

# Stock Market Anomalies and Baseball Cards

Joseph Engelberg<sup>†</sup>    Linh Le<sup>‡</sup>    Jared Williams<sup>‡</sup>

<sup>†</sup>Department of Finance, University of California at San Diego

<sup>‡</sup>Department of Finance, University of South Florida

## Anomalies

Basic finance theory suggests that stock returns should be unpredictable after adjusting for risk

- Strategies that consistently earn abnormally high returns must be risky

Empiricists have documented several anomalies that are difficult to explain:

- **Momentum:** Stocks that have performed well (poorly) in the past tend to continue performing well (poorly) in the future (Jegadeesh and Titman, 1993)
- **Post-Earnings Announcement Drift:** Stock prices drift in the direction of past earnings surprises (Ball and Brown, 1968)
- **IPO Underperformance:** Stocks of firms that have recently gone public perform poorly (Ritter 1991)

## Explanations

Financial economists have developed many theories to explain these price patterns

- There is still much debate and disagreement about the cause of these anomalies
- Although these theories were motivated by the stock market, some of them naturally generate predictions in non-financial environments, too

**Point of this paper:** to test some of these theories in a non-financial environment

- If a theory is valid, it should be able to explain price patterns in any environment that satisfies the model's key features

## Explanations (cont.)

### Hong and Stein (1999):

- Information gradually diffuses across the investor population
- Investors do not learn from price
- Prediction: price movements are positively autocorrelated
- One of the most prominent theories of stock price momentum

### Miller (1977)

- Assets are priced by the most optimistic investors
- Prediction: high disagreement causes overpricing and subsequent underperformance
- A common explanation for IPO underperformance (Ritter and Welch, 2002)

## Baseball Cards

Our laboratory: the baseball card market

- Generally, each card is a piece of cardboard featuring a specific player
  - Contains an image of the player and often past statistics
- Generally sold in “packs”
  - Buyers do not know whose cards will be in a pack

Although baseball cards generate no cash flows:

- The value of a player's baseball cards is highly correlated with his on-field performance
- Baseball cards can have substantial value
  - T206 Honus Wagner (produced in 1909-1911) has been sold for \$2.8 million
- Theories of gradual information diffusion and disagreement should apply in this market

## Beckett Baseball Monthly

Our data come from Beckett Baseball Monthly

- James Beckett was a statistics professor who began collecting data on card prices in 1976
- First monthly price guide was published in November 1984
- Our sample: 72 issues published between January 1991 and December 1996
  - Scanned the pages (roughly 40-50 pages of price data per issue)
  - Converted the images to machine-readable data using optical character recognition (“OCR”) software

# Sample page from January 1991

Engelberg, Le,  
and Williams

Introduction

Data

Gradual  
Information  
Diffusion

Disagreement

Conclusion

## PRICE GUIDE

34 Roberto Alomar	3.58	7.00
35 Ted Lundquist	3.58	7.00
42 Wayne Spivey	25.00	45.00
80 Willie Pizarro	75.00	125.00
82 Dick Lundy	2.50	5.00
70 Harvey Kuiper	3.00	5.00
75 Bobby Richardson	4.00	6.00
76 Felipe Alou	3.00	4.00
78 Mike Krukow	3.00	4.00
81 Eric Soderstrom	3.00	4.00
83 Fred Lynn	3.00	4.00
115 Bob Alford FC ROY	3.00	4.00
147 Tom Seaver	2.00	3.00
126 Tom Postley FC	2.00	3.00
147 Tom Seaver (base)	2.00	3.00
148 Jim Stynes	5.00	10.00
158 Tom Seaver	5.00	10.00
159 Jim Stynes	5.00	10.00
160 Steve Garvey	2.50	4.00
161 Tom Seaver	2.50	4.00
162 Tom Seaver	2.50	4.00
163 Tom Seaver	2.50	4.00
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199 Tom Seaver	2.50	4.00
200 Tom Seaver	2.50	4.00

### 1960 Topps



LOUISIANA SPARTAN	2400	3800.00
64 Mickey Vernon	100.00	200.00
65 Mickey Vernon	100.00	200.00
66 Mickey Vernon	100.00	200.00
67 Mickey Vernon	100.00	200.00
68 Mickey Vernon	100.00	200.00
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70 Mickey Vernon	100.00	200.00
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100 Mickey Vernon	100.00	200.00





## Summary Statistics

For a card to be in our sample, it must be listed in at least one of the 72 Beckett issues

- 37,116 distinct cards in our sample
- Card years range from 1948 and 1996
- 1,662,273 (card, date, price) combinations

Price distribution:

- Mean = \$8.87
- 5th percentile = \$0.035
- 25th percentile = \$0.086
- Median = \$0.37
- 75th percentile = \$2.40
- 95th percentile = \$35.40

Max: \$19,733 (1952 Mickey Mantle Topps)

# Card Price Determinants

Engelberg, Le,  
and Williams

Introduction

Data

Gradual  
Information  
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Dependent Variable: Price

Batting Average	1461.55*** (521.64)						
On Base Percentage	1465.22** (565.99)						
Slugging Percentage	758.11*** (257.06)						
OPS	606.98*** (203.35)						
Home Runs					0.272*** (0.093)		
Runs						0.104*** (0.033)	
RBIs							0.098*** (0.0296)
Observations	187186	187186	187186	187186	187186	187186	187186
Card Set*Month Fixed Effects	YES	YES	YES	YES	YES	YES	YES
R-Squared	0.0821	0.1017	0.1088	0.1156	0.1112	0.1108	0.1057

## Hong and Stein (1999) Predictions

Baseball card prices should exhibit momentum because:

- Baseball players play 162 games per year
- Player performance is a primary determinant of card values in the long run
- Hong and Stein (1999) predict that the information about a player's ability should slowly diffuse among card collectors

Additional predictions:

- Card price momentum should be stronger among
  - active (rather than retired) players
  - among newer sets than older sets
- Player performance in year  $t$  should be positively correlated with card returns in year  $t + 1$

## Momentum

**Momentum:** stocks that have done well over the past 3-12 months continue to outperform (over the next 3-12 months)  
stocks that have done poorly over the past 3-12 months

Momentum strategies:

- Each month, sort stocks into deciles based on their return over the prior 3-12 months
- Go long (short) the top (bottom) decile
- Unwind your positions 3-12 months later

Momentum profits:

- Profitability is 6-12% per year
- This is puzzling because stocks that have performed well in the past don't appear riskier than stocks that performed poorly in the past

## Momentum Profits

**Test 1:** Does momentum exist among baseball cards, as predicted by Hong and Stein (1999)?

Replicate a standard momentum strategy:

- Sort cards into deciles based on return over past 3 months
- Buy (sell) cards in the top (bottom) decile
- Unwind the position 3 months later

Monthly profits, by decile:

	<u>Ret</u>	<u>t-stat</u>
Loser	-2.91%	-13.52
Middle	0.17%	1.21
Winner	2.69%	10.48
W - L	5.60%	19.46

## Monthly Momentum Profits, Active versus Retired Players

### Active Players:

	<u>Ret</u>	<u>t-stat</u>
Loser	-4.61%	-11.44
Middle	-0.61%	-2.70
Winner	4.82%	10.01
W - L	9.42%	15.48

### Retired Players:

	<u>Ret</u>	<u>t-stat</u>
Loser	-1.03%	-9.85
Middle	0.40%	3.28
Winner	1.63%	7.43
W - L	2.66%	10.53

## Monthly Momentum Profits, Complete Sets

It is also common for collectors to trade *complete sets* of cards (e.g., 1952 Topps)

Does momentum exist at the set level?

Profitability of the momentum strategy that trades complete sets of cards:

	<u>Ret</u>	<u>t-stat</u>
Loser	-2.60%	-9.69
Middle	-0.62%	-5.59
Winner	1.75%	6.19
W - L	4.34%	13.18

## Monthly Momentum Profits, New versus Old Sets

### Sets Less than 10 Years Old:

	<u>Ret</u>	<u>t-stat</u>
Loser	-2.67%	-9.07
Middle	-1.02%	-7.79
Winner	1.93%	5.14
W - L	4.60%	10.90

### Sets Greater than 10 Years Old:

	<u>Ret</u>	<u>t-stat</u>
Loser	-0.48%	-1.98
Middle	-0.03%	-0.22
Winner	0.49%	2.38
W - L	0.90%	3.36



## Price Drift

Another advantage of baseball cards is that there are objective measures of players' on-field performance

If gradual information diffusion causes momentum, then price drifts should be related to past information

To test this, we examine the monthly returns of players' cards as a function of their on-field performance in the *prior* season

- This strategy trades on extremely stale information
  - E.g., this strategy compares the returns of cards in December of 1995 with the player's on-field performance in April of 1994

These tests are analogous to tests of post-earnings announcement drift

## Price Drifts Following On-Field Performance

Performance Metric	Bottom	Top	Top - Bottom	t-stat
Batting Average	-0.012	0.007	0.018***	4.35
On Base Percentage	-0.003	0.002	0.005	0.85
Slugging Percentage	-0.010	0.005	0.015***	3.22
OPS (On Base + Slugging)	-0.014	0.004	0.018***	4.38
Home Runs	0.001	0.002	0.001	0.26
Runs	-0.007	0.000	0.007*	1.59
RBI's	-0.013	-0.001	0.011**	2.21
Stolen Bases	-0.005	-0.001	0.004	1.01

## IPOs

Empirically, stocks underperform following IPOs

- The average cumulative abnormal return of an IPO is -23.4% over the first 3 years (Ritter and Welch, 2002)
- Most common explanation: Miller (1977)

### Miller (1977):

- Stock prices are determined by the **most optimistic** investors
- Stocks with high disagreement will be overpriced compared to stocks with low disagreement
- As disagreement declines, stock prices move towards the average valuation
- In the context of IPOs:
  - There is generally a lot of disagreement about the value of IPO firms
  - Hence, they underperform as more information is gradually released

## Miller (1977) predictions

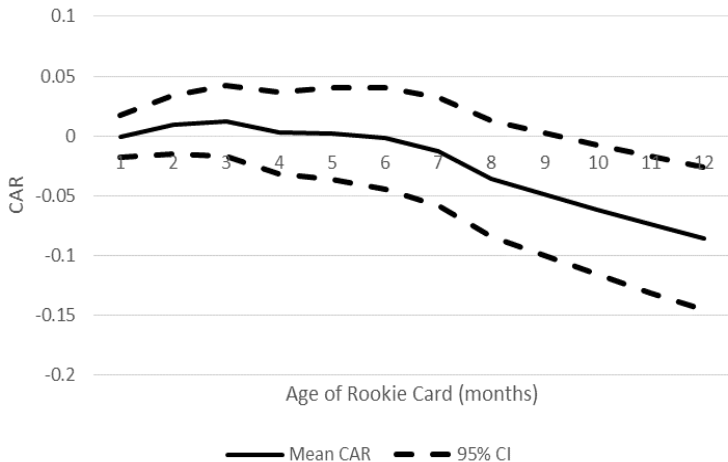
Miller (1977) predicts that overpricing (and subsequent underperformance) is most severe when disagreement is high

In the baseball card market, disagreement should be highest for:

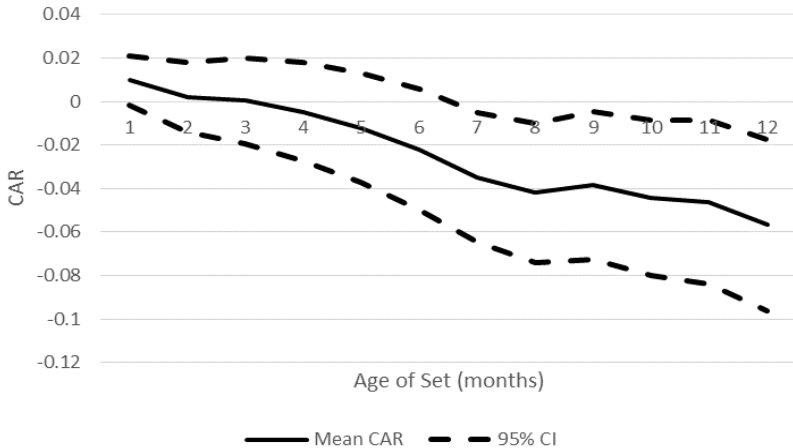
- Rookie players (during their rookie year)
- Newer sets

Hence, rookie cards should underperform the other cards in the set, and newer sets should underperform older sets

## Returns of Rookie Cards



## Returns of New Sets



## Concluding Remarks

The market for baseball cards exhibits momentum as well as analogs for post-earnings announcement drift and IPO underpricing

The evidence is supportive of the theories developed by Hong and Stein (1999) and Miller (1977)