ULB
SolvayBrusselsSchool
of Economics and Management

Advanced Corporate Finance

7. Investor behavior and capital market efficiency

Objectives of the session

1. So far => analysis of company value, of projects and of derivatives. Intuitively => Important to value stock prices
2. Help to determine the price of stocks or shares
3. If everybody has the same set of assumptions, is it possible to "beat the market"?
4. In this session, we will review the three forms of market efficiency (weak, semi-strong and strong) and their implications
5. We will also see a series of empirical analysis supporting or not the notion of market efficiency
6. Eventually we will discuss investor behavior

Notions of Market Efficiency

- An Efficient market is one in which:
  - Arbitrage is disallowed: rules out free lunches
  - Purchase or sale of a security at the prevailing market price is never a positive NPV transaction
  - Prices reveal information

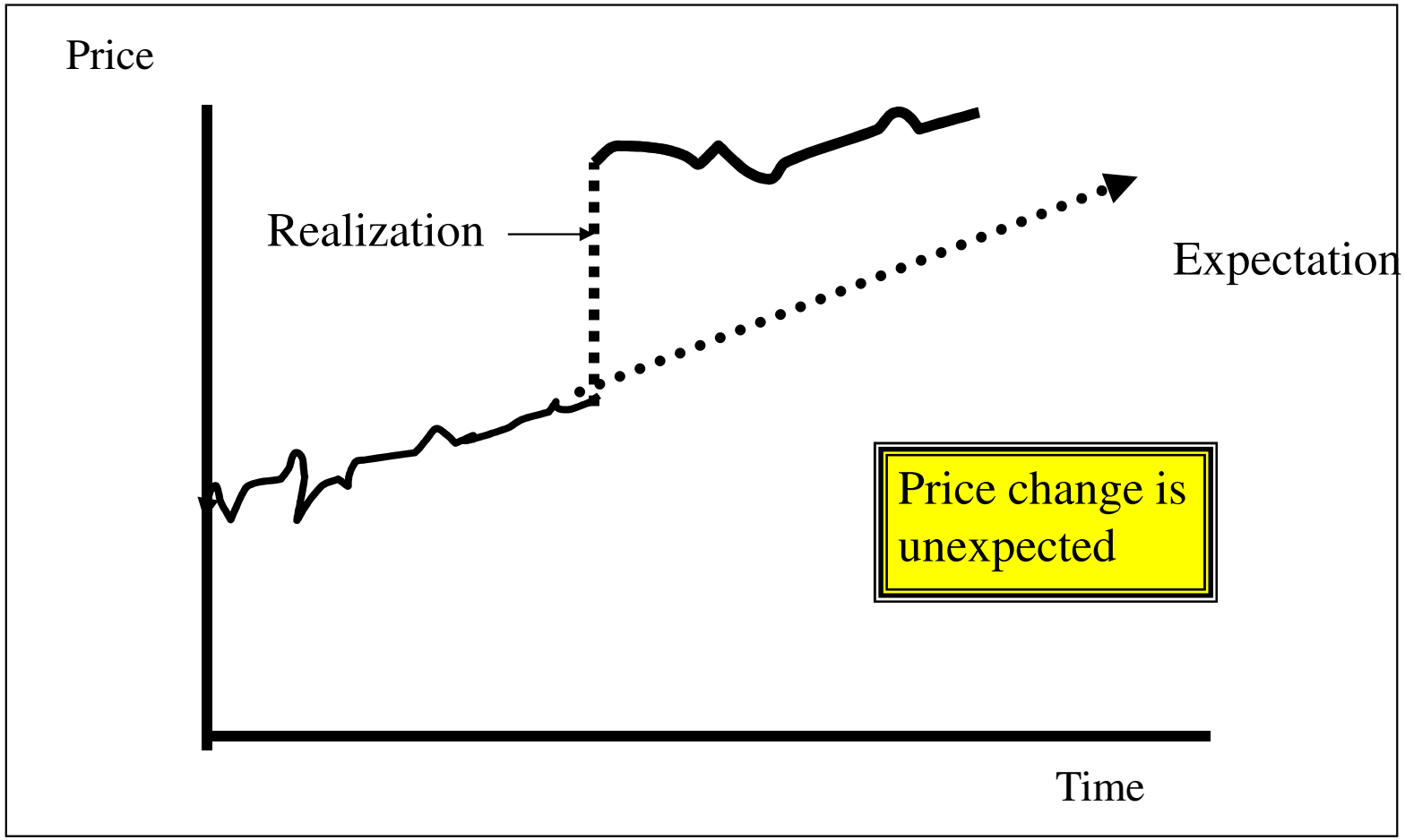
- Three forms of Market Efficiency

  (a) Weak Form Efficiency
    - Prices reflect all information in the past record of stock prices

  (b) Semi-strong Form Efficiency
    - Prices reflect all publicly available information

  (c) Strong-form Efficiency
    - Price reflect all information

Efficient markets: intuition



Weak Form Efficiency

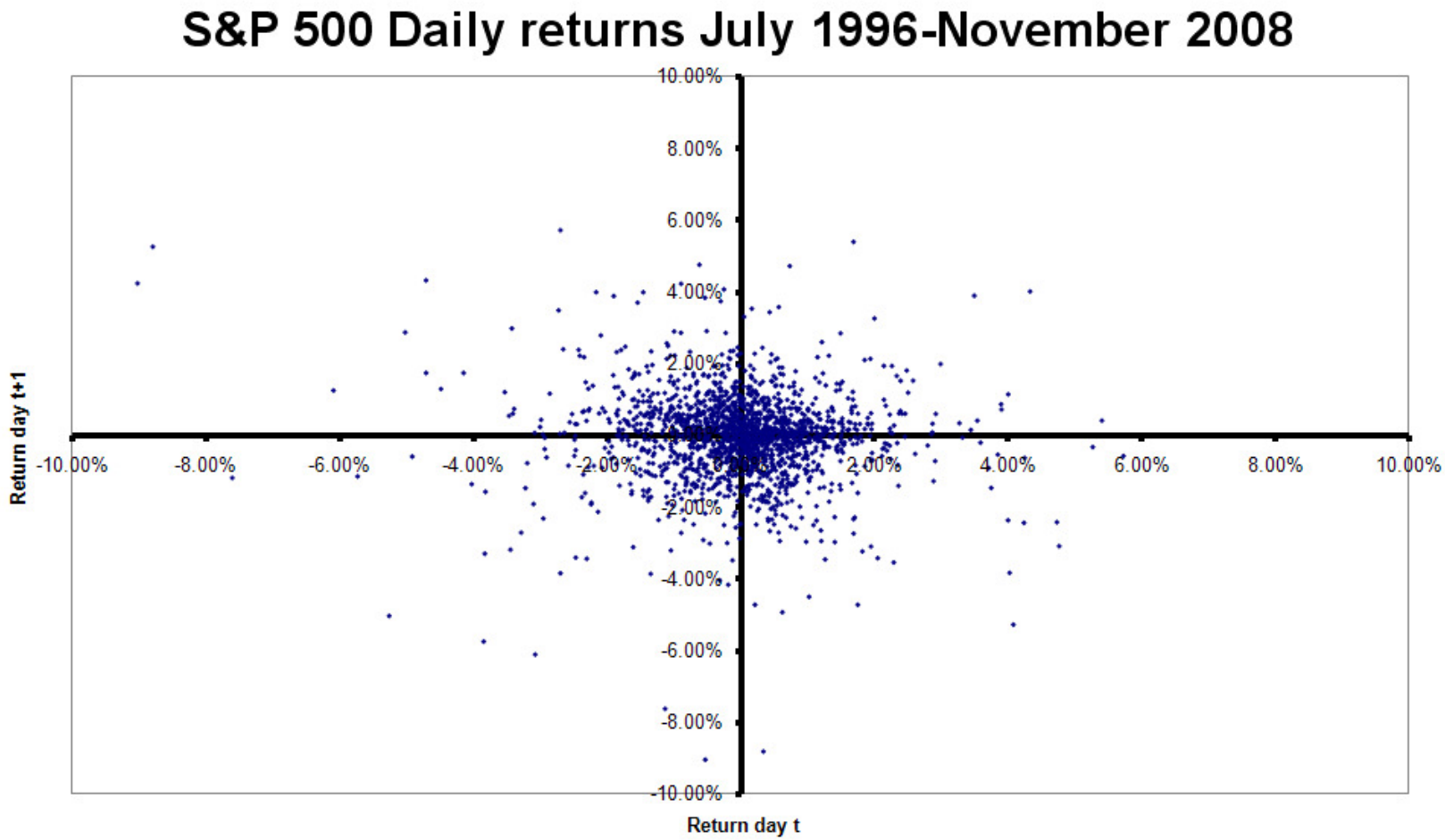
- **Random-walk model:**
  - $P_t - P_{t-1} = P_{t-1} * (\text{Expected return}) + \text{Random error}$
  - Expected value (Random error) = 0
  - Random error of period t unrelated to random component of any past period

- **Implication:**
  - Expected value $(P_t) = P_{t-1} * (1 + \text{Expected return})$
  - Technical analysis: useless

- **Empirical evidence: serial correlation**
  - Correlation coefficient between current return and some past return
  - Serial correlation = Cor (R_t, R_{t-s})

Random walk model of stock prices

$$Correlation(R_t, R_{t+1}) = -0.028$$



Semi-strong Form Efficiency

- Prices reflect all publicly available information

- **Empirical evidence: Event studies (MacKinlay, 1997)**

  – Test whether the release of information influences returns and when this influence takes place

  – Abnormal return AR : $AR_t = R_t - R_{mt}$

  – Cumulative abnormal return:

$$CAR_t = AR_{t0} + AR_{t0+1} + AR_{t0+2} + \ldots + AR_{t0+n}$$

CAR for earning announcements

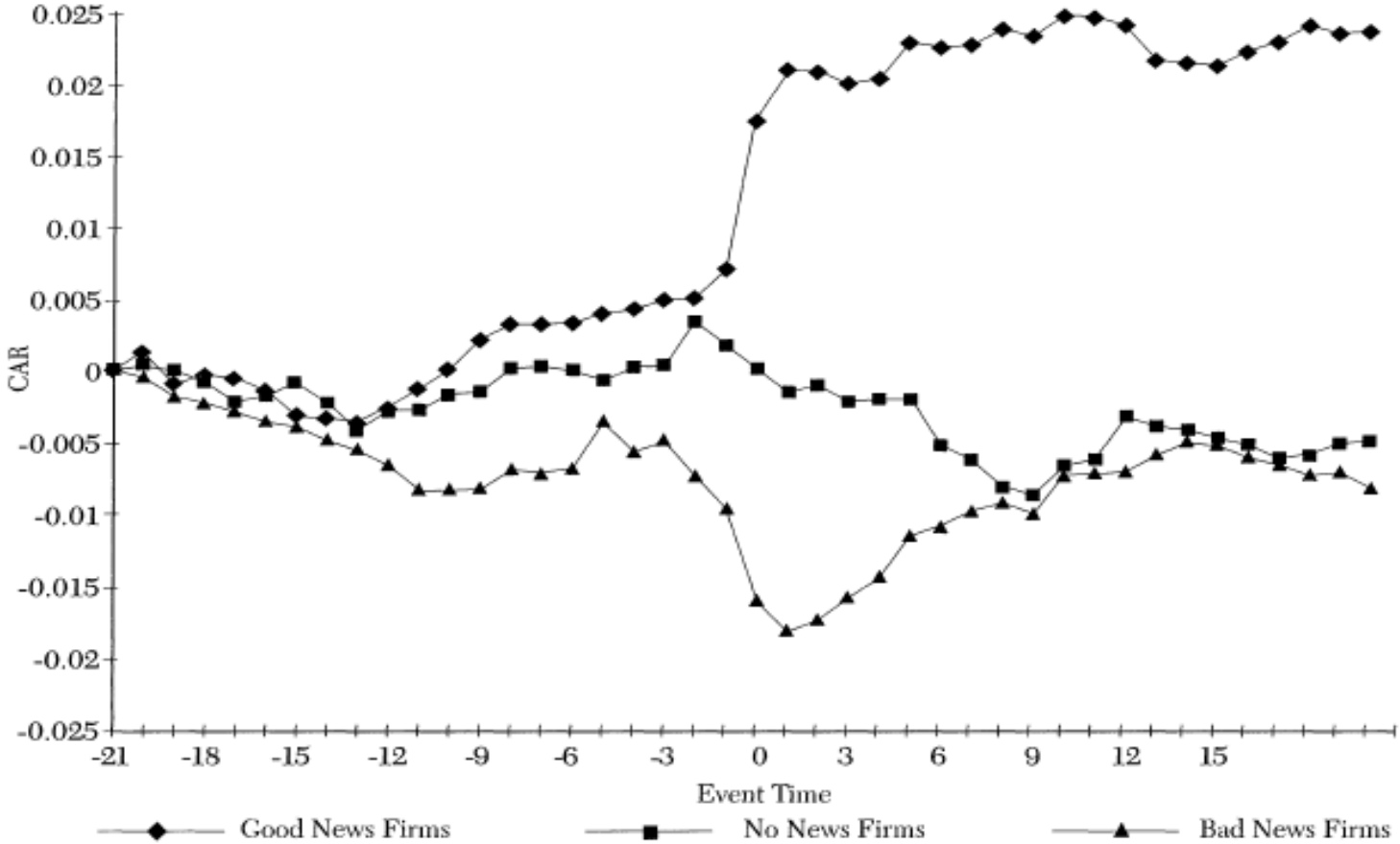


Figure 2b. Plot of cumulative abnormal return for earning announcements from event day -20 to event day 20. The abnormal return is calculated using the constant mean return model as the normal return

Semi-strong form of efficiency

- How do professional portfolio managers perform?

- Jensen (1968): Mutual funds do not generate abnormal returns

- $R_{fund} - R_f = \alpha + \beta (R_M - R_f)$

- Homogenous expectations?
  - Even if not, or uninformed person => market portfolio

- Rational expectations rather than homogenous ones

- Insider trading: Insiders do seem to generate abnormal returns (should cover their information acquisition activities)

US Equity Mutual Funds 1982-1991 (Malkiel, 1995)

Average Annual Return

• Capital appreciation funds	16.32%
• Growth funds	15.81%
• Small company growth funds	13.46%
• Growth and income funds	15.97%
• Equity income funds	15.66%
• S&P 500 Index	17.52%
• Average deviation from benchmark (risk adjusted)	-3.20%

US Equity Mutual Funds 1982-1991 (Malkiel, 1995)

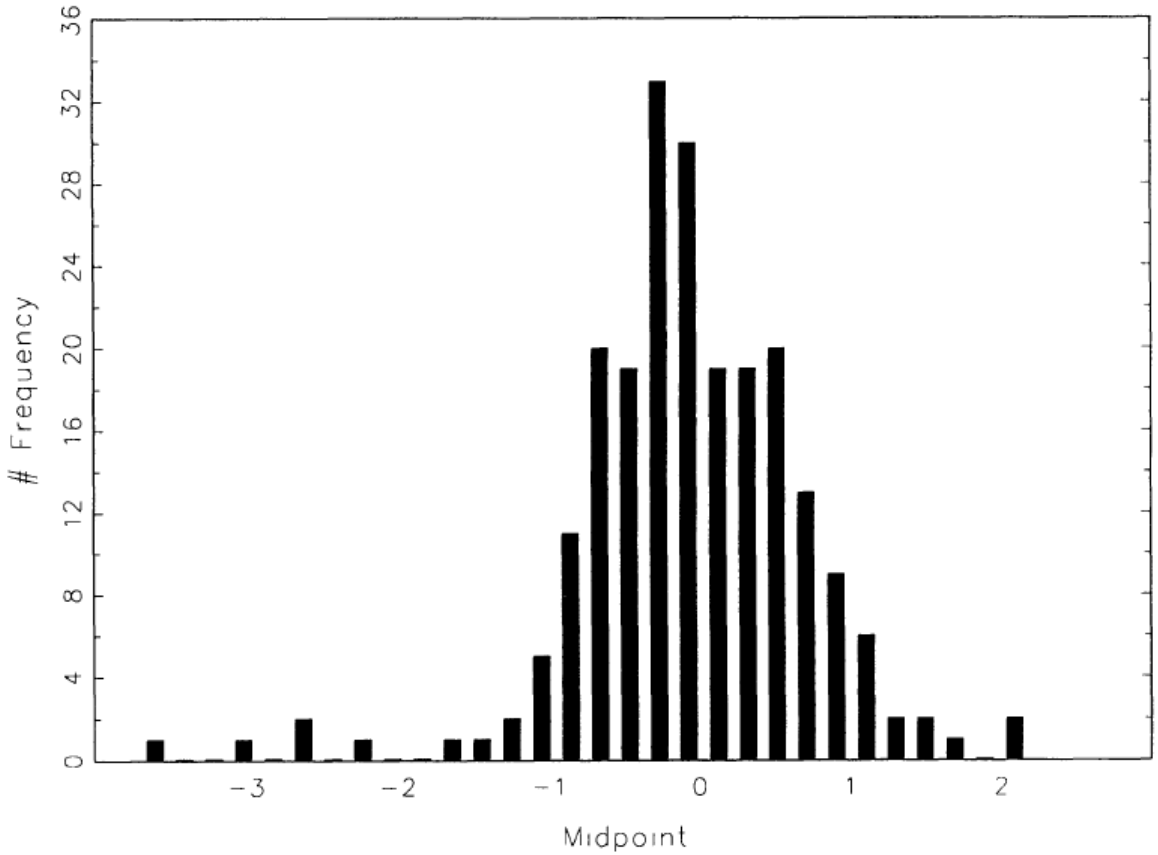


Figure 1. Estimates of Individual Mutual-Fund Alphas 1972 to 1991. The frequency distribution of estimated alphas for all equity mutual funds with 10-year continuous records.

Decomposition of Mutual Fund Returns

(Wermers ,2000)

- Sample: 1,758 funds 1976-1994

- Benchmark 14.8%
- Gross return 15.8%

+1%

Funds outperform benchmark

Stock picking +0.75%
No timing ability
Deviation from benchmark +0.55%

- Expense ratio 0.8%
- Transaction costs 0.8%
- Non stock holdings 0.4%

Not enough to cover costs

- Net Return 13.8%

Insider trading

- Meulbroek (1992) => analysis on insider tradings' impact on stock prices
- Database from the Securities and Exchanges Commission (SEC)
- Insider Trading => trading in securities by individuals or firms possessing important non-public information.
- Positive? fosters efficient markets because of quicker price discovery
- Negative? Supposition of large impact on stock prices (and unfairness)

- Legal cases where SEC cited illegal traders

- Specification:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i \text{Announce}_{it} + \delta_i \text{Inside}_{it} + \sum_{j=1}^{J} \mu_{ij} \text{News}_{ijt} + \varepsilon_{it}$$

ULB SolvayBrusselsSchool of Economics and Management

Meulbroek (1992), descriptive statistics

	Median	Standard Deviation	Minimum	Maximum	*N*
Total profit gained	24,673	2,286,736	(1,517)	23,832,480	211
Total loss avoided	23,575	100,480	(21,741)	471,365	25
Number of securities traded	1.00	6.52	1.00	54.00	255
Ave. profit/security	17,628	394,414	(10,871)	3,972,080	198
Number of immediate tippees	1.00	2.47	1.00	17.00	95
Number of total tippees	2.00	4.01	1.00	22.00	92
Immediate tippee profit	39,103	2,109,121	0	19,030,000	89
Remote tippee profit	158,113	410,108	0	1,794,717	31
Total penalty	21,000	1,872,902	0	25,150,020	255
Ave. penalty/security	19,349	418,902	0	5,100,000	210
Penalty/profit	1.00	0.95	0.00	9.29	169

Meulbroek (1992), Type of Inside Information

Type of Inside Information	Total	Percent
All takeover related	145	79
Friendly tender	38	21
Hostile tender	34	18
Friendly merger	50	27
Hostile merger	3	2
LBO	10	5
Restructuring	5	2
Major share acq.	5	2
Negative earnings	12	6
Positive earnings	3	2
Bankruptcy or financial fraud	10	5
Misc. good news	11	6
Misc. bad news	2	1
All positive news	159	87
All negative news	24	13
Total	183	100

Meulbroek (1992)

⇒ average AR per day of insider trading = 3.06%

⇒ In some cases much larger; for example bankruptcy or fraud = -5.65%

⇒ CAR on insider Trade days = 6.85%

⇒ Insider Trading « run-up », proportion of impact of insider trading on impact when the news is released

$$\text{Run-up}_i = \frac{\hat{\delta}_i \cdot N_i}{\hat{\gamma}_i}$$

On average equal to 47.56%!

Also impact on volume traded!

Legislation exists => no belief in strong efficiency, application (politicians?)

ULB SolvayBrusselsSchool of Economics and Management

What moves the market?

- Who knows?

- Lot of noise:
  - 1985-1990: 120 days with $|\Delta DJ| > 5\%$
    - 28 cases (1/4) identified with specific event

    (Siegel *Stocks for the Long Run* Irwin 1994, p 184)
  - Orange juice futures (Roll 1984)
    - 90% of the day-to-day variability cannot be explained by fundamentals

- Financial journalists?

ULB
SolvayBrusselsSchool
of Economics and Management

In practice what do we see?

- In theory, providing people form rational expectations and think in a risk return framework => investors should hold the market portfolio
- But in practice??? Campbell, Calvet, Sodini (2009) for Swedish data:

  Real estate ⇔ 70% of assets;

  Bank deposits and money ⇔ 11%,

  Stocks and mutual funds ⇔ 6%,

  Bonds, derivatives, capital insurance for the remainder
- Data issue: Campbell (2006): "Indeed, it may be more unusual today for people to reveal intimate details of their financial affairs, than to reveal details of the intimate affairs"

ULB SolvayBrusselsSchool of Economics and Management

In practice what do we see?

⇒ Underdiversification (concentration of investments in stock from companies in the same industry or same region, especially importance of investments in the company where people work)

⇒ Median of number of individual stocks held = **3**

⇒ Polkovnichenko (2005)

- Investors hold simultaneously diversified and undiversified investments
- Some households with substantial savings have no investment in equity

⇒ Large number of stocks from the employer

⇒ Intensive trade habits

Example: Coca-Cola in Benartzi (2001) => 90% of allocation of retirement saving plans in the Cy, on top of that 76% of employees' discretionary amount!

Trading Is Hazardous to Your Wealth (Barber and Odean, 2000)

- Sample: trading activity of 78,000 households 1991-1997

- Main conclusions:

1. Average household underperforms benchmark by 1.1% annually
2. Trading reduces net annualized mean returns

   Infrequent traders: 18.5% Frequent traders: 11.4%
3. Households trade frequently (75% annual turnover)
4. Trading costs are high: for average round-trip trade 4%

   (Commissions 3%, bid-ask spread 1%)

Potential explanations

- Benartzi (2001): Employees and employer's contribution allocation ⇔ endorsement effect (implicit investment advice), and excessive extrapolation
- Huberman (2001):
  - Home bias see French and Poterba (1991), US, Japan, UK all have over 90% of domestic ownership! And associated costs
  - => role of familiarity, test thanks to the Regional Bell Operating Companies shares (seven of them, equally accessible on the NYSE)

Barber and Odean (2001)

- Number of trades might be due to overconfidence
- Overconfidence more often present when low predictability and noisy feedback ⇔ Finance
- Greater overconfidence => greater trading => greater costs and lower performance
- Proxy for overconfidence? Gender?
- Men => more time and money on security analysis, more present in the financial sector, less likely to listen to brokers, anticipate higher returns than women do
- If men overconfident then one would expect :
  - Men trade more than women
  - By trading more they hurt their performance

Barber and Odean (2001)

TABLE II

POSITION VALUE, TURNOVER, AND RETURN PERFORMANCE OF COMMON STOCK INVESTMENTS OF FEMALE AND MALE HOUSEHOLDS: FEBRUARY 1991 TO JANUARY 1997

	All households			Married households			Single households		
	Women	Men	Difference (women–men)	Women	Men	Difference (women–men)	Women	Men	Difference (women–men)
Number of households	8,005	29,659	NA	4,894	19,741	NA	2,306	6,326	NA
Panel A: Position Value and Turnover									
Mean [median] beginning position value ($)	18,371 [7,387]	21,975 [8,218]	−3,604*** [−831]***	17,754 [7,410]	22,293 [8,175]	−4,539*** [−765]***	19,654 [7,491]	20,161 [8,097]	−507*** [−606]***
Mean [median] monthly turnover (%)	4.40 [1.74]	6.41 [2.94]	−2.01*** [−1.20]***	4.41 [1.79]	6.11 [2.81]	−1.70*** [1.02]***	4.22 [1.55]	7.05 [3.32]	−2.83*** [−1.77]***
Panel B: Performance									
Own-benchmark monthly abnormal gross return (%)	−0.041***	−0.069***	0.028***	−0.050***	−0.068***	0.018	−0.029*	−0.074***	0.045***
	(−2.84)	(−3.66)	(2.43)	(−2.89)	(−3.67)	(1.28)	(−1.64)	(−3.60)	(2.53)
Own-benchmark monthly abnormal net return (%)	−0.143***	−0.221***	0.078***	−0.154***	−0.214***	0.060***	−0.121***	−0.242***	0.120***
	(−9.70)	(−10.83)	(6.35)	(−9.10)	(−10.48)	(3.95)	(−6.68)	(−11.15)	(6.68)

Barber and Odean (2001)

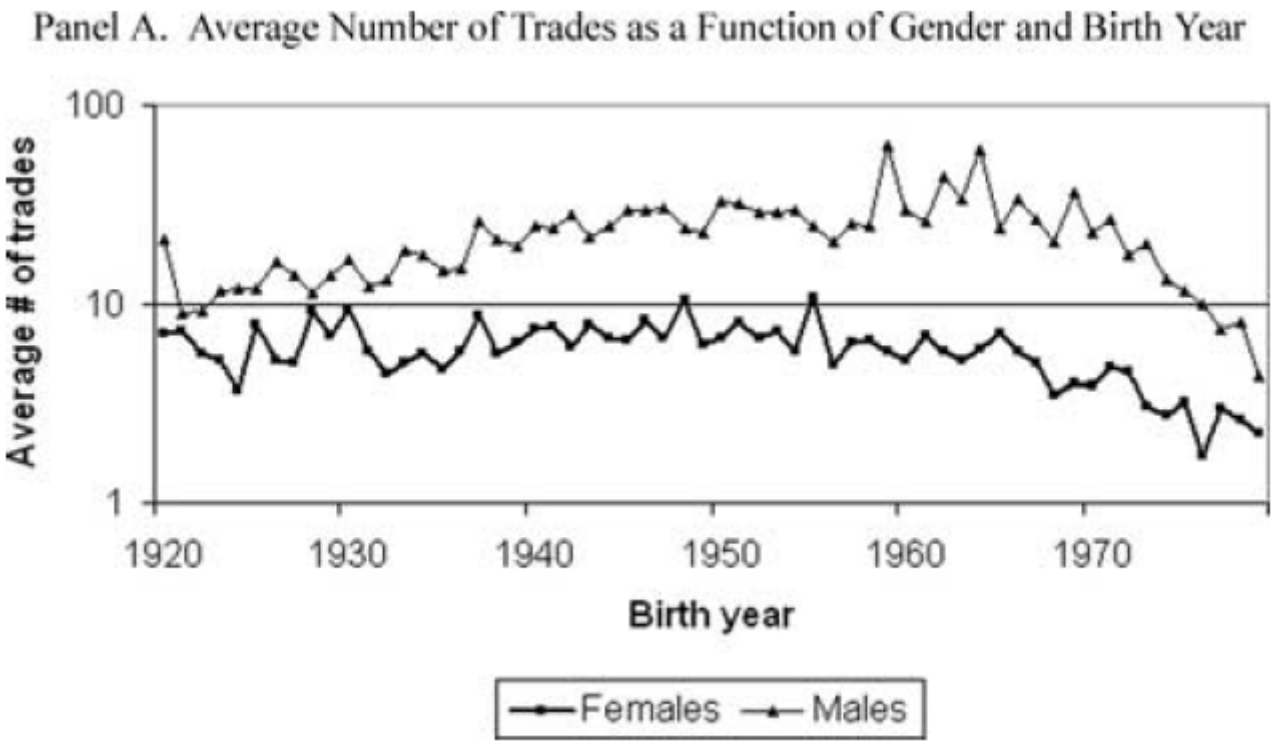
- Other observations
- Impact of marriage
- Women => less risky assets
- Young and Single => more volatile portfolios with more volatile stocks, more likely to invest in small stocks, more willing to accept market risk
- Higher incomes => more willing to accept market risk

- Gambling attitude???

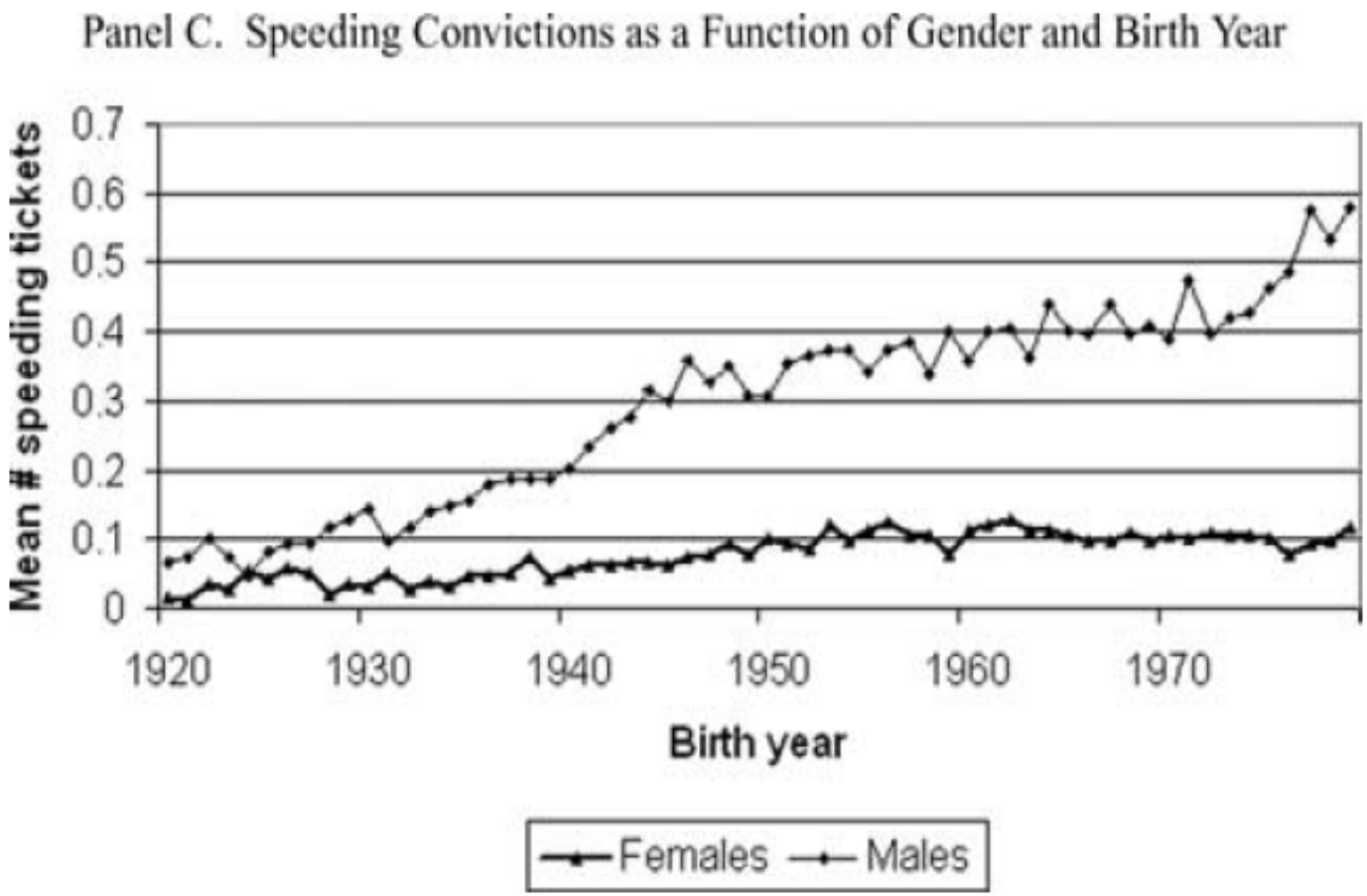
Sensation seeking?

- Gender => proxy for overconfidence, however may also reflect other characteristics
- Grinblatt and Keloharju (2009) => role of sensation seeking
- Sensation seekers : “search for novel, intense and varied experiences generally associated with real or imagined physical, social or financial risk”
- Database on Finland, extremely detailed
- Proxy for overconfidence: survey made during military service (compulsory)
- Proxy for sensation seeking: number of automobile speeding convictions
- Correlation between the two extremely limited
- Conclusion: portion of trading is driven by sensation seeking and overconfidence

Sensation seeking



Sensation seeking



ULB
SolvayBrusselsSchool
of Economics and Management

Other observations…

- Odean (1998) => reluctance to realize the losses and eagerness to realize gains (disposition effect)
- Mistaken belief that winners and losers will mean revert
- Idea: distinguish realized and paper gains and realized and paper losses
- Reference point => average purchase price

$$\frac{\text{Realized Gains}}{\text{Realized Gains + Paper Gains}} = \text{Proportion of Gains Realized (PGR)}$$

$$\frac{\text{Realized Losses}}{\text{Realized Losses + Paper Losses}} = \text{Proportion of Losses Realized (PLR)}$$

- If reluctance to realize losses then PGR > PLR
- If Tax effects then December may exhibit a different pattern

Losers and winners

	Entire Year	December	Jan.–Nov.
PLR	0.098	0.128	0.094
PGR	0.148	0.108	0.152
Difference in proportions	−0.050	0.020	−0.058
t-statistic	−35	4.3	−38

- Importance of PGR/PLR, here the ratio is worth 1.5 => a stock up in value is 50% more likely to be sold than a stock down in value!
- December effect
- Mean reversion not proved ex post => winners sold do better than losers not sold
- Conclusion => behavior induces lower returns!

ULB
SolvayBrusselsSchool
of Economics and Management

Stock market participation?

- Surprisingly few people invest in stock => 50% in the US, less in Europe
- Reasons advanced => costs
- Alternatively, people may not perceive the benefits
- Does cognitive ability play a role?
- Grinblatt, Keloharju and Linnainmaa (2011)
  - Participation and diversification decisions positively linked to IQ (even when using many controls)
  - Public policy implications…

ULB
SolvayBrusselsSchool
of Economics and Management

IQ, Trading behavior and Performance

- Grinblatt, Keloharju and Linnainmaa (2011b) => IQ influence on trading behavior, performance and transaction costs
- Conclusion, high IQ investors:
  - Less subject to disposition effect
  - More aggressive about tax-loss trading
  - More diversification
  - More likely to supply liquidity when stocks experience a one month high
  - Superior market timing, stock picking and trade execution
- Inefficient market? Not really
  - Superior information?
  - Prices fair or nearly fair to all…

ULB
SolvayBrusselsSchool
of Economics and Management

Standard and Behavioral Approaches

- Campbell (2006) => a reminder of the difference between positive research (describes what agents actually do) and normative research (what they should do)
- Economists often assume that both coincide (from there the revealed preference approach in economics)
- Behavioral finance => choices agents actually make
- Standard finance theory => choices that maximize their welfare (and they can be educated to make)

ULB

SolvayBrusselsSchool
of Economics and Management

Fads?

Mood?

- May traders' mood influence stock market prices?
- How can we proxy mood?
- Mood proxies should:
  - Drive mood in a substantial an unambiguous way
  - Impact the mood of a large proportion of population
  - Effects must be correlated across the majority of individuals in a region
- Edmans, Garcia and Norli (2007) => look at 39 countries and results from World Cups (Soccer, cricket, ice hockey, basketball and rugby)
- Most important effect associated to soccer:
  - Loss reduces next day return => loss in World Cup elimination stage, linked to a 49 bp negative abnormal return
  - Impact more important for small stocks (known to be disproportionately held by nationals)

Mood?

- Other elements may influence mood…
- Hirshleifer and Shumway (2003) impact of sunlight on markets
- Sunlight would affect mood positively, bring agents to view the world more favorably and as consequence lead to a more bullish than usual market
- 26 markets (most important in each country) and link with sunshine
- Conclusion: strong correlation between sunshine and stock returns (none for snow and rain when controlling for sunshine)
- Other studies: disruption of sleep patterns linked to changes to and from daylight saving, non-secular holidays, lunar cycles, temperature…

Market efficiency?

- Behavioral elements => people in general
- Professional traders => do not seem to outperform
- Are there generic strategies which could be used? And beat the market? What is the impact of investment style?
- "Anomalies"
  - Size effect
  - Book to market ratio
  - Momentum strategy

Size and Book to Market effects

- Fama and French (1993): Investing in small stocks (by market capitalization) would lead to positive alphas (NB: this means that the Betas were used to assess the expected return)
- Positive relation between average return and book-to market equity measures => high figure ⇔ value stocks => investing in value stocks would bring positive alphas
- Data mining or real element playing a role?
- Stock with positive alpha => higher expected return and thus lower price => lower value of market equity => higher B/M measure

Momentum

- Trading strategy which buys past winners and sells past losers
- Jegadeesh and Titman (1993)
- Momentum strategy would have lead to abnormal returns for the period 1965-1989
- Selection based on past 6 months returns => compounded excess return of 12.01% per year on average!
- Tests => results not due to systematic risk
- Interpretation => overreaction (and later return reversals)

Fama (1991)

- Market efficiency => strong version "security prices fully reflect all available information", more sensible version "prices reflect information to the point where the marginal benefits of acting on information (the profits to be made) do not exceed the marginal costs"
- Testing market efficiency => joint hypothesis problem (market efficiency, jointly tested with some model of equilibrium, an asset pricing model)
- A problem but not a "mortal sin"
- Cleanest evidence of market efficiency comes from event studies (esp. with daily returns) => stock prices adjust quickly to information
- Private information => see Meulbroek (1992)
- Return predictability => autocorrelation positive but so small that not economically significant