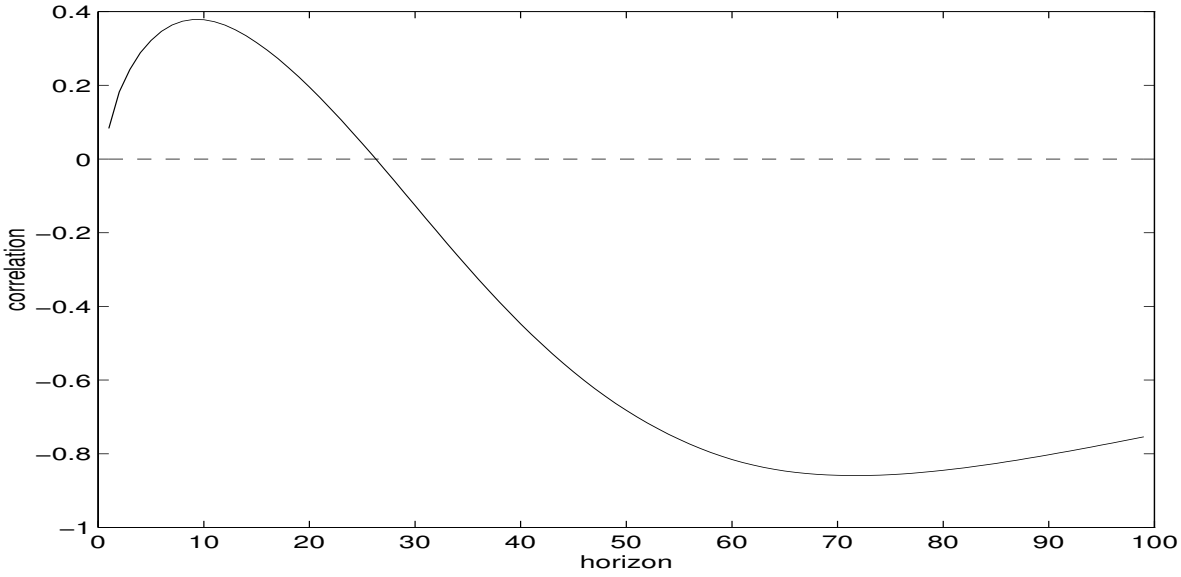
- The price-change autocorrelogram for full simulation is:



- This is consistent with the empirical evidence.

- The Long-Horizon Regression Coefficient for a regression of price changes on price changes:

$$R(t, t+\tau) = \alpha + \beta R(t-\tau, t) + \epsilon$$



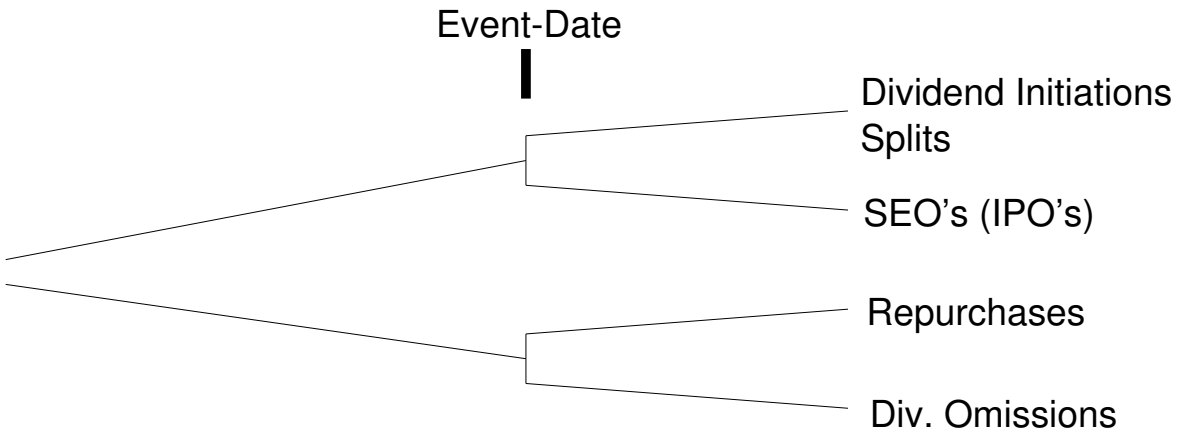
Model Implications: Event Studies

- Basic implication of overconfidence model is (1) Overreaction to *Private* Information, and (2) Underreaction to Public.
- The model *does* imply that a security's return on a public-information release date is negatively correlated with the future return.
- However, counter-intuitively, the static confidence model does not imply that the correlation of the future return with the public signal is itself negative.
  - Static Confidence Model $\Rightarrow cov(P_3 - P_2, s_2) = 0$
- Intuition:
  - Assume $\sigma_\theta = \sigma_1 = \sigma_2$

Prior	$\mathbf{s}_1$	s_2
	3	3
	2	2
	1	1
0	0	0
	-1	-1
	-2	-2

- Suppose $s_2 = 2$, then $E[\theta|s_2] = 1$, $S_1 = 0$ or 2 equally likely.
- Bias equally likely to be up or down.
- Even though underreaction, knowing s_2 does not help predict sign of future returns.

- If event is *selective* (based on mispricing or $E[\epsilon|P_1, s_2]$), it will forecast future returns.
- Model is consistent with:



Implications: **Selective Events**

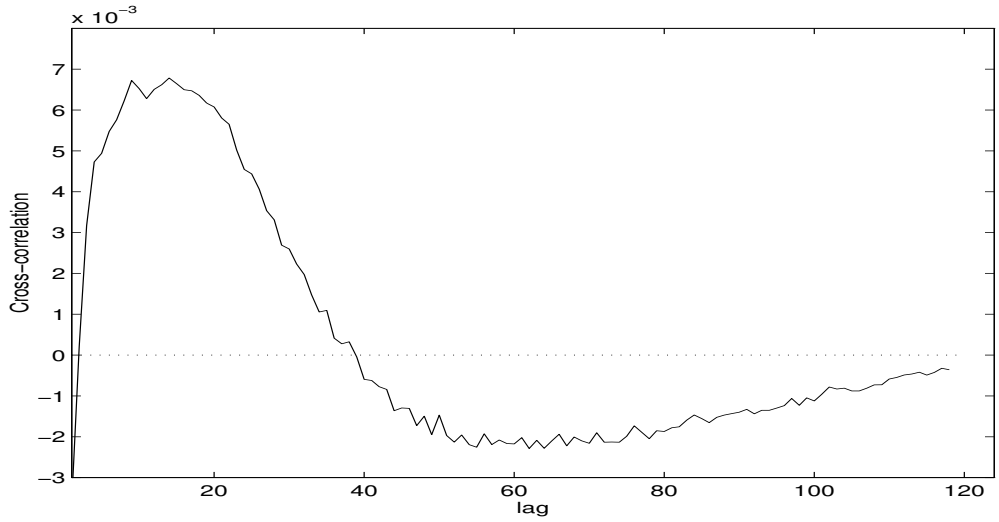
- Suppose managers act to correct pricing errors:
  - issue shares when stock overvalued
  - repurchase when stock undervalued
  - signal (split, dividend increase, forecast earnings favorably, boost accruals or cash flows) when undervalued
- However, market revalues stubbornly $\Rightarrow$
  - average abnormal post-event return has same sign as event-date reaction.
- Consistent with any prior runup or rundown
- Informed outsider may also exploit misvaluations:
  - Analyst buy/sell recommendations
  - Toehold purchases, takeover bids?
- Implications:
  - For **good news events**, the post-event abnormal returns will be larger when B/M high or pre-event performance poor (more negative initial valuation error).
    - Ikenberry, Lakonishok, and Vermaelen (1995): B/M and repurchase
  - For **bad news events**, the post-event abnormal returns more negative when B/M low or pre-event performance good (more positive initial valuation error).
    - Ikenberry, Rankine, and Stice (1996): prior performance and splits

Implications: **Earnings Growth and Future Returns**

- Many PEAD studies use non-selective measures – We need full dynamic model to account for this reaction.
- In simulation, we define a public-information/"earnings" change as:

$$\Delta e_t = \tilde{\phi}_t - \Phi_{t-1} = \tilde{\phi}_t - E[\tilde{\phi}_t | \phi_s, s = 2, \ldots, t-1]$$

- Δe_t is therefore the deviation of ϕ_t from its expected value based on all past public signals.
- Simulation: average correlation between information changes and future prices changes looks like:



- Broadly consistent with both post-earnings announcement drift, and long-run post-earnings reversals.
  - Magnitude of the effects depends on the intensity of the attribution bias relative to the variance of the public signals.

Implications: **Price Scaled Variables**

- High *price-scaled measures of fundamentals* (*e.g.,* E/P, D/P, B/M, 1/M) imply high future returns.
- Favorable private signal $\Rightarrow$ M $\uparrow$, $B/M \downarrow$.
  - Overreaction $\Rightarrow$ long run $M \downarrow$
- Adverse private signal $\Rightarrow$ M $\downarrow$, $B/M \uparrow$.
  - Overreaction $\Rightarrow$ long run $M \uparrow$
- Therefore, high $B/M \Rightarrow$ high long run future returns.

- *Aggregate* price-scaled measures will forecast future market returns
  - if overconfidence about economy-wide information.
- Price-scaled measures will forecast cross sectional patterns
  - if overconfidence about firm-specific information.
- Price-scaled variables can dominate standard risk-measures if investors are sufficiently overconfident.
- Standard fundamental ratio anomalies support overreaction theories, refute underreaction theories.

Implications: **Managerial Actions**

- Raise capital when fundamental ratios are low (stock overvalued)
- Issue shares after firm's stock price has recently increased (consistent with Lucas and McDonald (1990).)
- If overconfidence about common factors, issue after firm's industry or stock market has risen or B/M low
  (consistent with IPO evidence of Pagano, Panetta, and Zingales (1998)).
- When book/market low, favor public over rights issues.
- When book/market low, favor equity over debt issues.
- When book/market low or after firm's stock has risen, favor repurchase over dividend.

Should managers disclose as much as possible prior to issuance?

- Can exploit overconfidence by not disclosing.
- But sometimes public disclosure can intensify an overreaction.

Relation to Existing Theories

Overconfidence:

- Kyle and Wang (1997): being overconfident as a commitment to trade aggressively.
- Wang (1998): Overconfidence $\rightarrow$ info-based trading without noise traders.
- Odean (1998): Overconfidence with private but not a public signal, determinants of volatility, volume, and market depth. Overconfidence increases volatility, overreaction to private signals,
- Caballé and Sákovics (1996): Beliefs about beliefs about...
- Benos (1996): Kyle (1985) model with overconfidence.

Positive Feedback Strategies

- DeLong, Shleifer, Summers, and Waldmann (1990): Security autocorrelation patterns based on mechanistic positive feedback investment strategies.

Berk (1995): Recognizes that market value reflects discounting of risk.

Noise Trader Approach

- Prices are moved by trading that seems unrelated to the arrival of information.
- Also important: investor mistakes involving misinterpretation of *genuine* new information.
- Noise traders can be viewed as overconfident traders taking the limit, holding constant the individual's perceived precision, as his signal becomes very noisy.

Do overconfident traders go broke?

- Not if overconfidence helps them intimidate others, or encourages high-return risks.

Further Empirical Implications

- Firms should prefer debt over equity when B/M is high or following stock-price rundown.
- Firms should prefer repurchases over dividends when B/M is low.
- Positive correlation between initial event reaction and post-event performance.
- Less under-reaction to non-selective corporate events.
- Positive abnormal returns after toehold disclosures
- Post-event performance better for good-news events when B/M high or pre-event performance poor.
- Post-event performance worse for bad news events when B/M low or pre-event performance good.

Other Comments on Overconfidence

The over-weening conceit which the greater part of men have of their own abilities, is an ancient evil remarked by the philosophers and moralists of all ages.

...

The distant prospect of hazards, from which we can hope to extricate ourselves by courage and address, is not disagreeable to us, and does not raise the wages of labour in any employment.

—*The Wealth of Nations,* p. 107, 110

- Smith: overconconfidence affects market prices in enterprises where outcome depends on ability.
- Does the 'overweening conceit' of mankind affect stock market prices?

Conclusions

- Approach to anomalies:
  - Parsimonious
  - Based on strong psychological evidence
  - Explains wide range of phenomena plus new evidence
- Possible further avenues:
  - Empirical testing
  - Institutions versus individuals

References

Abarbanell, Jeffery S., 1991, Do analysts' earnings forecasts incorporate information in prior stock price changes?, *Journal of Accounting and Economics* 14, 147–165.

——— , and Victor Bernard, 1992, Analysts' overreaction / underreaction to earnings information as an explanation for anomalous stock price behavior, *Journal of Finance* 47, 1181–1207.

Agrawal, Anup, Jeffery F. Jaffe, and Gershon Mandelker, 1992, The post-merger performance of acquiring firms in acquisitions: A re-examination of an anomaly, *Journal of Finance* 47, 1605–1621.

——— , 1996, The pre-acquisition performance of target firms: A re-examination of the inefficient management hypothesis, Working paper, Wharton School.

Ahlers, David, and Josef Lakonishok, 1983, A study of economists' consensus forecasts, *Management Science* 29, 1113–1125.

Ball, Ray, 1978, Anomalies in relationships between securities' yields and yield-surrogates, *Journal of Financial Economics* 6, 103–126.

Basu, S., 1983, The relationship between earnings yield, market value, and return for NYSE common stocks: Further evidence, *Journal of Financial Economics* 12, 126–156.

Baumann, Andrea O., Raisa B. Deber, and Gail G. Thompson, 1991, Overconfidence among physicians and nurses: The micro-certainty, macro-uncertainty phenomenon, *Social Science & Medicine* 32, 167–174.

Berk, Jonathan, 1995, A critique of size related anomalies, *Review of Financial Studies* 8, 275–286.

Bernard, Victor L., and Jacob K. Thomas, 1989, Post-earnings-announcement drift: Delayed price response or risk premium?, *Journal of Accounting Research, Supplement* 27, 1–48.

——— , 1990, Evidence that stock prices do not fully reflect the implications of current earnings for future earnings, *Journal of Accounting and Economics* 13, 305–340.

Brav, Alon, and Paul A. Gompers, 1997, Myth or reality? The long-run underperformance of initial public offerings: Evidence from venture and nonventure capital-backed companies, *Journal of Finance* 52, 1791–1821.

Brown, Steven J., and Peter F. Pope, 1996, Post-earnings announcement drift?, Working Paper, New York University.

Caballé, Jordi, and József Sákovics, 1996, Overconfident speculation with imperfect competition, Working Paper,Universitat Autonoma de Barcelona.

Campbell, John Y., and John H. Cochrane, 1999, By force of habit: A consumption-based explanation of aggregate stock market behavior, *Journal of Political Economy* 107, 205–251.

Campbell, John Y., and Robert J. Shiller, 1988, The dividend-price ratio and expectations of future dividends and discount factors, *Review of Financial Studies* 1, 195–228.

Chopra, Navin, Josef Lakonishok, and Jay R. Ritter, 1992, Measuring abnormal performance: Do stocks overreact?, *Journal of Financial Economics* 31, 235–268.

Christensen-Szalanski, Jay J., and James B. Bushyhead, 1981, Physicians' use of probabilistic information in a real clinical setting, *Journal of Experimental Psychology: Human Perception and Performance* 7, 928–935.

Cooper, Arnold C., Carolyn W. Woo, and William C. Dunkelberg, 1988, Entrepeneurs' perceived chances for success, *Journal of Business Venturing* 3, 97–108.

Daniel, Kent D., 2001, The power and size of mean reversion tests, *Journal of Empirical Finance* 8, 493–535.

——— , David Hirshleifer, and Avanidhar Subrahmanyam, 2001, Overconfidence, arbitrage, and equilibrium asset pricing, *Journal of Finance* 56, 921–965.

Davis, James, Eugene F. Fama, and Kenneth R. French, 2000, Characteristics, covariances, and average returns: 1929-1997, *Journal of Finance* 55, 389–406.

DeBondt, Werner F. M., 1991, What do economists know about the stock market?, *Journal of Portfolio Management* 17, 84–91.

——— , and Richard H. Thaler, 1985, Does the stock market overreact?, *Journal of Finance* 40, 793–808.

——— , 1987, Further evidence on investor overreaction and stock market seasonality, *Journal of Finance* 42, 557–581.

——— , 1990, Do security analysts overreact?, *American Economic Review* 80, 52–57.

DeLong, J. Bradford, Andrei Shleifer, Lawrence Summers, and Robert J. Waldmann, 1990, Positive feedback investment strategies and destabilizing rational speculation, *Journal of Finance* 45, 375–395.

Desai, Hemang, and Prem C. Jain, 1995, An analysis of the recommendations of the 'superstar' money managers at Barron's annual roundtable, *Journal of Finance* 50, 1257–1274.

——— , 1997, Long-run common stock returns following stock splits and reverse splits, *Journal of Business* 70, 409–434.

Dow, Charles Henry, 1920, *Scientific Stock Speculation* (Magazine of Wall Street: New York).

Elton, Edwin J., Martin J. Gruber, and Mustafa N. Gultekin, 1984, Professional expectations: Accuracy and diagnosis of errors, *Journal of Financial and Quantitative Analysis* 19, 351–363.

Fama, Eugene F., 1998, Market efficiency, long-term returns and behavioral finance, *Journal of Financial Economics* 49, 283–306.

——— , and Kenneth R. French, 1988a, Dividend yields and expected stock returns, *Journal of Financial Economics* 22, 3–25.

——— , 1988b, Permanent and temporary components of stock prices, *Journal of Political Economy* 96, 246–273.

——— , 1992, The cross-section of expected stock returns, *Journal of Finance* 47, 427–465.

——— , 1998, Value versus growth: The international evidence, *Journal of Finance* 53, 1975–1999.

Fischoff, Baruch, 1982, For those condemned to study the past: Heuristics and biases in hindsight, in Daniel Kahneman, Paul Slovic, and Amos Tversky, ed.: *Judgement under Uncertainty: Heuristics and Biases* (Cambridge University Press: Cambridge).

Froot, Kenneth, and Jeffery A. Frankel, 1989, Forward discount bias: Is it an exchange risk premium?, *Quarterly Journal of Economics* 104, 139–161.

Gompers, Paul, and Josh Lerner, 1998, Venture capital distributions: Short-run and long-run reactions, *Journal of Finance*.

Graham, Benjamin, and D. Dodd, 1934, *Security Analysis* (McGraw Hill: New York, N.Y.).

Grinblatt, Mark, Ronald W. Masulis, and Sheridan Titman, 1984, The valuation effects of stock splits and stock dividends, *Journal of Financial Economics* 13, 97–112.

Ikenberry, David, Josef Lakonishok, and Theo Vermaelen, 1995, Market underreaction to open market share repurchases, *Journal of Financial Economics* 39, 181–208.

Ikenberry, David, Graeme Rankine, and Earl K. Stice, 1996, What do stock splits really signal?, *Journal of Financial and Quantitative Analysis* 31, 357–375.

Jaffe, Jeffrey, Donald B. Keim, and Randolph Westerfield, 1989, Earnings yields, market values, and stock returns, *Journal of Finance* 44, 135–148.

Jegadeesh, Narasimhan, and Sheridan Titman, 1993, Returns to buying winners and selling losers: Implications for stock market efficiency, *Journal of Finance* 48, 65–91.

——— , 2001, Profitability of momentum strategies: An evaluation of alternative explanations, *Journal of Finance* 56, 699–720.

Kidd, John B., 1970, The utilization of subjective probabilities in production planning, *Acta Psychologica* 34, 338–347.

Kim, Myung-Jig, Charles R. Nelson, and Richard Startz, 1988, Mean reversion in stock prices? A reappraisal of the empirical evidence, *Review of Economic Studies* 58, 551–528.

Kothari, S.P., and Jay Shanken, 1997, Book-to-market, dividend yield, and expected market returns: A time-series analysis, *Journal of Financial Economics* 44, 169–203.

Kyle, Albert, and F. Albert Wang, 1997, Speculation duopoly with agreement to disagree: Can overconfidence survive the market test?, *Journal of Finance* 52, 2073–2090.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1994, Contrarian investment, extrapolation and risk, *Journal of Finance* 49, 1541–1578.

Langer, Ellen J., and Jane Roth, 1975, Heads I win tails it's chance: The illusion of control as a function of the sequence of outcomes in a purely chance task, *Journal of Personality and Social Psychology* 32, 951–955.

Lo, Andrew W., and A. Craig MacKinlay, 1988, Stock market prices do not follow random walks: Evidence from a simple specification test, *Review of Financial Studies* 1, 41–46.

Loughran, Tim, and Jay R. Ritter, 1995, The new issues puzzle, *The Journal of Finance* 50, 23–52.

Lucas, Deborah J., and Robert L. McDonald, 1990, Equity issues and stock price dynamics, *Journal of Finance* 45, 1019–1043.

MacKinlay, A. Craig, 1995, Multifactor models do not explain deviations from the CAPM, *Journal of Financial Economics* 38, 3–28.

Mendenhall, Richard, 1991, Evidence of possible underweighting of earnings-related information, *Journal of Accounting Research* 29, 170–180.

Michaely, Roni, Richard H. Thaler, and Kent L. Womack, 1995, Price reactions to dividend initiations and omissions: Overreaction or drift?, *Journal of Finance* 50, 573–608.

Michaely, Roni, and Kent Womack, 1999, Conflict of interest and the credibility of underwriter analyst recommendations, *Review of Financial Studies* 12, 573–608.

Miller, Dale T., and Michael Ross, 1975, Self-serving bias in attribution of causality: Fact or fiction?, *Psychological Bulletin* 82, 213–225.

Neale, Margaret, and Max Bazerman, 1990, *Cognition and Rationality in Negotiation* (The Free Press: New York).

Odean, Terrance, 1998, Volume, volatility, price and profit when all traders are above average, *Journal of Finance* 53, 1887–1934.

Oskamp, Stuart, 1965, Overconfidence in case study judgements, *Journal of Consulting Psychology* 29, 261–265.

Pagano, Marco, Fabio Panetta, and Luigi Zingales, 1998, Why do companies go public? an empirical analysis, *Journal of Finance* 53, 27–64.

Poterba, James M., and Lawrence H. Summers, 1988, Mean reversion in stock returns: Evidence and implications, *Journal of Financial Economics* 22, 27–59.

Rau, Raghavendra P., and Theo Vermaelen, 1998, Glamour, value and the post-acquisition performance of acquiring firms, *Journal of Financial Economics* 49.

Rosenberg, Barr, Kenneth Reid, and Ronald Lanstein, 1985, Persuasive evidence of market inefficiency, *Journal of Portfolio Management* 11, 9–17.

Rozeff, Michael S., and Mir A. Zaman, 1988, Market efficiency and insider trading: New evidence, *Journal of Business* 61, 25–44.

Russo, J. Edward, and Paul J. H. Schoemaker, 1992, Managing overconfidence, *Sloan Management Review* 33, 7–17.

Seyhun, H. Nejat, 1986, Insiders' profits, costs of trading, and market efficiency, *Journal of Financial Economics* 61, 189–212.

——— , 1988, The information content of aggregate insider trading, *Journal of Business* 61, 1–24.

Spiess, D. Katherine, and John Affleck-Graves, 1995, Underperformance in long-run stock returns following seasoned equity offerings, *Journal of Financial Economics* 38, 243–268.

Stael von Holstein, C., 1972, Probabilistic forecasting: An experiment related to the stock market, *Organizational Behavior and Human Performance* 8, 139–158.

Stattman, Dennis, 1980, Book values and stock returns, *The Chicago MBA: A Journal of Selected Papers* 4, 25–45.

Taylor, Shelley E., and Jonathan D. Brown, 1988, Illusion and well-being: A social psychological perspective on mental health, *Psychological Bulletin* 103, 193–210.

Wagenaar, Willem, and Gideoan Keren, 1986, Does the expert know? The reliability of predictions and confidence ratios of experts, in Erik Hollnagel, Giuseppe Mancini, and David D. Woods, ed.: *Intelligent Decision Support in Process Environment* (Springer: Berlin).

Wang, F. Albert, 1998, Strategic trading, asymmetric information and heterogeneous prior beliefs, *Journal of Financial Markets* 1, 321–352.

Womack, Kent L., 1996, Do brokerage analysts' recommendations have investment value?, *Journal of Finance* 51, 137–168.