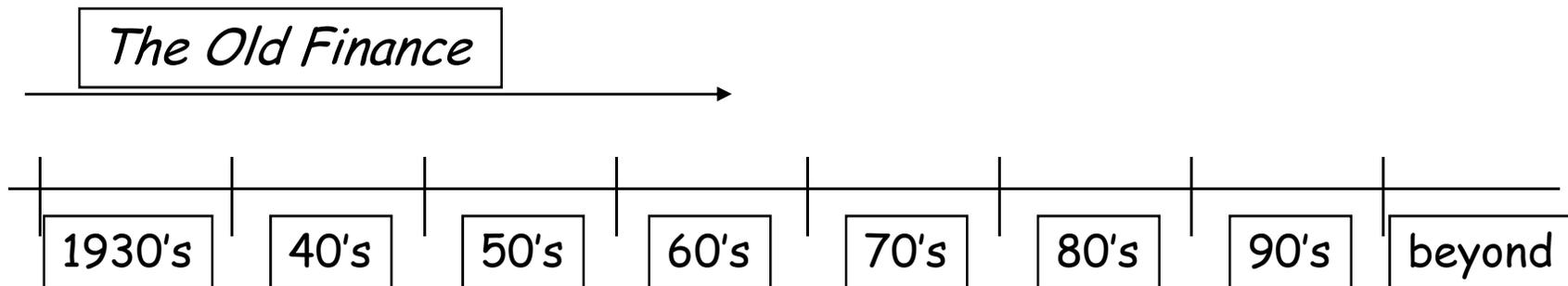

ECONOMIA DEGLI INTERMEDIARI FINANZIARI AVANZATA
MODULO ASSET MANAGEMENT

LECTURE 4

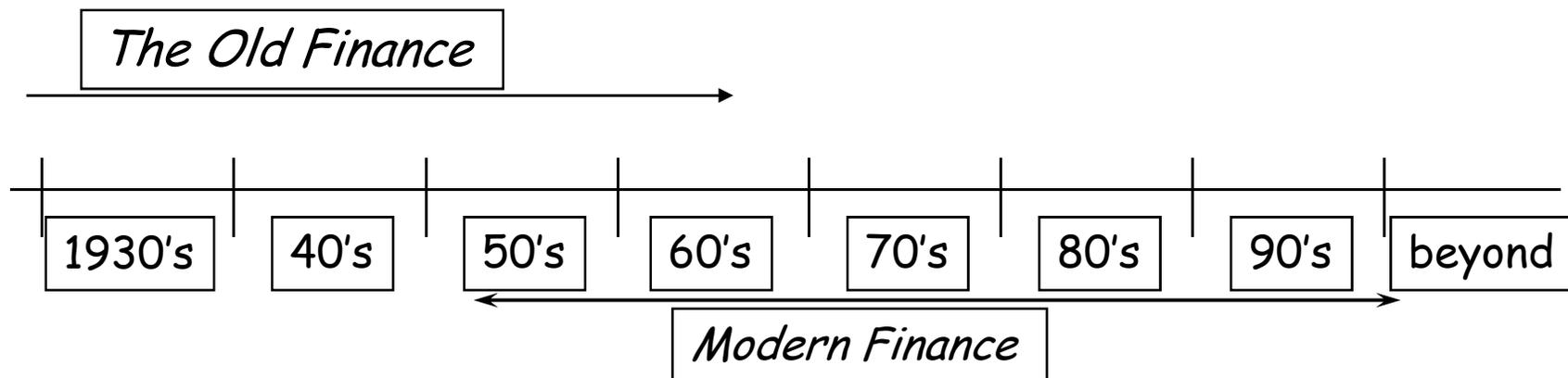
THE OLD FINANCE

- Theme: Analysis of Financial Statements and the Nature of Financial Claims
- Paradigms: Security Analysis (Graham & Dodd) Uses and Rights of Financial Claims (Dewing)
- Foundation: Accounting and Law
- **Best investment strategy =**
 - Stock-picking / value-investing approach, such as Warren Buffett uses



THE EVOLUTION OF ACADEMIC FINANCE

- Modern Finance
- Theme: Valuation Based on Rational Economic Behavior
- Paradigms: Optimization (Markowitz) Irrelevance (Modigliani & Miller) CAPM (Sharpe, Lintner & Mossen) EMH (Fama)
- Foundation: Financial Economics
- **Optimal investment strategy =**
 - Invest in index funds, try to match market as closely as possible at as low a cost as possible



THE EVOLUTION OF ACADEMIC FINANCE

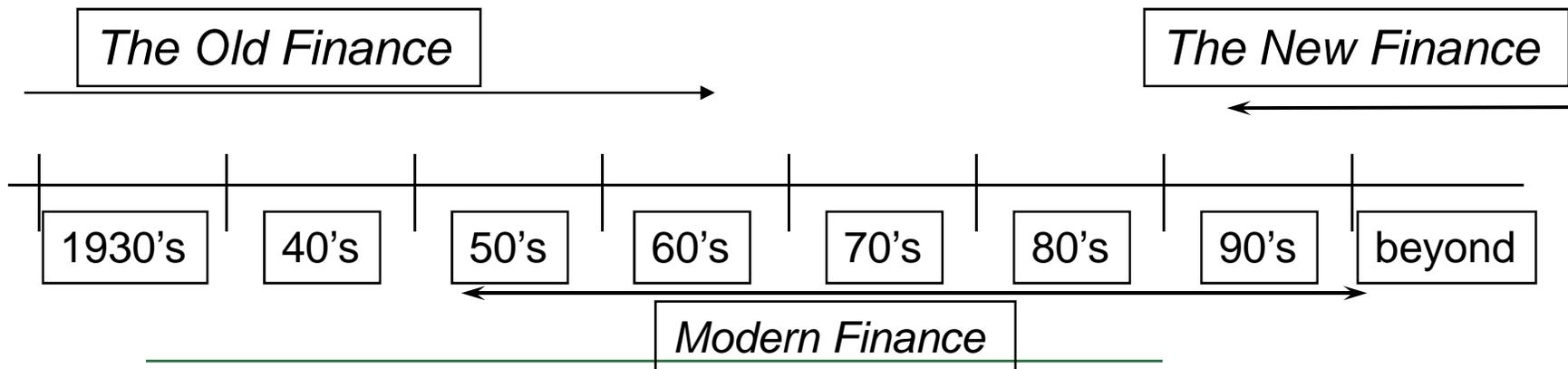
- The New Finance

- Theme: Inefficient Markets
- Paradigms: Inductive ad hoc Factor Models Behavioral Models
Expected Return Risk
- (Haugen) (Chen, Roll & Ross) (Kahneman & Tversky)
- Foundation: Statistics, Econometrics, and Psychology

- **Market is inefficient, but hard to beat nonetheless**

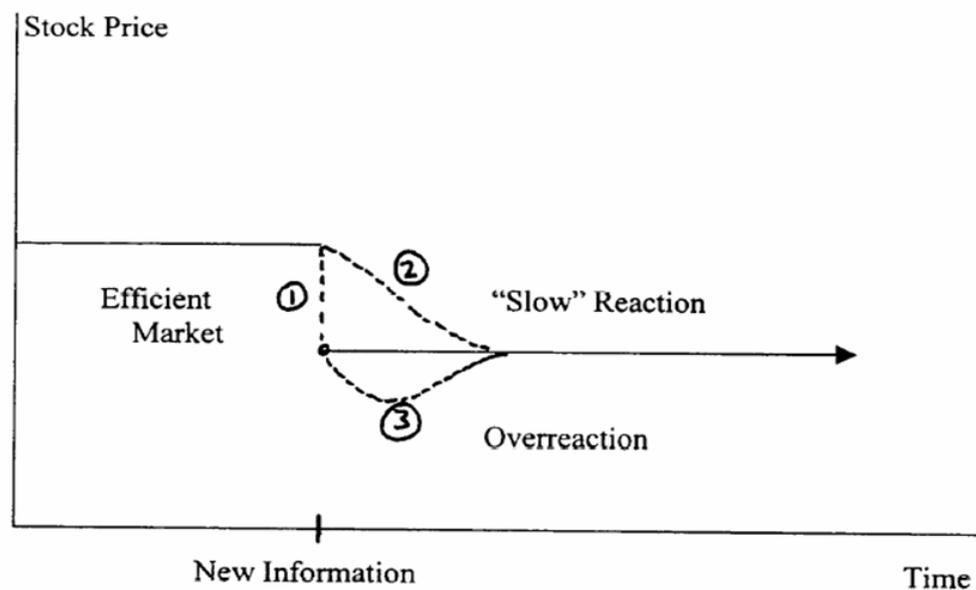
- Optimal investment approach

- Use Markowitz optimization to create optimal portfolios
 - i. APT Risk-factor model to model risk
 - ii. Ad hoc inductive expected return factor model to model expected returns
- Quantitative hedge fund, such as
 - i. Enhanced index fund
 - ii. Long / short fund



AN EFFICIENT CAPITAL MARKET

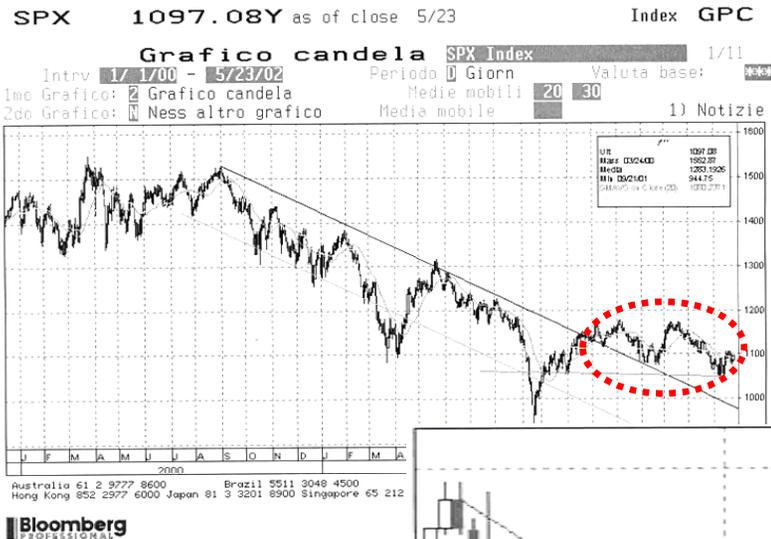
- A capital market is considered to be efficient if, through their trading activities, investors set the price of any particular security in a manner that impounds new information about that security in an instantaneous manner.
- Said differently, an efficient market is one in which all security prices are set as if all available information has already been assimilated by investors and traders and that information has been acted upon in the proper way. Thus, the only thing that will change the security's market price is the arrival of new information which, by definition, is not fully predictable.
- Notice from the preceding discussion that the critical concept defining an efficient market is not if new information about a particular security is reflected in the security's market price, but how rapidly the price adjusts to this new information.
- In establishing whether capital markets are efficient, it is often useful to consider the nature of the information that the market is expected to react to:
 - Weak Form Efficiency: Information contained in past price movements only.
 - Semi-Strong Form Efficiency: Public information announcements (e.g., earnings announcements, corporate restructurings)
 - Strong Form Efficiency: Non-public information (e.g., insider trading)



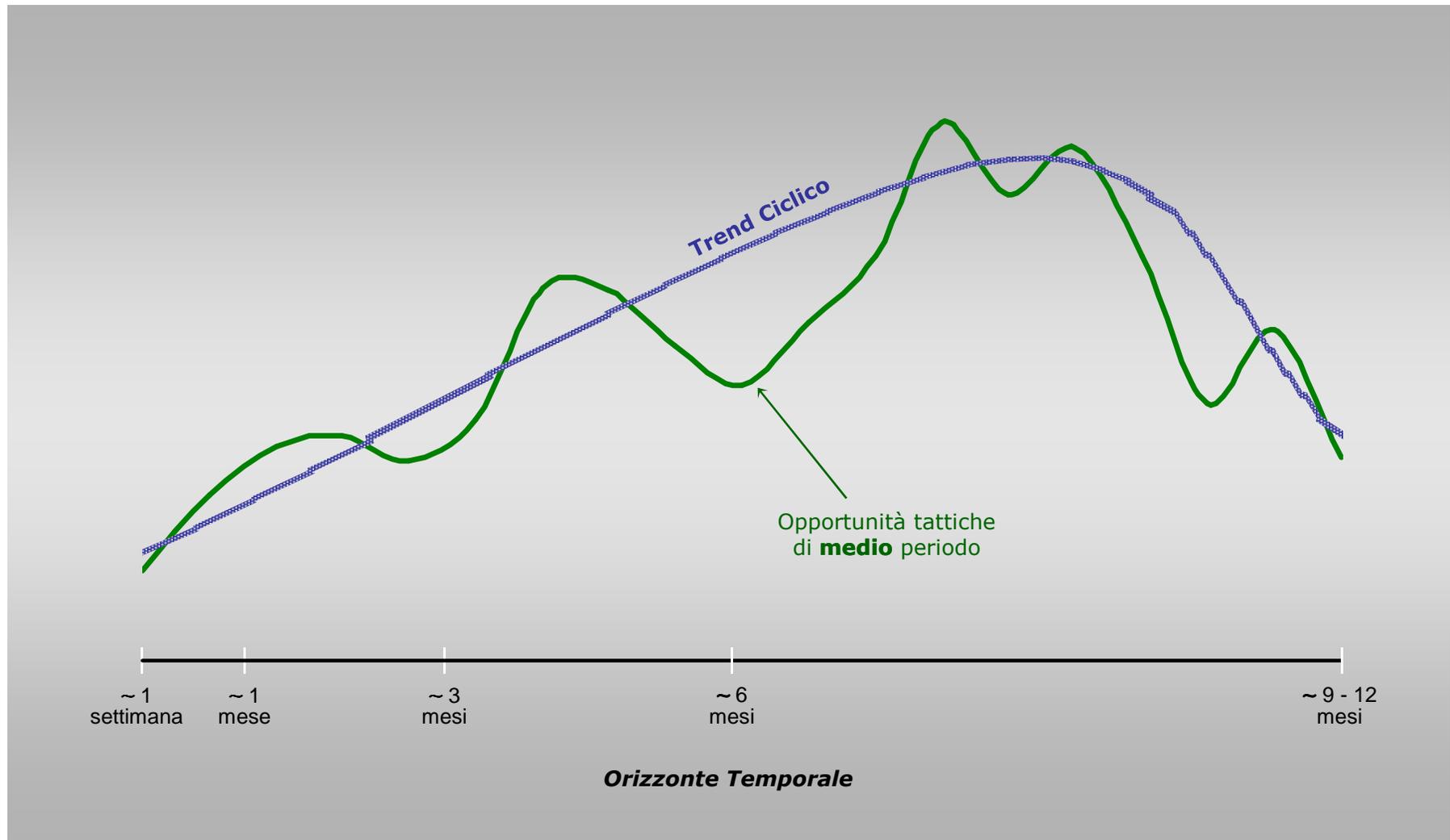
MARKET EFFICIENCY: IMPLICATIONS AND EVIDENCE

- One direct implication of capital markets that are economically (if not perfectly) efficient is that it will be impossible over time for a money manager to consistently add “alpha” to a client’s portfolio through such activities as market timing or superior stock selection.
- This in turn suggests that a passive indexing of asset class investments with the appropriate risk level is the appropriate strategy to follow.
- Empirical research on capital market efficiency has established the following stylized “facts”:
 - Markets are generally efficient in both the weak and semi-strong forms over time, but there are some important and consistent deviations from this rule.
 - Markets are generally not strong form efficient, but the number of people who genuinely possess inside information is smaller than those who think they do.
 - It is very difficult to establish market efficiency without specifying a model for expected returns (e.g., CAPM, Fama-French three-factor model). This means that any conclusions about market efficiency are subject to the possibility that the expected return model was mis-specified. (This is sometimes referred to as the joint hypothesis problem.)

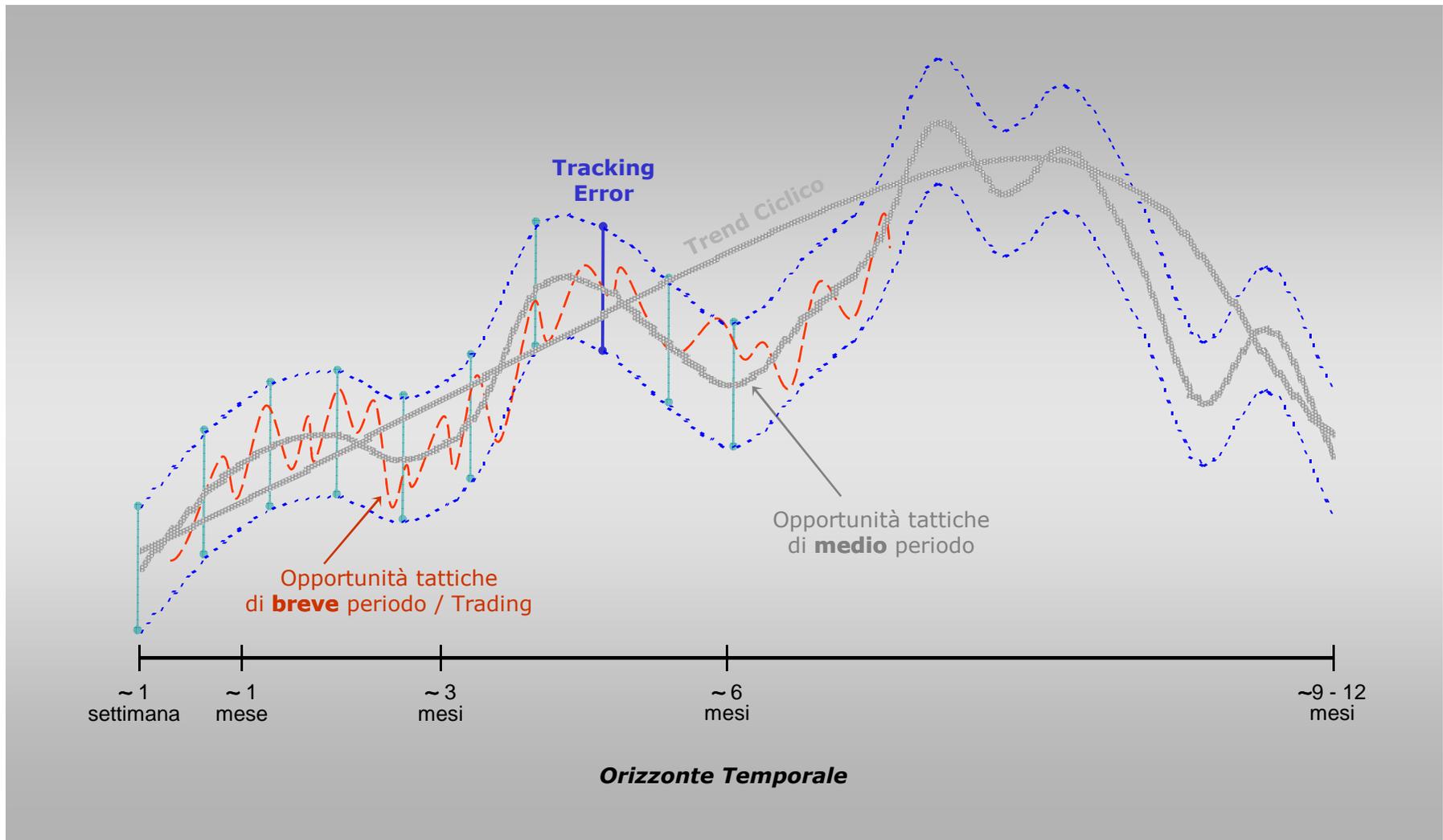
MARKET EFFICIENCY: IMPLICATIONS AND EVIDENCE



MARKET EFFICIENCY: IMPLICATIONS AND EVIDENCE

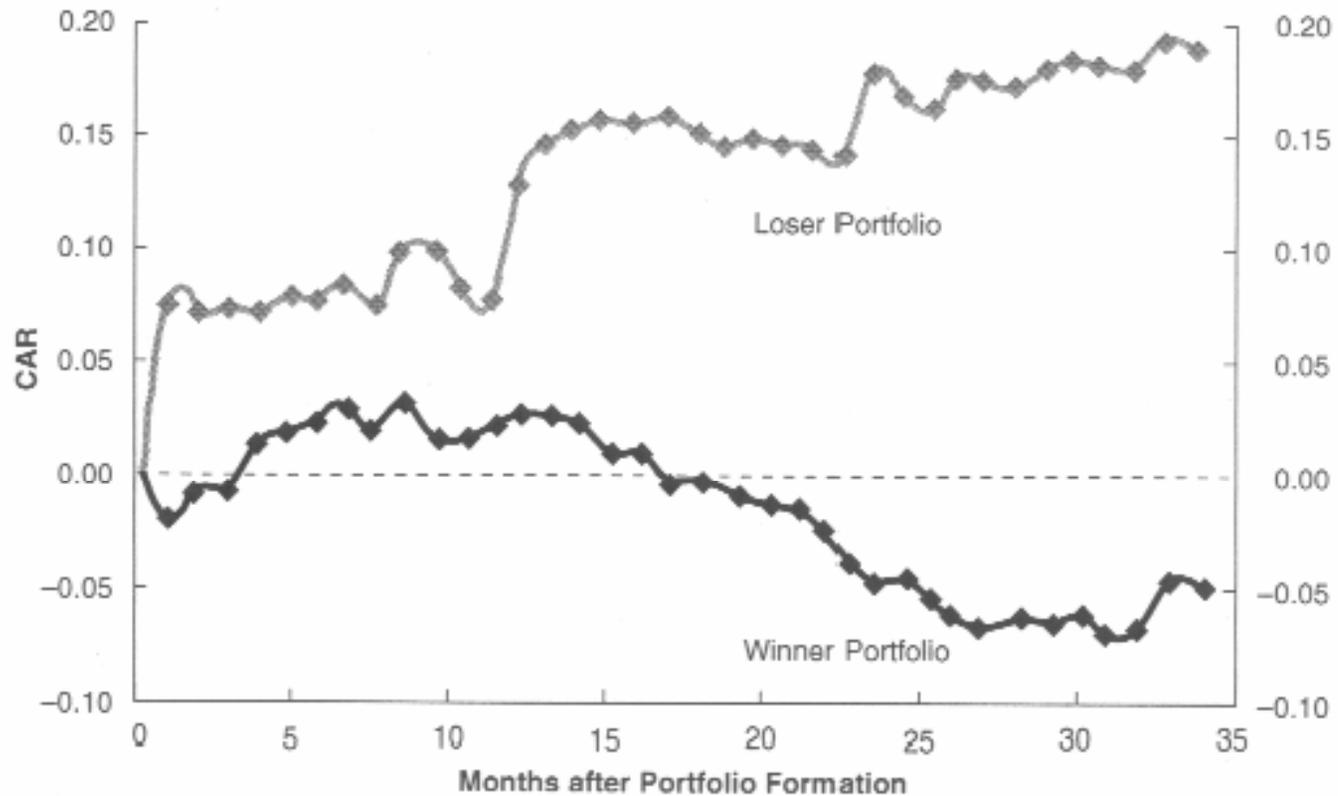


MARKET EFFICIENCY: IMPLICATIONS AND EVIDENCE



TWO IMPORTANT MARKET EFFICIENCY “ANOMALIES”

- **Market Overreaction**



Source: Werner F. M. DeBondt and Richard Thaler, "Does the Stock Market Overreact?" *Journal of Finance* 40, no. 3 (July 1985): 793–805. Reprinted with permission of Blackwell Publishing.

TWO IMPORTANT MARKET EFFICIENCY “ANOMALIES” (CONT.)

- **Market Underreaction** (i.e., Momentum)

	1 (LOW)	2	3	4	5	6	7	8	9	10 (HIGH)	10-1 (PPS)
A. Classification Based on Prior Six-Month Return											
1994	-12.00	-6.10	0.40	2.10	0.50	-0.90	-1.80	3.10	-4.50	-6.40	5.60
1995	35.70	27.40	32.30	35.00	32.30	32.20	30.30	36.70	35.30	42.10	6.40
1996	11.90	15.60	17.90	20.20	27.90	22.50	22.00	21.90	20.40	15.30	3.40
1997	7.20	05.70	14.80	20.80	26.60	32.80	35.60	37.30	37.50	23.80	16.60
1998	-2.30	-4.40	-7.00	-3.30	-0.40	0.00	04.50	0.10	-0.80	04.40	6.70
1994-98 average	8.10	7.64	11.68	14.96	17.38	17.32	18.12	19.82	17.58	15.84	7.74
B. Classification Based on Standardized Unexpected Earnings											
1994	-2.30	-2.40	-6.80	-1.00	-4.60	-1.20	-0.10	-3.30	0.90	-2.00	0.30
1995	36.70	25.40	27.80	31.00	33.40	27.50	36.10	36.90	38.60	40.60	3.90
1996	16.30	17.90	19.20	16.30	21.90	19.60	23.10	22.70	24.70	18.40	2.10
1997	25.50	21.70	23.50	22.80	24.10	24.50	25.20	28.40	29.60	28.10	2.60
1998	-3.20	-5.20	-1.30	04.40	-0.60	5.00	-0.10	-0.60	0.00	-6.20	-3.00
1994-98 average	14.60	11.48	12.48	14.70	14.84	15.08	16.84	16.82	18.76	15.78	1.18

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BACKGROUND & DEFINITION

- Definitions
 - Contrarian:
 - i. Investors buy stocks that have performed poorly and sell stock that have performed well.
 - Momentum:
 - i. Investors buy stocks that are rising in value with the anticipation of earnings acceleration.

Key research findings supporting contrarian effect (mean reversion):

- **In the USA:**
 - From 1926 to 1982, “loser” portfolios outperformed the market by 19.6% after 36 months while “winner” portfolios earned 5% less than market (De Bondt and Thaler).
 - “Value” stocks outperformed “glamour” stocks on the NYSE and AMEX from 1968 to 1989 for 1 and 5 year horizons (Lakonishok, Shleifer, and Vishny).
- **In Germany:**
 - For a 5 year term, both momentum and contrarian strategies outperformed the market. On a shorter term, contrarian strategies underperformed the market (Schiereck, De Bondt, and Weber).
- **In the UK:**
 - “Value” portfolios gave greater returns than the market as they tend to react sharply to good surprises and mildly to bad ones (Levis and Liodakis)
- **In Taiwan:**
 - Contrarian strategies did not offer same results as in US, and only provided marginal excess returns (Yang).
- **In Japan:**
 - Abnormal returns for contrarian strategies observed in the Japanese market (Chang, McLeavy, and Rhee).

MARKET ANOMALIES: MOMENTUM EFFECT

- Momentum profitability poses a strong challenge to the theory of asset pricing – momentum effect is the most challenging asset pricing anomaly
- A momentum effect captures the short-term (6 to 12 months) return continuation effect that stocks with high returns over the past three to 12 months tend to outperform in the future (Jegadeesh & Titman, JoF 1993).
- Very simple trading strategy – portfolio is constructed based on cumulative return criterion over certain time-horizon
- Historically momentum strategy earned profits of about 1% per month over the following 12 months.
- The profitability cannot be explained with the existing multi-factor models and macroeconomic-based risk explanations

MOMENTUM EFFECT POSSIBLE EXPLANATION

- What is the real cause of the momentum effect?
- Results are spurious or product of “data mining” – this argument has been neutralized through consistent findings of the momentum effect in various markets and across different time periods
- Results are compensation for risk bearing – current findings are inconclusive and contradictory
- Irrational behavior of investors is causing momentum – behavioral theories of overreaction and underreaction have also been formulated

IMPACT OF THE MOMENTUM EFFECT ON OTHER LINKED AREAS

unresolved issues in current research on the momentum effect

- “Industry Effect” – is this similar phenomenon linked or independent of the momentum effect; if yes, to what degree and why?
- What (multi-factor) models shall be used as a benchmark to estimate risk-adjusted momentum profits?
- Some findings point out that the momentum effect is mostly based on the persistence of the winners – what are the key characteristics of stocks in extreme portfolios and how they impact the profitability?
- How large is the impact of transaction cost?
- How more profitable strategies can be created? –Derivation of optimized-weight strategy based on optimization of certain properties of stocks in winner and loser portfolios.

ACTIVE EQUITY MANAGEMENT: TECHNICAL VS. FUNDAMENTAL APPROACHES

Technical Approaches:

- A contrarian investment strategy is based on the belief that the best time to buy (sell) a stock is when the majority of other investors are the most bearish (bullish) about it. In this way, the contrarian investor will attempt to always purchase the stock when it is near its lowest price and sell it (or even short sell it) when it nears its peak.
- Implicit in this approach is the belief that stock returns are mean-reverting, indicating that over time stocks will be priced so as to produce returns consistent with their risk-adjusted expected (i.e., mean) returns. The overreaction hypothesis shows that investing on this basis can provide consistently superior returns.
- At the other extreme, active portfolios can also be formed on the assumptions that recent trends in past prices will continue. A price momentum strategy, as it is more commonly called, assumes that stocks that have been hot will stay hot, while cold stocks will also remain so. Although there may well be sound economic reasons for these trends to continue (e.g., company revenues and earnings that continue to grow faster than expected), it may also simply be the case that investors periodically underreact to the arrival of new information. Thus, a pure price momentum strategy focuses just on the trend of past prices alone and makes purchase and sale decisions accordingly.

ACTIVE EQUITY MANAGEMENT: TECHNICAL VS. FUNDAMENTAL APPROACHES

Fundamental Approaches:

- An earnings momentum strategy is a somewhat more formal active portfolio approach that purchases and holds stocks that have “accelerating” earnings and sells (or short sells) stocks with disappointing earnings. The notion behind this strategy is that ultimately a company’s share price will follow the direction of its earnings, which is one “bottom line” measure of the firm’s economic success. In judging the degree of momentum in a firm’s earnings, it is often the case in practice that investors will compare the company’s actual EPS to some level of what was expected.
- Two types of expected earnings are used most frequently: (i) those generated by a statistical model and (ii) the consensus forecast of professional stock analysts. The previous chart shows that over the 1994-1998 period earnings momentum strategies were generally successful as well, although surprisingly not to the same degree as price momentum strategies.
- A more promising approach to active anomaly investing involves forming portfolios based on various characteristics of the companies themselves. Two characteristics that consistently matter in the stock market are the total capitalization of the firm’s outstanding equity (i.e., firm size) and the financial position of the firm, as indicated by its various financial ratios (e.g., P/E, P/BV). Both attributes are commonly used to define the nature of style investing. There are two general conclusions we can make about these firm characteristics. First, over time, firms with smaller market capitalizations produce different risk-adjusted returns than those with large market capitalizations. Second, over time, firms with lower P/E and P/BV ratios (i.e., value stocks) produce bigger risk-adjusted returns than those with higher levels of those ratios (i.e., growth stocks).

EXAMPLE 1: JAPAN MARKET 1994-2004

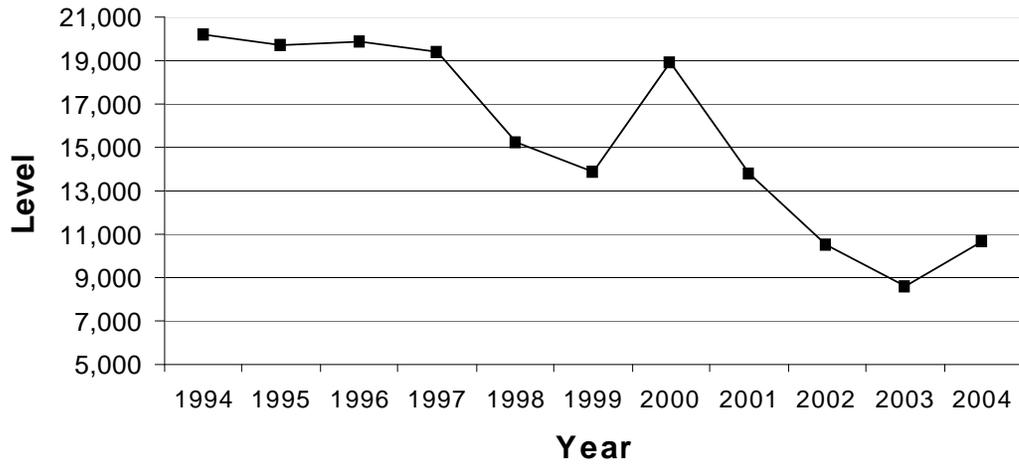
- DATA SET
 - Japanese market
 - Sample period – Jan 1994 to Jan 2004
 - Data for 3784 securities
- METHODOLOGY
 - Yearly returns calculated for each stock
 - All stocks sorted based on returns
 - Top and bottom deciles used to form “winner” and “loser” portfolios
 - Equal security weights in the portfolios
 - Portfolio returns calculated for 1 year, 3 year, and 5 year holding periods

 - Conducted t-tests for the difference in mean loser and winner returns
 - t-test for returns being different from zero
 - Used Sharpe ratio to evaluate returns with level of risk

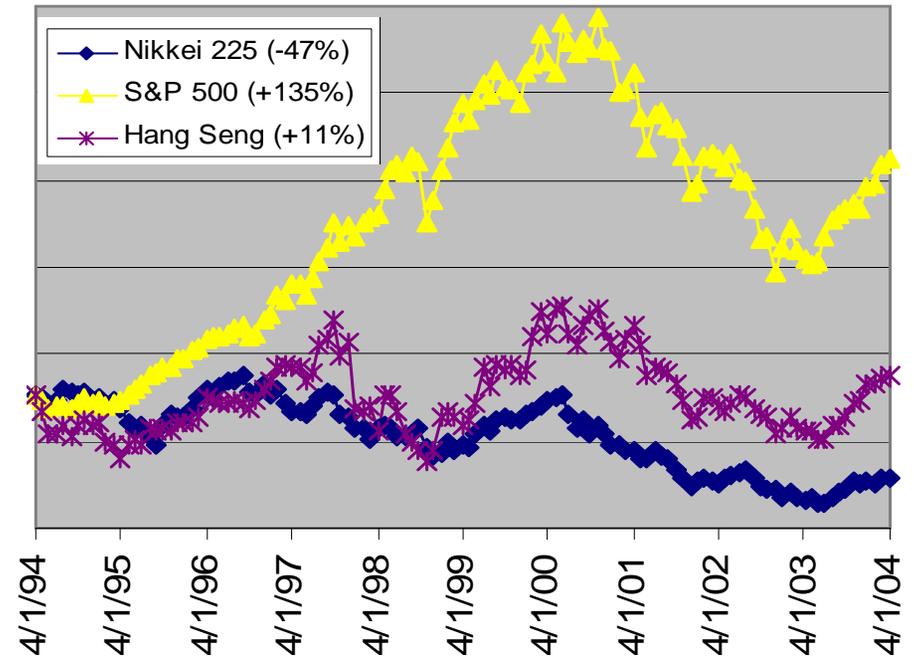
$$S = \frac{r_p - r_f}{\sigma_p}$$

DATA SET

Japan Nikkei Index 1994-2004



Nikkei vs S&P 500 and Hang Seng



RESULTS & CONCLUSIONS

- Results
 - The majority of periods had negative returns – therefore negative Sharpe ratios
 - Sharpe ratios ranged from – 0.73 to +0.73
 - Winner and loser portfolio returns were statistically different from each other and different from zero
 - 1 yr return - t-tests significant in most periods: 3 & 5 yr returns – slightly less significant

- **CONCLUSIONS?**

	1 year	3 year	5 year
Full Sample			
Winner	3.75%	-21.75%	-8.23%
Loser	11.44%	-4.20%	2.11%
Difference (W-L)	-7.69%	-17.56%	-10.35%

Small Sub Sample			
Winner	7.57%	-13.29%	2.19%
Loser	16.90%	10.77%	-0.75%
Difference (W-L)	-9.33%	-24.05%	2.94%

Large Sub Sample			
Winner	5.89%	-20.99%	-5.78%
Loser	9.02%	-6.93%	-4.99%
Difference (W-L)	-3.13%	-14.06%	-0.79%

EXAMPLE 1: US MARKET 1992-2003

- Data and Methodology
- We use **daily data** of 382 stocks included in the S&P Index in the period January 1, 1992 to December 31, 2003. (stocks with equal and complete return history)
- Four “J-month/K-month” strategies based on the ranking and holding periods of 6 and 12 months are examined (i.e., 6/6, 6/12, 12/6 and 12/12 strategy)
- Strategies are applied to non-overlapping K-month investment horizons (i.e., positions are held for K-months after which the portfolio is rebalanced)
- We also examine strategies with one-month holding periods and with one-month gap between ranking and holding period
- Zero-investment portfolio is constructed at the end of each ranking period by simultaneously selling winners and losers
- Stocks with highest value of **risk-adjusted criterion** constitute winner portfolio (e.g., highest decile) and those with lowest the loser portfolio
- Performance of the momentum portfolio (winner – loser) is evaluated at the end of each holding or investment period

MODIFICATION OF THE DECISION CRITERIA FOR PORTFOLIO CONSTRUCTION

- We extend the momentum strategy methodology in several ways
 - To reflect risk-return trade-off in portfolio selection, we use of risk-adjusted criterion instead of return only criterion for portfolio construction
 - Use of **daily data** rather than monthly data, facilitating better capture of distributional properties of the data
 - Risk-return criteria have form of risk-return ratios compliant with coherent risk measures
 - Risk-return criteria are applicable when stock returns are not normally distributed
- **What is the aim of the risk-adjusted decision rule?**
 - Align conceptual risk-return framework of investment strategy with the momentum trading decision rule (e.g. capture risk-return profile of stocks)
 - Allow treatment of the non-normal data which was disregarded in previous and contemporary studies
 - Apply various risk measures within risk-adjusted criterion that pay more attention to the tail of the distribution
 - Obtain balanced risk-return performance
 - Use risk-adjusted criteria in portfolio optimization problem and devise alternative optimized-weighted strategy

RISK-ADJUSTED CRITERION: BENEFIT

- **What we would like to examine?**
- Whether the risk-adjusted criteria can generate more profitable strategies than those based on simple cumulative return criterion
- What is the appropriate risk measure embedded in a risk-return criterion that obtains the best results (e.g., Variance, ETL)
- Evaluate and compare performance of ratios based on different distributional assumption and measures of risk
- Which criterion gives the most robust strategy regarding transaction costs ?
- What is the marginal benefit of the optimized-weighted strategy?

TREATMENT OF NON-NORMAL DATA

Normal distribution is not a realistic assumption for stock returns

- High empirical kurtosis \Rightarrow heavy tailedness
- Asymmetric empirical distribution
- Slowly decaying correlation of squared returns \Rightarrow long-range dependence
- Heteroskedasticity (volatility clustering)

OPTIMIZATION STRUCTURE

Optimizing weights within winner and loser portfolios may lead to improvement in performance over usual equally-weighted strategies

- Risk-return ratio (Sharpe) is used as an objective function in the optimization
- At the rebalancing time points, we solve two optimization problems using the risk-return ratio ρ
- The optimal risky portfolios are given by the portfolio that maximizes the criterion measure $\rho(\cdot)$ for winners and minimizes the same measure for losers.
- By solving optimization problems, we adjust the proportion of stocks in the winner and loser portfolio according to the weights obtained
- We compare the profits of an optimized-weighted strategies with those of an equal-weighted strategy

OPTIMIZATION STRUCTURE

Portfolio selection and optimization approach follows usual Markowitz (1962) approach with portfolio choice based on reward-risk criteria

- For any risk-return criterion $\rho(\cdot)$, we compute the optimal winner portfolio of the max optimization problem and optimal loser portfolio of the min optimization problem:

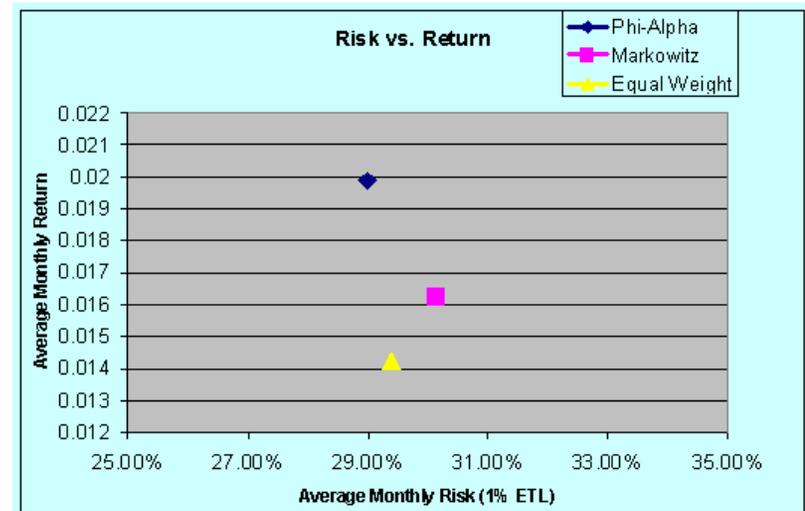
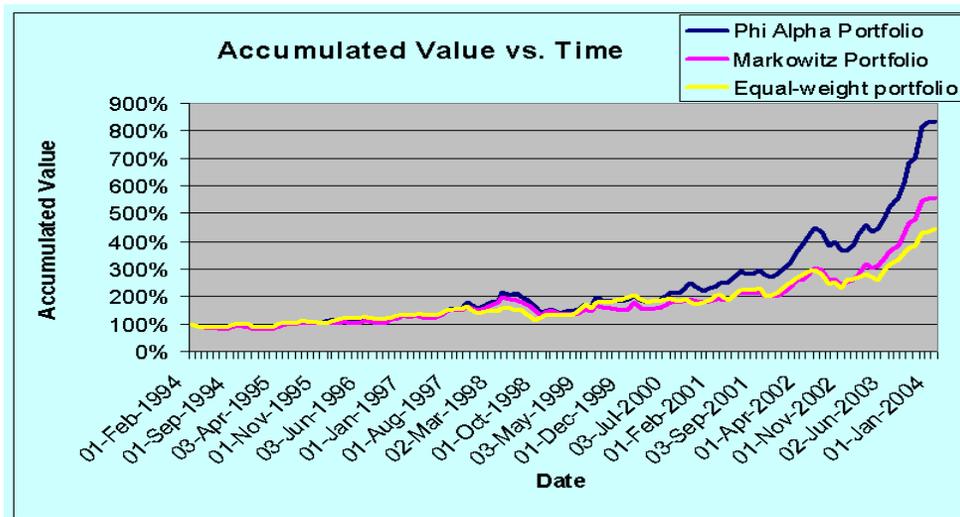
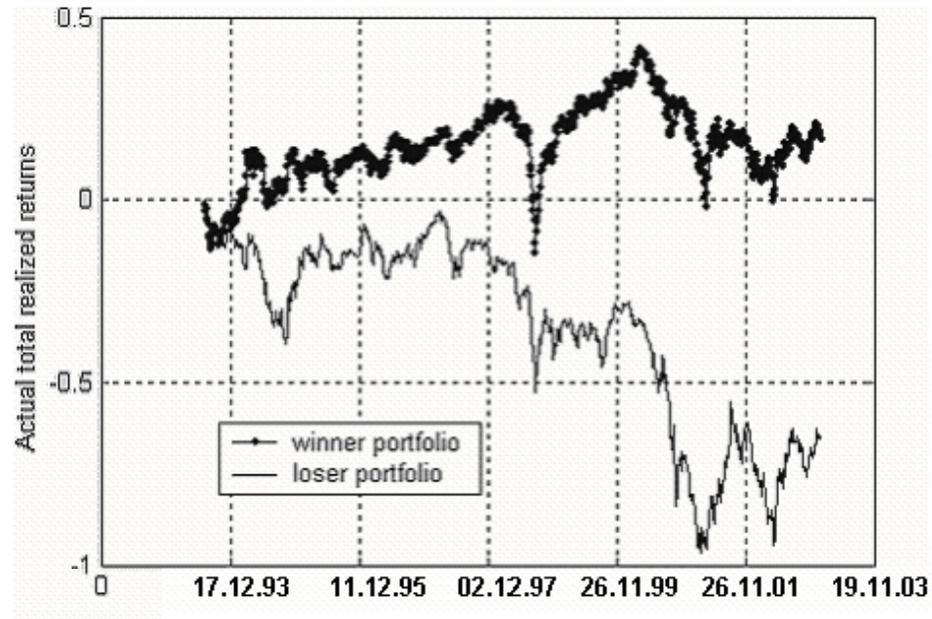
$$\begin{array}{ll} \max_x \rho(x'r) & \min_y \rho(y'r) \\ \text{s.t.} & \text{s.t.} \\ \sum_{i=1}^n x_i = 1; x_i \geq 0; i = 1, \dots, N & \sum_{i=1}^n y_i = 1; y_i \geq 0; i = 1, \dots, N \end{array}$$

- where ρ is the ratio criterion, x_i and y_i **are optimized weights** in the winner and loser portfolios respectively, and N equals the number of stocks in winner or loser portfolio
- In general, this approach may not be consistent with the formal approach based on an axiomatic model of risk preferences with expected utility selection.

IMPACT OF TRANSACTION COSTS ON MOMENTUM PORTFOLIOS

- **Results from Studies on Transaction Costs Impact are inconclusive**
 - Jegadeesh and Titman (1993) consider a one-way 0.5% transaction costs and obtain risk-adjusted momentum return of 9.29% per year
 - Carhart (1997) estimates reduction in performance by 0.95% of the trade's market value and concludes that momentum strategy in stocks is unprofitable
 - Grundy and Martin (2001) examine a 6/6 strategy with monthly rebalancing and estimate the round-trip costs that remove the significance of the risk-adjusted return for the Fama-French model and absorb profits completely
 - Lesmond, Schill and Zhou (2003) re-examine a Jegadeesh and Titman 6/6 strategy using four measures of transaction costs and find adjusted profits of non-significant.
 - Transaction Costs as a cost of Implementing a Trading Strategy
 - i. Korajczyk and Sadka (2004) find for long positions in winner-based strategy that proportional spread costs do not eliminate statistical significance of momentum profits
 - Issues in Consideration with Measuring Transaction Costs Impact
 - What realistic model of transaction cost impact to apply?
 - Risk and liquidity characteristics of extreme portfolios may have impact on the assumptions of the trading cost model
 - Realistic assessment shall focus on the actual turnover of the portfolios – Tradeoff between profitability and turnover
 - Adjustment applied at portfolio rebalancing periods

MAIN RESULTS



TOOLS OF “TECHNICAL ANALYSIS”

- Contrarian Opinion
 - The theory that if people are very optimistic, that is a predictor of falling prices for the market, and...
 - If people are very pessimistic, that is a predictor of rising prices
- We covered Contrarian Strategy already in Investment Strategies
 - Buy when others are selling
 - Sell when others are buying
 - The problem is the market historically has gone up three times more than it goes down
- Silly Theories & Oddities
 - Super Bowl Theory
 - i. National League Wins – bullish
 - ii. American League Wins – bearish
 - Hemlines of skirts
 - i. Mini skirts – bullish
 - ii. Long skirts – bearish
 - The Monday Effect
 - The January Effect
 - September and October
 - Worst months of the year
- “Bear markets are born of pessimism, grow on skepticism, mature on optimism and die on euphoria. The time of maximum pessimism is the best time to buy.” f. Templeton