The Psychology of the Stock Market

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Introduction

- Efficient Markets Hypothesis: prices reflect all available information

$$P_0 = \sum_{t=1}^{\infty} \frac{C_t}{(1 + r_t)^t} \big| I_0$$

  - Implies investors can't make money trading on information

- But prices are determined by humans, who don't take all available information into account

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Introduction

- But prices are determined by humans, who don't take all available information into account
  - May not have information
  - May not understand information

Behavioural Finance

- But why don't these mistakes cancel out?
  - Because they're rooted in human psychology

Overreaction

- Reversal strategy:
    - "Losers" over the past 36 months subsequently outperform 36-month past winners[1]
- Value strategy:
    - Price / Earnings multiple: how much £1 of earnings costs you
        - Should be higher in a growing company
        - But could be higher due to overextrapolation
    - "Value" stocks (low P/E) outperform "glamour" stocks (high P/E)[2]

1. DeBondt and Thaler (1985)
2. Lakonishok, Shleifer and Vishny (1994)

Underreaction

- Confirmation bias
    - Applies to both interpreting information and searching for it
    - See TED talk, "What to Trust in a Post-Truth World"
- Anchoring[1]
    - Spin roulette wheel, predetermined to stop at 10 or 65. Then asked people to guess the % of UN countries that are African. People who got 10 on roulette wheel guessed 25%, people who got 65 guessed 45%
    - Given 5 seconds to calculate 1 x 2 x 3 x 4 x 5 x 6 x 7 x 8. Median guess was 512. If given 8 x 7 x 6 x 5 x 4 x 3 x 2 x 1, median guess was 2,250
        - Correct answer is 40,320

1. Kahneman and Tversky (1974)

Underreaction

- Momentum strategy
  - "Winners" over the past 6 months subsequently outperform 6-month past losers[1]
  - Follow-up 8 years later: momentum remained profitable[2]
  - Pervasive: Value and Momentum Everywhere[3]
- Momentum is strongest in small stocks, and stocks with low analyst coverage[4]
 - Suggests that limited attention is a cause

1. Jegadeesh and Titman (1993)
2. Jegadeesh and Titman (2001)
3. Asness, Moskowitz, and Pedersen (2013)
4. Hong, Lim, and Stein (2000)

Limited Attention:
The Reaction to Earnings

- Earnings surprise: actual earnings minus forecast earnings
- Classify stocks into ten deciles according to earnings surprise[1]
    - Stock prices rise upon positive earnings surprises and fall upon negative earnings surprises
    - But underreaction: prices continue to react afterwards. *Post-earnings announcement drift*

1. Bernard and Thomas (1989)

Post-Earnings Announcement Drift

EVENT TIME IN TRADING DAYS RELATIVE TO EARNINGS ANNOUNCEMENT DAY
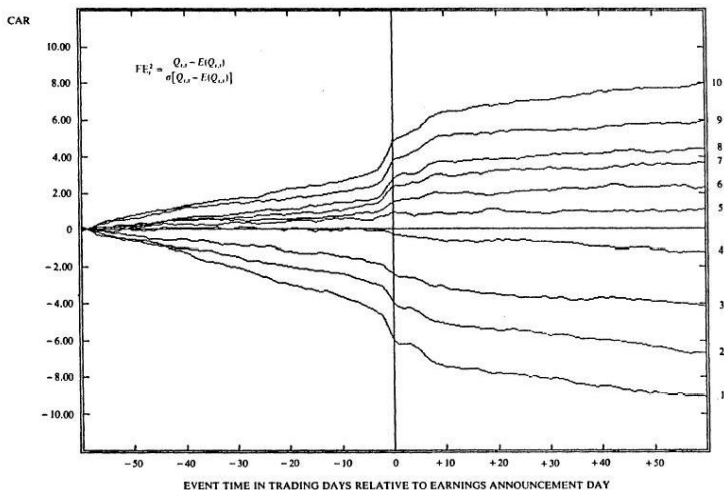
Post-Event Drift and Underreaction

- Post-event drift is even more pronounced
  - When other firms are announcing earnings[1]
  - On Fridays[2]
  - For customers' earnings announcements[3]
- Other types of post-event drift
  - Dividend changes[4]
  - Share repurchases[5]

1. Hirshleifer, Lim, and Teoh (2009)
2. DellaVigna and Pollet (2009)
3. Cohen and Frazzini (2007)
4. Michaely, Thaler, and Womack (1995)
5. Ikenberry, Lakonishok, and Vermaelen (1995), Manconi, Peyer, and Vermaelen (2018)

Limits to Arbitrage

- Even if most investors make mistakes, why don't a few smart agents exploit them?

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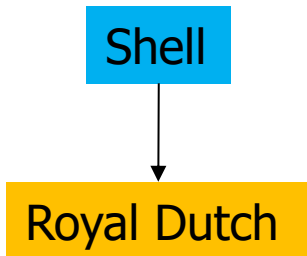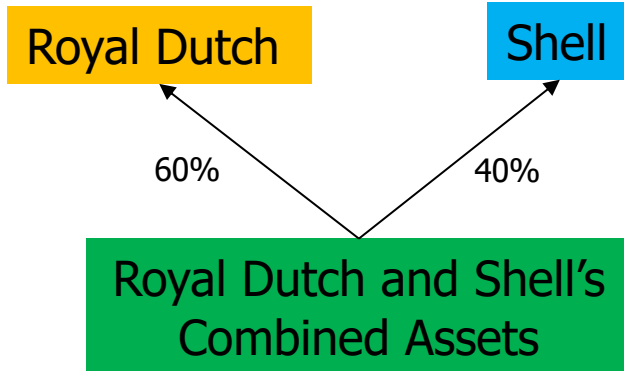
Shell

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Limits to Arbitrage

- Even if most investors make mistakes, why don't a few smart agents exploit them?

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60%   40%

Royal Dutch and Shell's Combined Assets

Sentiment and Stock Returns

- Two ways to show market inefficiency
  - Market does not incorporate information that it should (limited attention)
  - Market does incorporate information that it shouldn't
- Mood variables affect stock returns:
  - Seasonalities (Monday and Friday effects, December and January effects)
  - Weather (sunshine, temperature)
  - Seasonal affective disorder
  - Clock changes
  - Lunar cycles

Data Mining

- Spurious correlation: caused by random pattern in the data, not any underlying relationship
    - E.g. Superbowl effect
    - 5% of regressions will be significant at the 5% level even if no underlying relationship
- Address with *a priori* economic logic. A mood variable should
    - Drive mood in a substantial and unambiguous way
    - Impact a large proportion of the population
    - Be correlated across a country

England: Heart attacks rose after loss to Argentina in 1998 World Cup penalty shootout

United States: Homicides rise in major cities after team is eliminated from the NFL Playoffs

Canada: Suicides rise if Montreal Canadiens are eliminated from the Stanley Cup Playoffs

Sports Sentiment and Stock Returns[1]

- Sports drives mood in a substantial way
  - Causes heart attacks, homicides, riots, suicides
  - Effects extend to general life[2]
- Affects a large proportion of the relevant population
  - 25 billion viewers (cumulatively) watched 2002 World Cup
  - Home bias[3]
- Correlated within a country
  - Focus on international football
- 1,100 observations plus 1,500 for other sports

1. Edmans, Garcia, and Norli (2007)
2. Wann et al. (1994)
3. French and Poterba (1991)

The Main Result

	Wins			Losses		
	Num. games	β_W	t-val	Num. games	β_L	t-val
A. Abnormal raw returns						
All games	638	0.016	0.27	524	−0.212	−3.27
Elimination games	177	0.046	0.43	138	−0.384	−3.24
World Cup elimination games	76	0.090	0.53	56	−0.494	−2.71
Continental cups elimination games	101	0.013	0.09	82	−0.309	−1.99
Group games	243	0.052	0.53	198	−0.168	−1.47
World Cup group games	115	0.007	0.05	81	−0.380	−2.23
Continental cups group games	128	0.092	0.67	117	−0.022	−0.14
Close qualifying games	218	−0.049	−0.52	188	−0.131	−1.29
World Cup close qualifying games	137	−0.095	−0.78	122	−0.132	−1.05
European Championship close qualifying games	81	0.029	0.19	66	−0.130	−0.75

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Breakdown by Importance

	Wins			Losses		
	Num. games	β_W	t-val	Num. games	β_L	t-val
A. Top Seven soccer nations						
All games	251	0.056	0.92	121	−0.217	−2.59
World Cup games	142	0.065	0.80	67	−0.374	−3.30
Continental cup games	109	0.044	0.48	54	−0.021	−0.17
Elimination games	101	0.148	1.55	52	−0.221	−1.70
Group games and close qualifiers	150	−0.006	−0.08	69	−0.213	−1.96
B. Other soccer nations (32 countries)						
All games	387	−0.067	−1.38	403	−0.139	−2.89
World Cup games	186	−0.102	−1.42	192	−0.183	−2.60
Continental cup games	201	−0.034	−0.51	211	−0.099	−1.50
Elimination games	76	−0.135	−1.26	86	−0.158	−1.54
Group games and close qualifiers	311	−0.050	−0.92	317	−0.134	−2.46

The Ultimate Stress Test – Other Sports

	Wins			Losses		
	N	β_W	t-val	N	β_L	t-val
A. Abnormal returns						
All games	903	-0.013	-0.39	645	-0.084	-2.21
Cricket	153	-0.057	-0.73	88	-0.187	-1.85
Rugby	403	-0.086	-1.73	307	-0.095	-1.74
Ice hockey	238	0.105	1.57	148	0.083	1.02
Basketball	111	0.071	0.74	102	-0.208	-2.11

A Rational Reaction?

- Soccer wins and losses may have economic effects, e.g. reduced productivity, consumer expenditure or value of sponsorship deals
- But results are inconsistent with a rational reaction
  - Asymmetry of effect, suggesting loss aversion or biased expectations
  - Stronger in small stocks, which are more affected by sentiment
  - Modest reversal of loss effect on next day