Investment Philosophies: Introduction

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What is an investment philosophy?

- An investment philosophy is a coherent way of thinking about markets, how they work (and sometimes do not) and the types of mistakes that you believe consistently underlie investor behavior.
- An investment strategy is much narrower. It is a way of putting into practice an investment philosophy.
- For lack of a better term, an investment philosophy is a set of core beliefs that you can go back to in order to generate new strategies when old ones do not work.

Ingredients of an Investment Philosophy

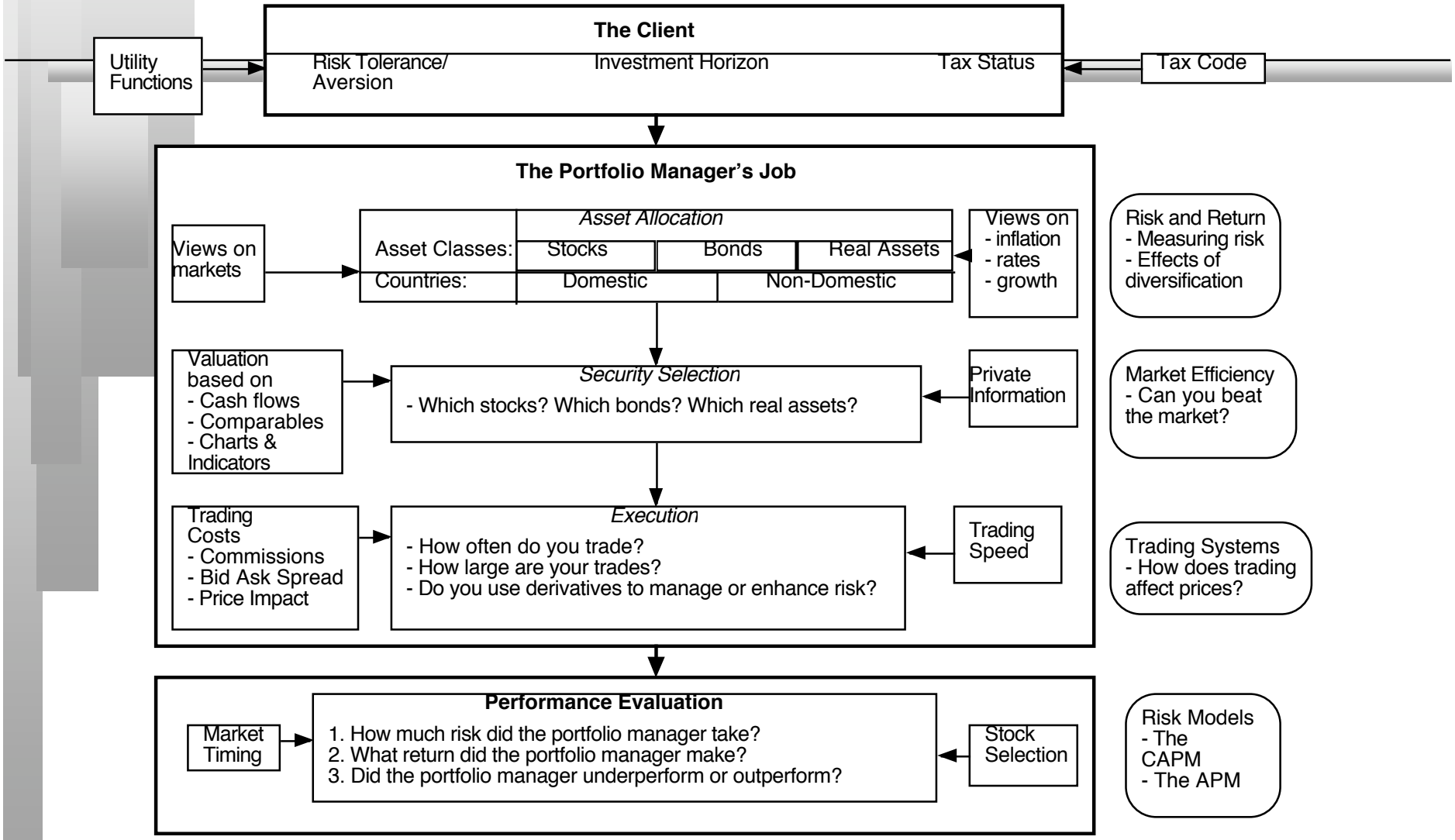
- Step 1: All investment philosophies begin with a view about how human beings learn (or fail to learn). Underlying every philosophy, therefore is a view of human frailty - that they learn too slowly, learn too fast, tend to crowd behavior etc….
- Step 2: From step 1, you generate a view about markets behave and perhaps where they fail…. Your views on market efficiency or inefficiency are the foundations for your investment philosophy.
- Step 3: This step is tactical. You take your views about how investors behave and markets work (or fail to work) and try to devise strategies that reflect your beliefs.

Why do you need an investment philosophy?

If you do not have an investment philosophy, you will find yourself:

1. Lacking a rudder or a core set of beliefs, you will be easy prey for charlatans and pretenders, with each one claiming to have found the magic strategy that beats the market.
2. Switching from strategy to strategy, you will have to change your portfolio, resulting in high transactions costs and you will pay more in taxes.
3. With a strategy that may not be appropriate for you, given your objectives, risk aversion and personal characteristics. In addition to having a portfolio that under performs the market, you are likely to find yourself with an ulcer or worse.

Figure 1.1: The Investment Process

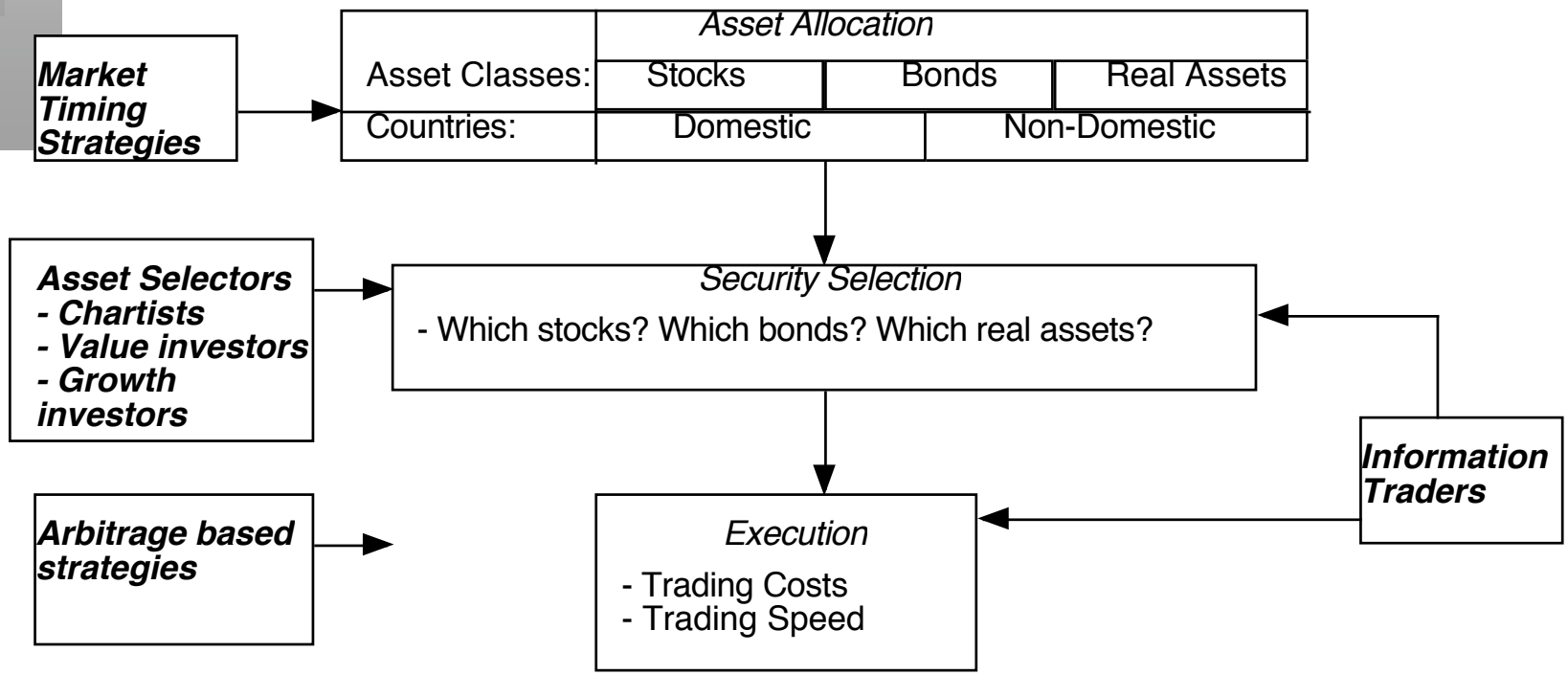


Categorizing Investment Philosophies

- *Market Timing versus Asset Selection*: With market timing, you bet on the movement of entire markets - financial as well as real assets. With asset selection, you focus on picking good investments within each market.
- *Activist Investing versus Passive Investing*: With passive investing, you take positions in companies and hope that the market corrects its mistakes. With activist investing, you play a role (or provide the catalyst) in correcting market mistakes.
- *Time Horizon*: Some philosophies require that you invest for long time periods. Others are based upon short holding periods.

Investment Philosophies in Context

Figure 1.2: Investment Philosophies



Developing an Investment Philosophy

- Step 1: Understand the fundamentals of risk and valuation
- Step 2: Develop a point of view about how markets work and where they might break down
- Step 3: Find the philosophy that provides the best fit for you, given your
  - Risk aversion
  - Time Horizon
  - Portfolio Size
  - Tax Status

The Tools of Portfolio Management
Risk, Valuation and Efficient Markets

What is Risk?

- Risk, in traditional terms, is viewed as a ‘negative’. Webster’s dictionary, for instance, defines risk as “exposing to danger or hazard”. The Chinese symbols for risk, reproduced below, give a much better description of risk

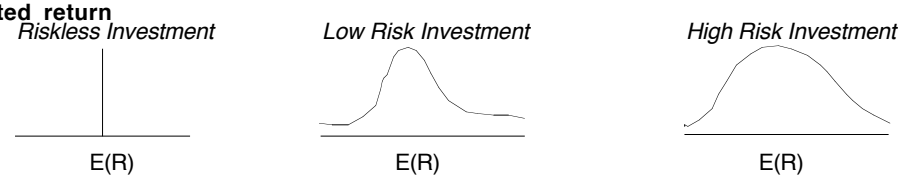
危機

- The first symbol is the symbol for “danger”, while the second is the symbol for “opportunity”, making risk a mix of danger and opportunity.

Alternatives to the CAPM

Step 1: Defining Risk

The risk in an investment can be measured by the variance in actual returns around an expected return



Step 2: Differentiating between Rewarded and Unrewarded Risk

Risk that is specific to investment (Firm Specific)
Can be diversified away in a diversified portfolio
1. each investment is a small proportion of portfolio
2. risk averages out across investments in portfolio

Risk that affects all investments (Market Risk)
Cannot be diversified away since most assets are affected by it.

The marginal investor is assumed to hold a "diversified" portfolio. Thus, only market risk will be rewarded and priced.

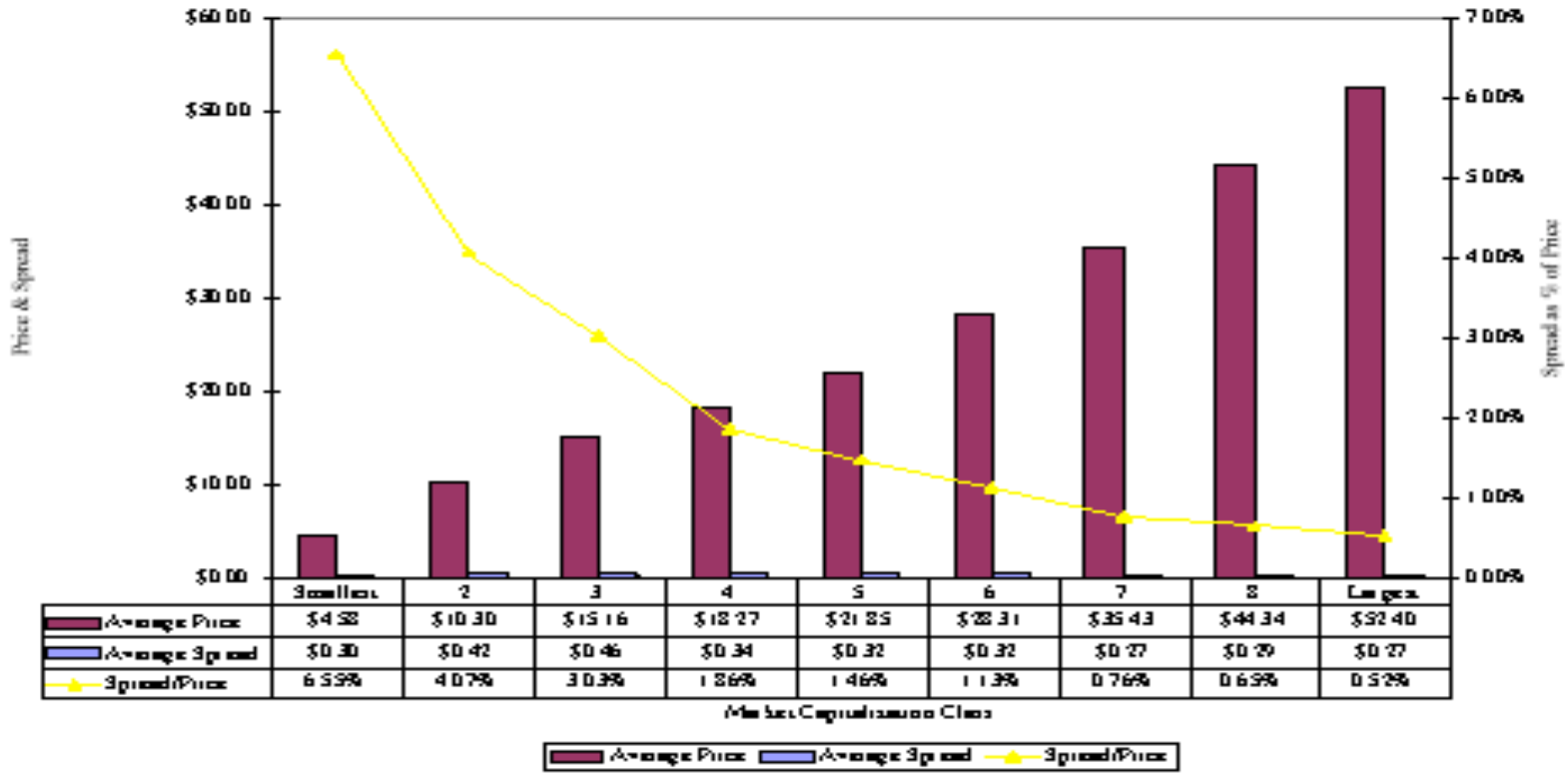
Step 3: Measuring Market Risk

The CAPM	**The APM**	**Multi-Factor Models**	**Proxy Models**
If there is 1. no private information 2. no transactions cost the optimal diversified portfolio includes every traded asset. Everyone will hold this<u>market portfolio</u> **Market Risk = Risk added by any investment to the market portfolio:**	If there are no arbitrage opportunities then the market risk of any asset must be captured by betas relative to factors that affect all investments. **Market Risk = Risk exposures of any asset to market factors**	Since market risk affects most or all investments, it must come from macro economic factors. **Market Risk = Risk exposures of any asset to macro economic factors.**	In an efficient market, differences in returns across long periods must be due to market risk differences. Looking for variables correlated with returns should then give us proxies for this risk. **Market Risk = Captured by the Proxy Variable(s)**
Beta of asset relative to Market portfolio (from a regression)	Betas of asset relative to unspecified market factors (from a factor analysis)	Betas of assets relative to specified macro economic factors (from a regression)	Equation relating returns to proxy variables (from a regression)

The Components of Trading Costs

- *Brokerage Cost*: This is the most explicit of the costs that any investor pays but it is by far the smallest component.
- *Bid-Ask Spread*: The spread between the price at which you can buy an asset (the dealer's ask price) and the price at which you can sell the same asset at the same point in time (the dealer's bid price).
- *Price Impact*: The price impact that an investor can create by trading on an asset, pushing the price up when buying the asset and pushing it down while selling.
- *Opportunity Cost*: There is the opportunity cost associated with waiting to trade. While being a patient trader may reduce the previous two components of trading cost, the waiting can cost profits both on trades that are made and in terms of trades that would have been profitable if made instantaneously but which became unprofitable as a result of the waiting.

The Magnitude of the Spread



Round-Trip Costs (including Price Impact) as a Function of Market Cap and Trade Size

	Dollar Value of Block ($ thousands)								
Sector	*5*	*25*	*250*	*500*	*1000*	*2500*	*5000*	*10000*	*20000*
Smallest	17.30%	27.30%	43.80%						
2	8.90%	12.00%	23.80%	33.40%					
3	5.00%	7.60%	18.80%	25.90%	30.00%				
4	4.30%	5.80%	9.60%	16.90%	25.40%	31.50%			
5	2.80%	3.90%	5.90%	8.10%	11.50%	15.70%	25.70%		
6	1.80%	2.10%	3.20%	4.40%	5.60%	7.90%	11.00%	16.20%	
7	1.90%	2.00%	3.10%	4.00%	5.60%	7.70%	10.40%	14.30%	20.00%
8	1.90%	1.90%	2.70%	3.30%	4.60%	6.20%	8.90%	13.60%	18.10%
Largest	1.10%	1.20%	1.30%	1.71%	2.10%	2.80%	4.10%	5.90%	8.00%

The Cost of Waiting

- If there was no cost to waiting, even a large investor could break up trades into small lots and buy or sell large quantities without affecting the price or the spread significantly.
- There is, however, a cost to waiting. In particular, the price of an asset that an investor wants to buy because he or she believes that it is undervalued may rise while the investor waits to trade, and this, in turn, can lead to one of two consequences.
  - One is that the investor does eventually buy, but at a much higher price, reducing expected profits from the investment.
  - The other is that the price rises so much that the asset is no longer under valued and the investor does not trade at all. A similar calculus applies when an investor wants to sell an asset that he or she thinks is overvalued.

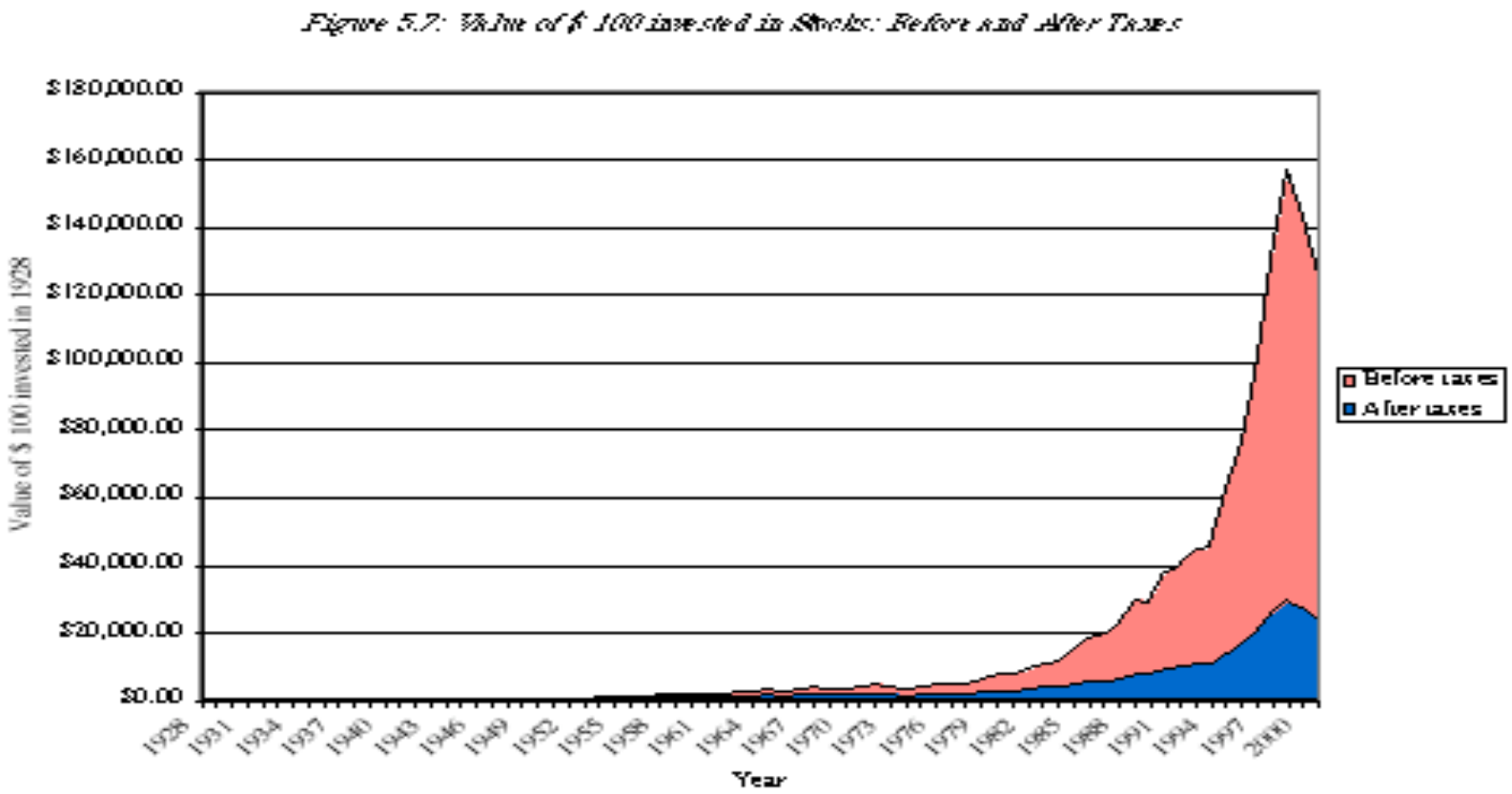
The Overall Cost of Trading: Small Cap versus Large Cap Stocks

Market Capitalization	*Implicit Cost*	*Explicit Cost*	*Total Trading Costs (NYSE)*	*Total Trading Costs (NASDAQ)*
Smallest	2.71%	1.09%	3.80%	5.76%
2	1.62%	0.71%	2.33%	3.25%
3	1.13%	0.54%	1.67%	2.10%
4	0.69%	0.40%	1.09%	1.36%
Largest	0.28%	0.28%	0.31%	0.40%

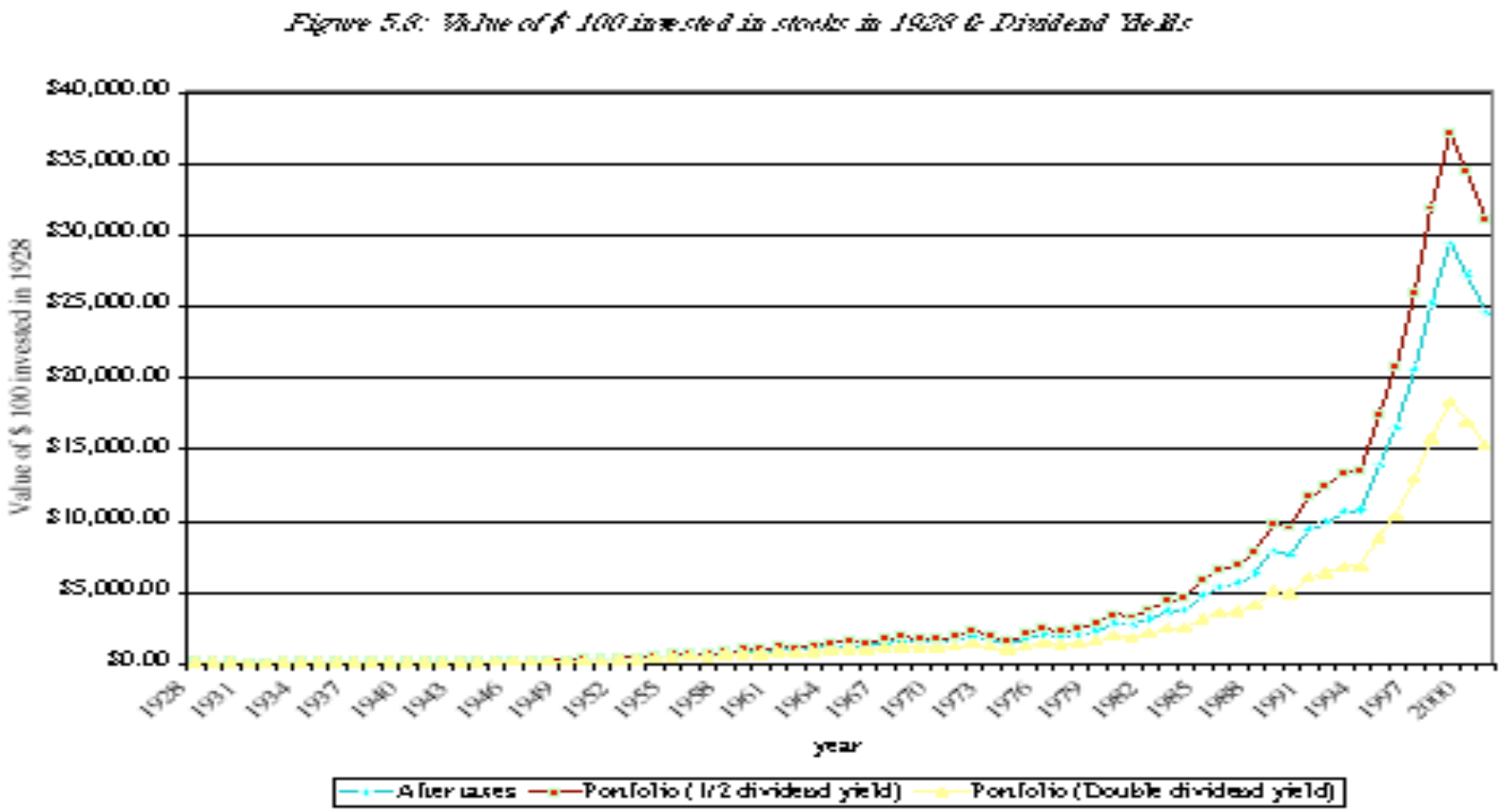
Why taxes matter?

- Investors get to spend after-tax income and not pre-tax income.
- Some investment strategies expose investors to a much greater tax liability than other strategies.
- To measure the efficacy of an investment strategy, we have to look at after-tax returns and not pre-tax returns.

The Tax Effect: Stock Returns before and after taxes

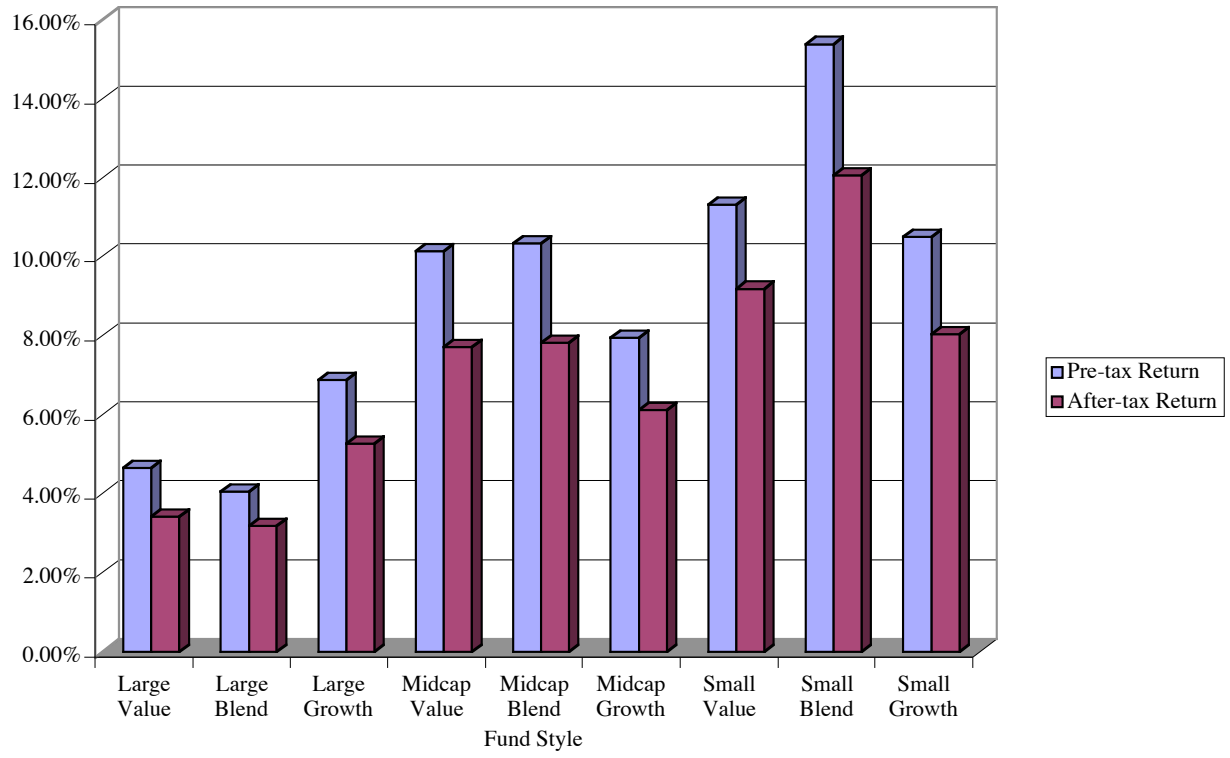


The Tax Effect and Dividend Yields

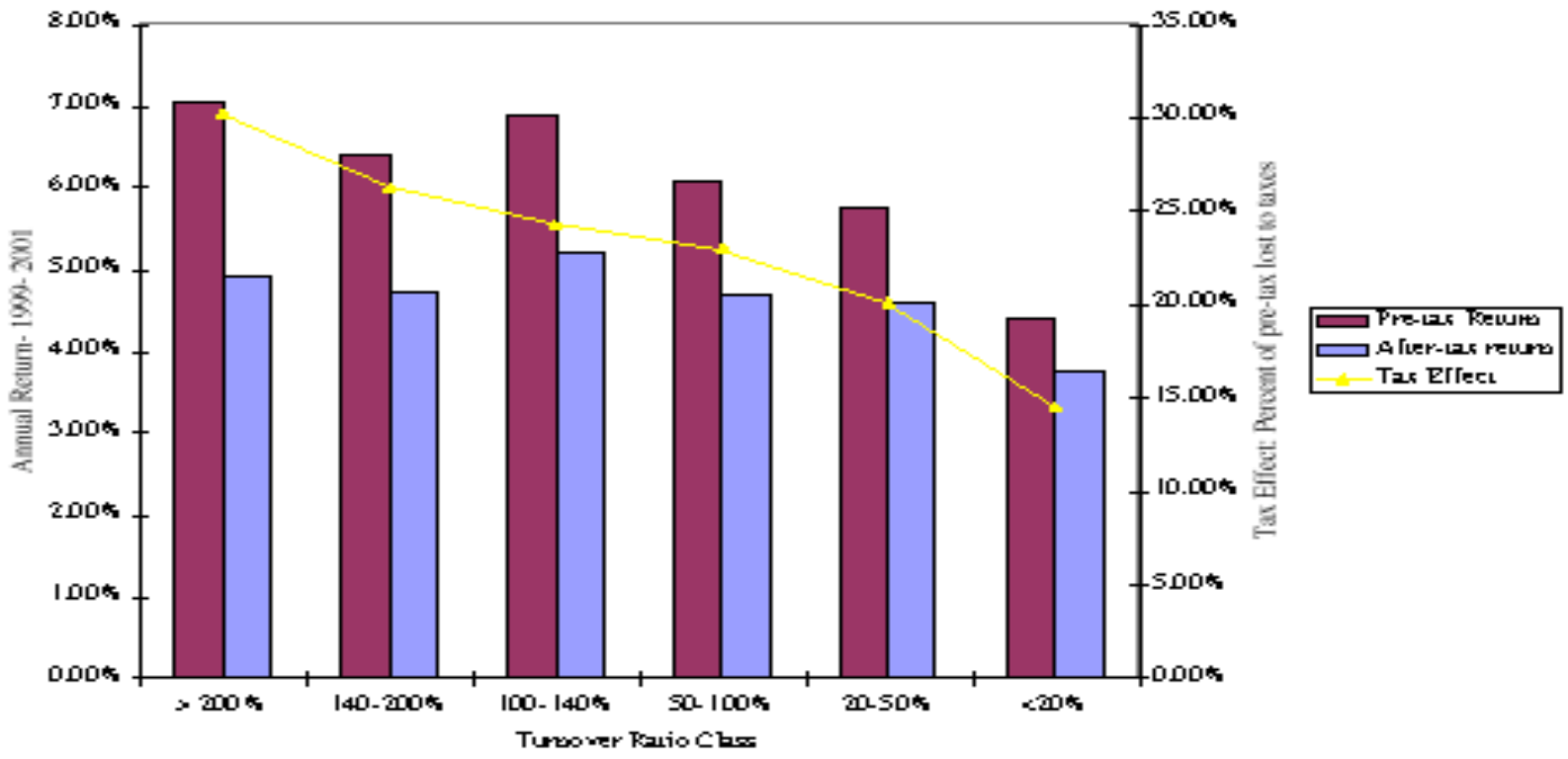


Mutual Fund Returns: The Tax Effect

Figure 5.10: Pre-tax and After-tax Returns at U.S. equity mutual funds- 1999-2001



Tax Effect and Turnover Ratios



Why market efficiency matters ..

- Question of whether markets are efficient, and if not, where the inefficiencies lie, is central to investment valuation.
  - **If markets are, in fact, efficient, the market price is the best estimate of value**, and the process of valuation becomes one of justifying the market price.
  - **If markets are not efficient, the market price may deviate from the true value**, and the process of valuation is directed towards obtaining a reasonable estimate of this value.
- Market 'inefficiencies' can provide the basis for **screening the universe** of stocks to come up with a sub-sample that is more likely to have under valued stocks
  - **Saves time** for the analyst
  - **Increases the odds significantly** of finding under and over valued stocks.

What is an efficient market?

- Efficient market is one where the market price is an **unbiased estimate** of the true value of the investment.
- Implicit in this derivation are several key concepts -
- Market efficiency **does not require that the market price be equal to true value** at every point in time. All it requires is that errors in the market price be unbiased, i.e., that prices can be greater than or less than true value, as long as these deviations are random.

  Randomness implies that there is an equal chance that stocks are under or over valued at any point in time.

Necessary Conditions for Market Efficiency

- **Markets do not become efficient automatically**. It is the actions of investors, sensing bargains and putting into effect schemes to beat the market, that make markets efficient.
- The **necessary conditions** for a market inefficiency to be eliminated are as follows -

(1) The market inefficiency should provide the **basis for a scheme** to beat the market and earn excess returns. For this to hold true -

(a) The asset (or assets) which is the source of the inefficiency **has to be traded**.

(b) The **transactions costs** of executing the scheme have to be smaller than the expected profits from the scheme.

(2) There should be **profit maximizing investors** who

(a) **recognize** the 'potential for excess return'

(b) **can replicate** the beat the market scheme that earns the excess return

(c) **have the resources** to trade on the stock until the inefficiency disappears

Testing Market Efficiency

- Tests of market efficiency look at the whether specific investment strategies earn excess returns. Some tests also account for transactions costs and execution feasibility. In every case, **a test of market efficiency is a joint test of market efficiency and the efficacy of the model used for expected returns**.
- When there is evidence of excess returns in a test of market efficiency, it can indicate **that markets are inefficient or that the model used to compute expected returns is wrong or both**.
- There are a number of different ways of testing for market efficiency, and the approach used will depend in great part on the investment scheme being tested.

1. Event Study

- **An event study is designed to examine market reactions to, and excess returns around specific information events**. The information events can be market-wide, such as macro-economic announcements, or firm-specific, such as earnings or dividend announcements.

II. Portfolio Study

- In some investment strategies, **firms with specific characteristics are viewed as more likely to be undervalued**, and therefore have excess returns, than firms without these characteristics.
- In these cases, the **strategies can be tested by creating portfolios of firms possessing these characteristics at the beginning of a time period**, and examining returns over the time period. To ensure that these results are not colored by the idiosyncracies of any one time period, this is repeated for a number of periods.

III. Regressions

- One of the limitations of portfolio studies is that they become increasing unwieldy, as the number of variables that you use in your strategy increases.
- The other problem with portfolio studies is that you group firms into classes and ignore differences across firms within each class. Thus, the stocks in the lowest PE ratio class may have PE ratios that range from the 4 to 12.
- If you believe that these differences may affect the expected returns on your strategy, you could get a better measure of the relationship by running a multiple regression. Your dependent variable would be the returns on stocks and the independent variables would include the variables that form your strategy.

Cardinal Sins in Market Testing

- *Using 'anecdotal evidence' to support/reject an investment strategy:* Anecdotal evidence is a double edged sword. It can be used to support or reject the same hypothesis.
- *Testing an investment strategy on the same data and time period from which it was extracted:* This is the tool of choice for the unscrupulous investment advisor. An investment scheme is extracted from hundreds through an examination of the data for a particular time period.
- *Choosing a biased sample*, The sample on which the test is run may be selected in a “biased” way.
- *Failure to control for market performance and risk:* A failure to control for overall market performance can lead one to conclude that your investment scheme works just because it makes good returns.

Some Lesser Sins..

- *Survival Bias:* Most researchers start with a existing universe of publicly traded companies and working back through time to test investment strategies. This can create a subtle bias since it automatically eliminates firms that failed during the period, with obvious negative consequences for returns.
- *Not allowing for transactions Costs:* Some investment schemes are more expensive than others because of transactions costs - execution fees, bid-ask spreads and price impact. A complete test will take these into account before it passes judgment on the strategy.
- *Not allowing for difficulties in execution:* Some strategies look good on paper but are difficult to execute in practice, either because of impediments to trading or because trading creates a price impact.

Market Timing

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The Payoff to Market Timing

- In a 1986 article, a group of researchers raised the shackles of many an active portfolio manager by estimating that as much as 93.6% of the variation in quarterly performance at professionally managed portfolios could be explained by the mix of stocks, bonds and cash at these portfolios.
- In a different study in 1992, Shilling examined the effect on your annual returns of being able to stay out of the market during bad months. He concluded that an investor who would have missed the 50 weakest months of the market between 1946 and 1991 would have seen his annual returns almost double from 11.2% to 19%.
- Ibbotson examined the relative importance of asset allocation and security selection of 94 balanced mutual funds and 58 pension funds, all of which had to make both asset allocation and security selection decisions. Using ten years of data through 1998, Ibbotson finds that about 40% of the differences in returns across funds can be explained by their asset allocation decisions and 60% by security selection.

The Cost of Market Timing

- In the process of switching from stocks to cash and back, you may miss the best years of the market. In his article on market timing in 1975, Bill Sharpe suggested that unless you can tell a good year from a bad year 7 times out of 10, you should not try market timing. This result is confirmed by Chua, Woodward and To, who use Monte Carlo simulations on the Canadian market and confirm you have to be right 70-80% of the time to break even from market timing.
- These studies do not consider the additional transactions costs that inevitably flow from market timing strategies, since you will trade far more extensively with these strategies. At the limit, a stock/cash switching strategy will mean that you will have to liquidate your entire equity portfolio if you decide to switch into cash and start from scratch again the next time you want to be in stocks.
- A market timing strategy will also increase your potential tax liabilities. You will have to pay capital gains taxes when you sell your stocks, and over your lifetime as an investor, you will pay far more in taxes.

Market Timing Approaches

- Non-financial indicators
- Technical indicators such as price charts and trading volume.
- Mean reversion indicators, where stocks and bonds are viewed as mispriced if they trade outside what is viewed as a normal range.
- Macro economic variables, such as the level of interest rates or the state of the economy.
- Fundamentals such as earnings, cashflows and growth.

Non-financial Indicators

- Spurious indicators that may seem to be correlated with the market but have no rational basis. Almost all spurious indicators can be explained by chance.
- Feel good indicators that measure how happy are feeling - presumably, happier individuals will bid up higher stock prices. These indicators tend to be contemporaneous rather than leading indicators.
- Hype indicators that measure whether there is a stock price bubble. Detecting what is abnormal can be tricky and hype can sometimes feed on itself before markets correct.

Technical Indicators

- Past prices
  - Price reversals or momentum
  - The January Indicator
- Trading Volume
- Market Volatility
- Other price and sentiment indicators

1a. Past Prices: Does the past hold signs for the future?

Priors	*Number of occurrences*	*% of positive returns*	*Average return*
After two down years	19	57.90%	2.95%
After one down year	30	60.00%	7.76%
After one up year	30	83.33%	10.92%
After two up years	51	50.98%	2.79%

1b. The January Indicator

- As January goes, so goes the year – if stocks are up, the market will be up for the year, but a bad beginning usually precedes a poor year.
- According to the venerable Stock Trader's Almanac that is compiled every year by Yale Hirsch, this indicator has worked 88% of the time.
- Note, though that if you exclude January from the year's returns and compute the returns over the remaining 11 months of the year, the signal becomes much weaker and returns are negative only 50% of the time after a bad start in January. Thus, selling your stocks after stocks have gone down in January may not protect you from poor returns.

2a. Trading Volume

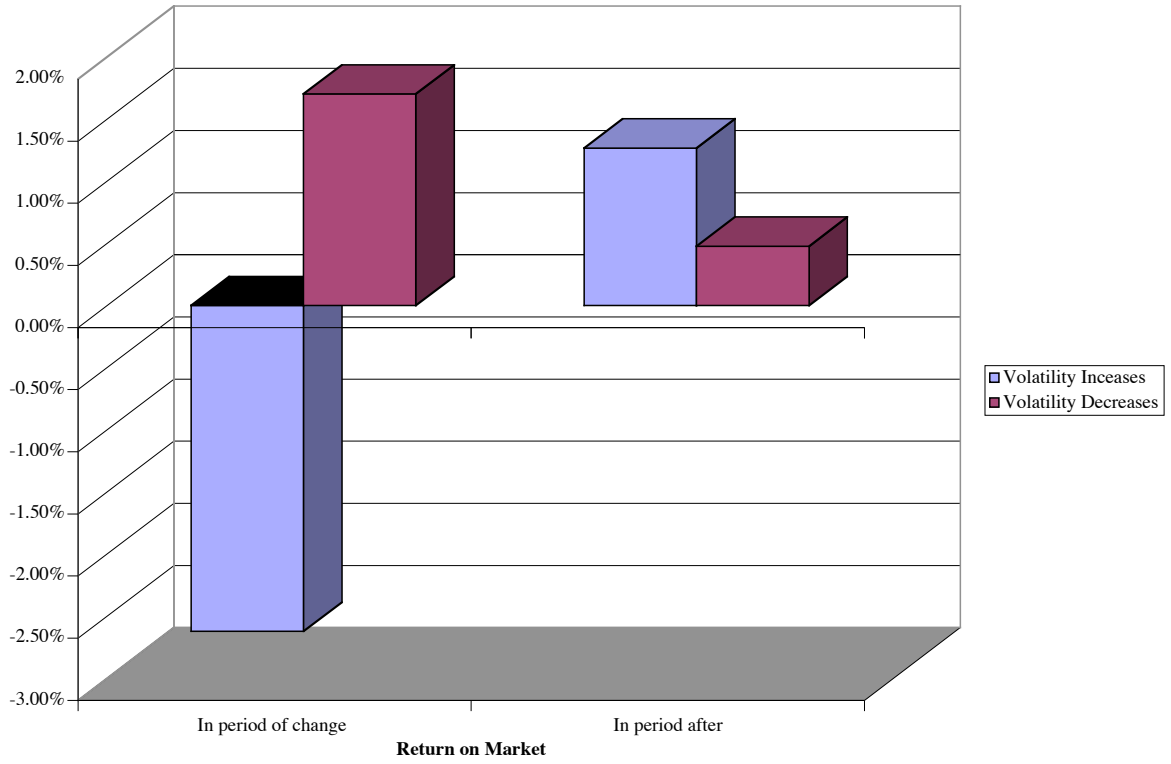
- Price increases that occur without much trading volume are viewed as less likely to carry over into the next trading period than those that are accompanied by heavy volume.
- At the same time, very heavy volume can also indicate turning points in markets. For instance, a drop in the index with very heavy trading volume is called a selling climax and may be viewed as a sign that the market has hit bottom. This supposedly removes most of the bearish investors from the mix, opening the market up presumably to more optimistic investors. On the other hand, an increase in the index accompanied by heavy trading volume may be viewed as a sign that market has topped out.
- Another widely used indicator looks at the trading volume on puts as a ratio of the trading volume on calls. This ratio, which is called the put-call ratio is often used as a contrarian indicator. When investors become more bearish, they sell more puts and this (as the contrarian argument goes) is a good sign for the future of the market.

2b. Money Flow

- Money flow is the difference between uptick volume and downtick volume, as predictor of market movements. An increase in the money flow is viewed as a positive signal for future market movements whereas a decrease is viewed as a bearish signal.
- Using daily money flows from July 1997 to June 1998, Bennett and Sias find that money flow is highly correlated with returns in the same period, which is not surprising. While they find no predictive ability with short period returns – five day returns are not correlated with money flow in the previous five days – they do find some predictive ability for longer periods. With 40-day returns and money flow over the prior 40 days, for instance, there is a link between high money flow and positive stock returns.
- Chan, Hameed and Tong extend this analysis to global equity markets. They find that equity markets show momentum – markets that have done well in the recent past are more likely to continue doing well,, whereas markets that have done badly remain poor performers. However, they find that the momentum effect is stronger for equity markets that have high trading volume and weaker in markets with low trading volume.

3. Volatility

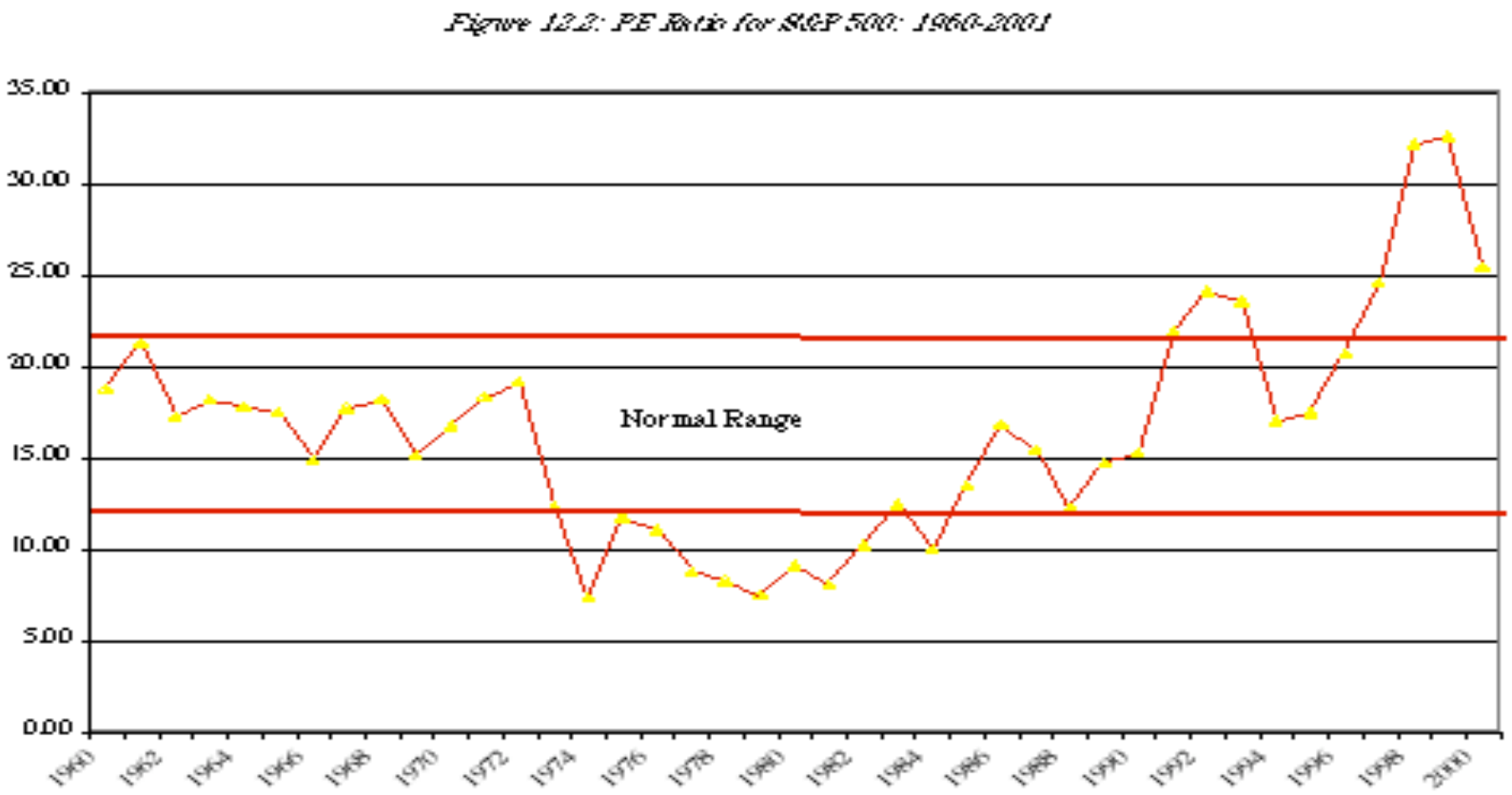
Figure 12.1: Returns around volatility changes



Mean Reversion Measures

- These approaches are based upon the assumption that assets have a normal range that they trade at, and that any deviation from the normal range is an indication that assets are mispriced.
- With stocks, the normal range is defined in terms of PE ratios.
- With bonds, the normal range is defined in terms of interest rates.

A Normal Range of PE Ratios



2. A Normal Range of Interest Rates

- When changes in interest rates are regressed against the current level of interest rates, there is a negative and significant relationship between the level of the rates and the change in rates in subsequent periods, i.e., there is a much greater likelihood of a drop in interest rates next period if interest rates are high in this one, and a much greater chance of rates increasing in future periods if interest rates are low in this one.
- Using treasury bond rates from 1970 to 1995 and regressing the change in interest rates (Δ Interest Rate_t) in each year against the level of rates at the end of the prior year (Interest Rate_{t-1}), we arrive at the following results:

$$\Delta \text{ Interest Rate}_t = 0.0139 - 0.1456 \text{ Interest Rate}_{t-1} \qquad R^2=.0728$$
$$(1.29) \qquad (1.81)$$

  - This regression suggests two things. One is that the change in interest rates in this period is negatively correlated with the level of rates at the end of the prior year; if rates were high (low), they were more likely to decrease (increase). Second, for every 1% increase in the level of current rates, the expected drop in interest rates in the next period increases by 0.1456%.

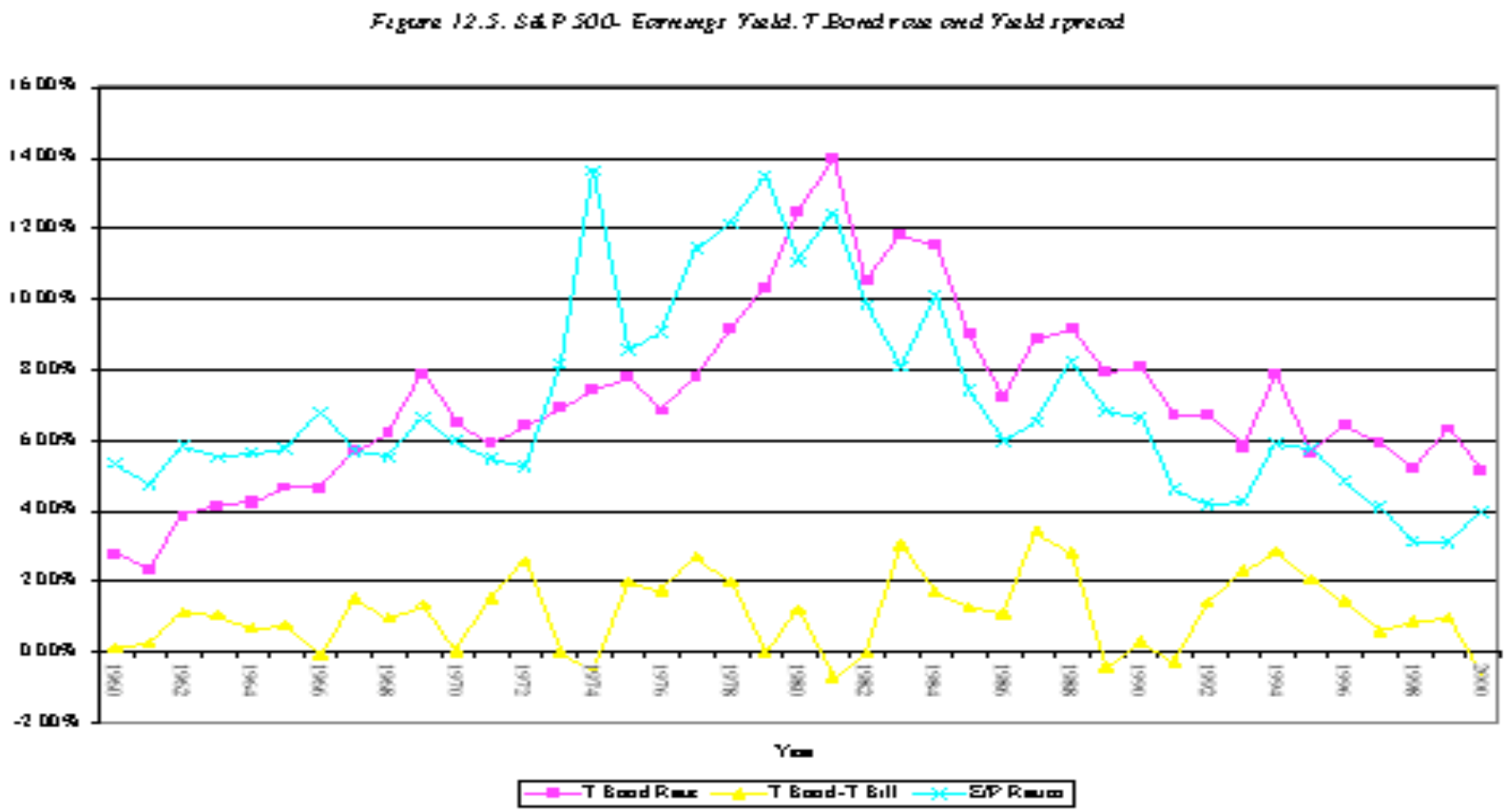
Fundamentals

- The simplest way to use fundamentals is to focus on macroeconomic variables such as interest rates, inflation and GNP growth and devise investing rules based upon the levels or changes in macro economic variables.
- *Intrinsic valuation models*: Just as you value individual companies, you can value the entire market.
- *Relative valuation models*: You can value markets relative to how they were priced in prior periods or relative to other markets.
- While there are some studies that show promise in all of these, they are all very noisy indicators…

An Example: Buy when the earnings yield is high, relative to the T.Bond rate..

Earnings yield - T.Bond Rate	*Number of years*	*Average*	*Standard Deviation*	*Maximum*	*Minimum*
> 2%	8	11.33%	16.89%	31.55%	-11.81%
1 -2%	5	-0.38%	20.38%	18.89%	-29.72%
0-1%	2	19.71%	0.79%	20.26%	19.15%
-1-0%	6	11.21%	12.93%	27.25%	-11.36%
-2-1%	15	9.81%	17.33%	34.11%	-17.37%
< -2%	5	3.04%	8.40%	12.40%	-10.14%

Another Example: Comparisons across Time



More on the time comparison…

- This strong positive relationship between E/P ratios and T.Bond rates is evidenced by the correlation of 0.6854 between the two variables. In addition, there is evidence that the term structure also affects the E/P ratio.
- In the following regression, we regress E/P ratios against the level of T.Bond rates and the yield spread (T.Bond - T.Bill rate), using data from 1960 to 2000.

$$E/P = 0.0188 + 0.7762\ \text{T.Bond Rate} - 0.4066\ (\text{T.Bond Rate} - \text{T.Bill Rate}) \qquad R^2 = 0.495$$

(1.93) (6.08) (-1.37)

- Other things remaining equal, this regression suggests that
  - Every 1% increase in the T.Bond rate increases the E/P ratio by 0.7762%. This is not surprising but it quantifies the impact that higher interest rates have on the PE ratio.
  - Every 1% increase in the difference between T.Bond and T.Bill rates reduces the E/P ratio by 0.4066%. Flatter or negative sloping term yield curves seem to correspond to lower PE ratios and upwards sloping yield curves to higher PE ratios.

Using the Regression to gauge the market…

- We can use the regression to predict E/P ratio at the beginning of 2001, with the T.Bill rate at 4.9% and the T.Bond rate at 5.1%.

$$E/P_{2000} = 0.0188 + 0.7762\,(0.051) - 0.4066\,(0.051-0.049)$$

$$= 0.0599 \text{ or } 5.99\%$$

$$PE_{2000} = \frac{1}{E/P_{2000}} = \frac{1}{0.0599} = 16.69$$

- Since the S&P 500 was trading at a multiple of 25 times earnings in early 2001, this would have indicated an over valued market.

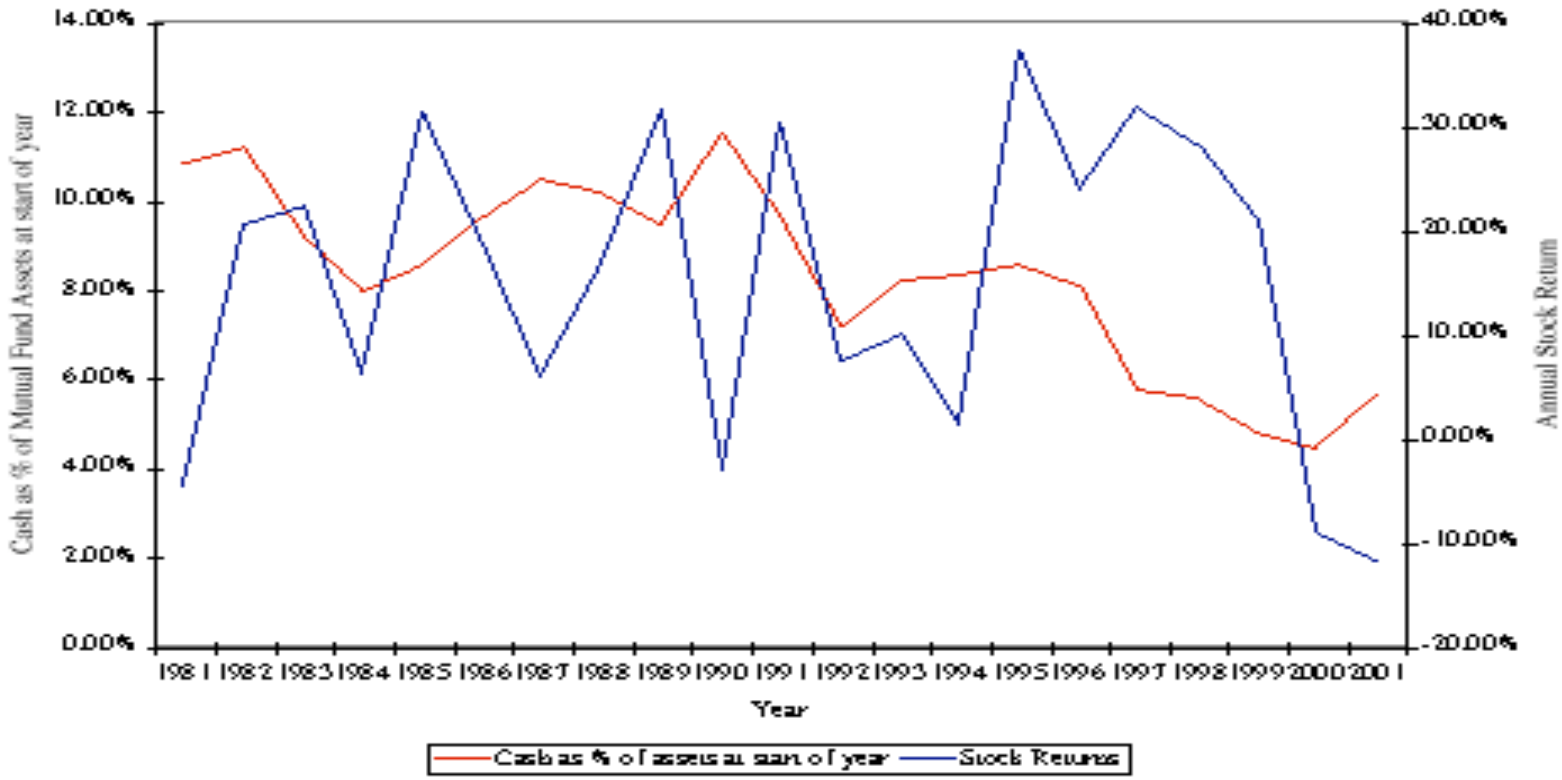
Determinants of Success at using Fundamentals in Market Timing

- This approach has two limitations:
  - Since you are basing your analysis by looking at the past, you are assuming that there has not been a significant shift in the underlying relationship. As Wall Street would put it, paradigm shifts wreak havoc on these models.
  - Even if you assume that the past is prologue and that there will be reversion back to historic norms, you do not control this part of the process..
- How can you improve your odds of success?
  - You can try to incorporate into your analysis those variables that reflect the shifts that you believe have occurred in markets.
  - You can have a longer time horizon, since you improve your odds on convergence.

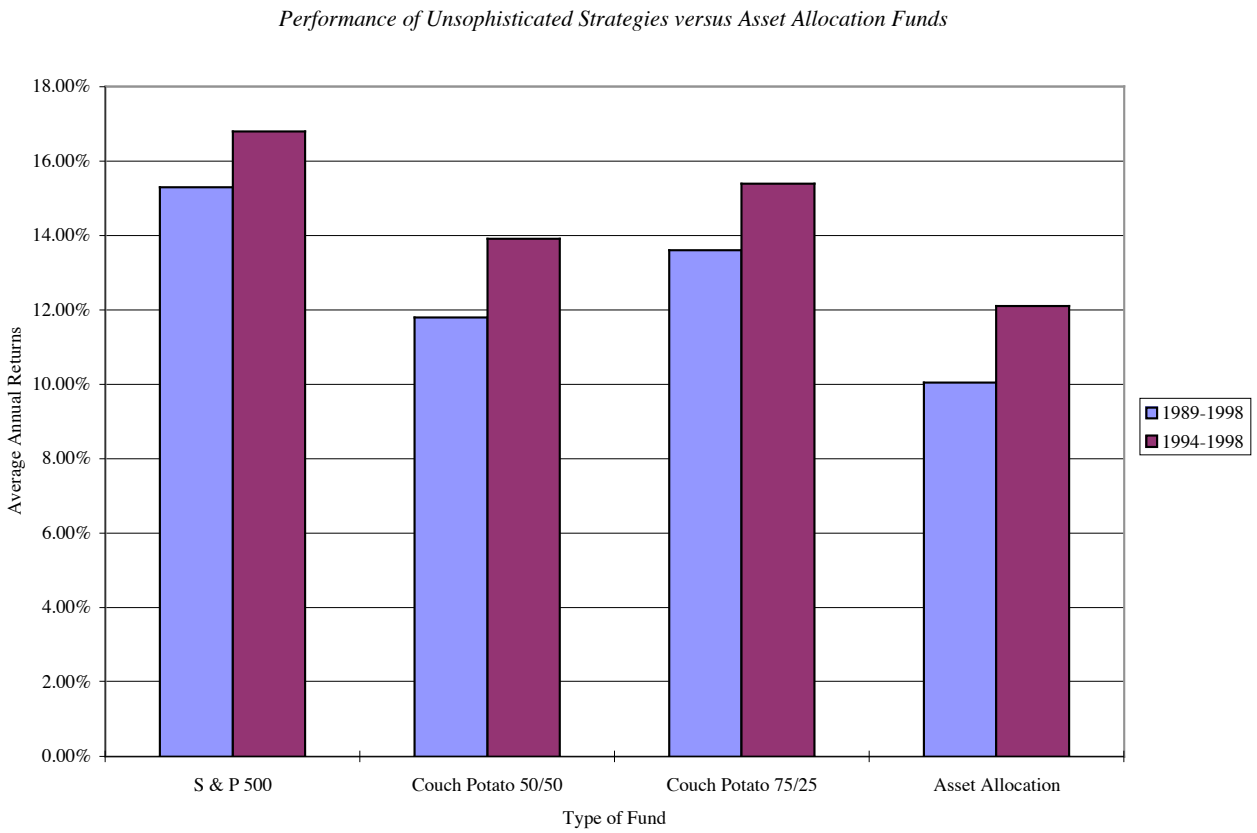
The Evidence on Market Timing

- Mutual Fund Managers constantly try to time markets by changing the amount of cash that they hold in the fund. If they are bullish, the cash balances decrease. If they are bearish, the cash balances increase.
- Investment Newsletters often take bullish or bearish views about the market.
- Market Strategists at investment banks make their forecasts for the overall market.

1. Mutual Fund Cash Positions



Tactical Asset Allocation Funds: Are they better at market timing?



2. Investment Newsletters

- Campbell and Harvey (1996) examined the market timing abilities of investment newsletters by examining the stock/cash mixes recommended in 237 newsletters from 1980 to 1992.
  - If investment newsletters are good market timers, you should expect to see the proportion allocated to stocks increase prior to the stock market going up. When the returns earned on the mixes recommended in these newsletters is compared to a buy and hold strategy, 183 or the 237 newsletters (77%) delivered lower returns than the buy and hold strategy.
  - One measure of the ineffectuality of the market timing recommendations of these investment newsletters lies in the fact that while equity weights increased 58% of the time before market upturns, they also increased by 53% before market downturns.
  - There is some evidence of continuity in performance, but the evidence is much stronger for negative performance than for positive. In other words, investment newsletters that give bad advice on market timing are more likely to continue to give bad advice than are newsletters that gave good advice to continue giving good advice.

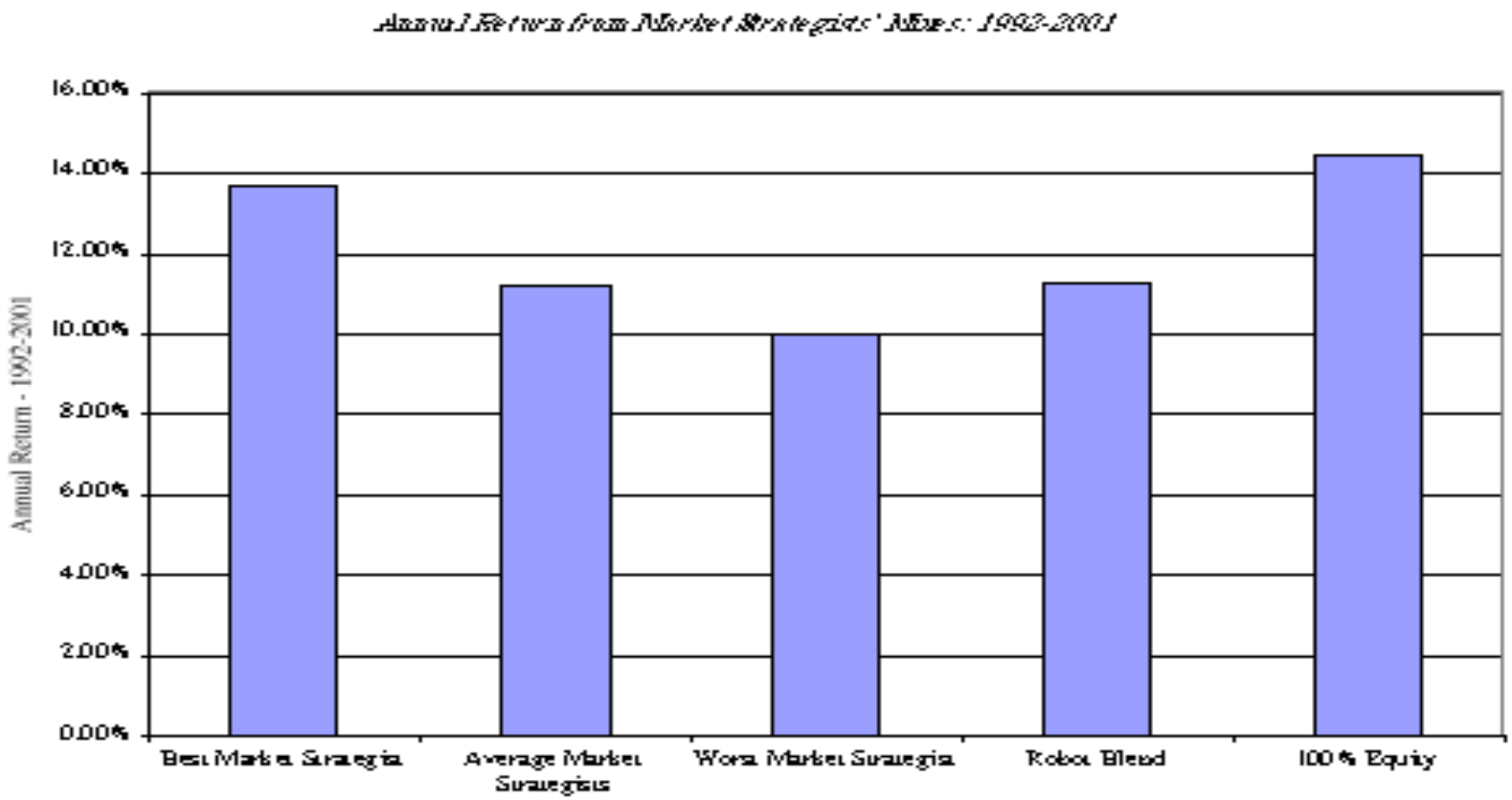
Some hope? Professional Market Timers

- Professional market timers provide explicit timing recommendations only to their clients, who then adjust their portfolios accordingly - shifting money into stocks if they are bullish and out of stocks if they are bearish.
- A study by Chance and Hemler (2001) looked at 30 professional market timers who were monitored by MoniResearch Corporation, a service monitors the performance of such advisors, and found evidence of market timing ability.
- It should be noted that the timing calls were both short term and frequent. One market timer had a total of 303 timing signals between 1989 and 1994, and there were, on average, about 15 signals per year across all 30 market timers. Notwithstanding the high transactions costs associated with following these timing signals, following their recommendations would have generated excess returns for investors.

3. Market Strategists provide timing advice…

Firm	*Strategist*	*Stocks*	*Bonds*	*Cash*
A.G. Edwards	Mark Keller	65%	20%	15%
Banc of America	Tom McManus	55%	40%	5%
Bear Stearns & Co.	Liz MacKay	65%	30%	5%
CIBC World Markets	Subodh Kumar	75%	20%	2%
Credit Suisse	Tom Galvin	70%	20%	10%
Goldman Sach & Co.	Abby Joseph Cohen	75%	22%	0%
J.P. Morgan	Douglas Cliggott	50%	25%	25%
Legg Mason	Richard Cripps	60%	40%	0%
Lehman Brothers	Jeffrey Applegate	80%	10%	10%
Merrill Lynch & Co.	Richard Bernstein	50%	30%	20%
Morgan Stanley	Steve Galbraith	70%	25%	5%
Prudential	Edward Yardeni	70%	30%	0%
Raymond James	Jeffrey Saut	65%	15%	10%
Salomon Smith	John Manley	75%	20%	5%
UBS Warburg	Edward Kerschner	80%	20%	0%
Wachovia	Rod Smyth	75%	15%	0%

But how good is it?



To be a successful market timer

- Be aware of shifts in the market.
  - Since you are basing your analysis by looking at the past, you are assuming that there has not been a significant shift in the underlying relationship. As Wall Street would put it, paradigm shifts wreak havoc on these models.
  - Even if you assume that the past is prologue and that there will be reversion back to historic norms, you do not control this part of the process..
- And improve your odds for success.
  - You can try to incorporate into your analysis those variables that reflect the shifts that you believe have occurred in markets.
  - You can have a longer time horizon, since you improve your odds on convergence.

Market Timing Strategies

- Asset Allocation: Adjust your mix of assets, allocating more than you normally would (given your time horizon and risk preferences) to markets that you believe are under valued and less than you normally would to markets that are overvalued.
- Style Switching: Switch investment styles and strategies to reflect expected market performance.
- Sector Rotation: Shift your funds within the equity market from sector to sector, depending upon your expectations of future economic and market growth.
- Market Speculation: Speculate on market direction, using either financial leverage (debt) or derivatives to magnify profits.

Connecting Market Timing to Security Selection

- You can be both a market timer and security selector. The same beliefs about markets that led you to become a security selector may also lead you to become a market timer. In fact, there are many investors who combine asset allocation and security selection in a coherent investment strategy.
- There are, however, two caveats to an investment philosophy that includes this combination.
  - To the extent that you have differing skills as a market timer and as a security selector, you have to gauge where your differential advantage lies, since you have limited time and resources to direct towards your task of building a portfolio.
  - You may find that your attempts at market timing are under cutting your asset selection and that your overall returns suffer as a consequence. If this is the case, you should abandon market timing and focus exclusively on security selection.

Charting and Technical Analysis

Aswath Damodaran

The Random Walk Hypothesis

	Current	Next period
Information	All information about the firm is publicly available and traded on.	New information comes out about the firm.
Market Expectations	Investors form unbiased expectations about the future	Since expectations are unbiased, there is a 50% chance of good or bad news.
Price Assessment	Stock price is an unbiased estimate of the value of the stock.	The price changes in accordance with the information. If it contains good (bad) news, relative to expectations, the stock price will increase (decrease).
Implications for Investors	No approach or model will allow us to identify under or over valued assets.	Reflecting the 50/50 chance of the news being good or bad, there is an equal probability of a price increase and a price decrease.

The Basis for Price Patterns

1. Investors are not always rational in the way they set expectations. These irrationalities may lead to expectations being set too low for some assets at some times and too high for other assets at other times. Thus, the next piece of information is more likely to contain good news for the first asset and bad news for the second.
2. Price changes themselves may provide information to markets. Thus, the fact that a stock has gone up strongly the last four days may be viewed as good news by investors, making it more likely that the price will go up today then down.

The Empirical Evidence on Price Patterns

- Investors have used **price charts and price patterns** as tools for predicting future price movements for as long as there have been financial markets.
- The first studies of market efficiency focused on the **relationship between price changes over time**, to see if in fact such predictions were feasible.
- Evidence can be classified into two classes
  - studies that focus on **short-term** (intraday, daily and weekly price movements) price behavior and
    research that examines **long-term** (annual and five-year returns) price movements.

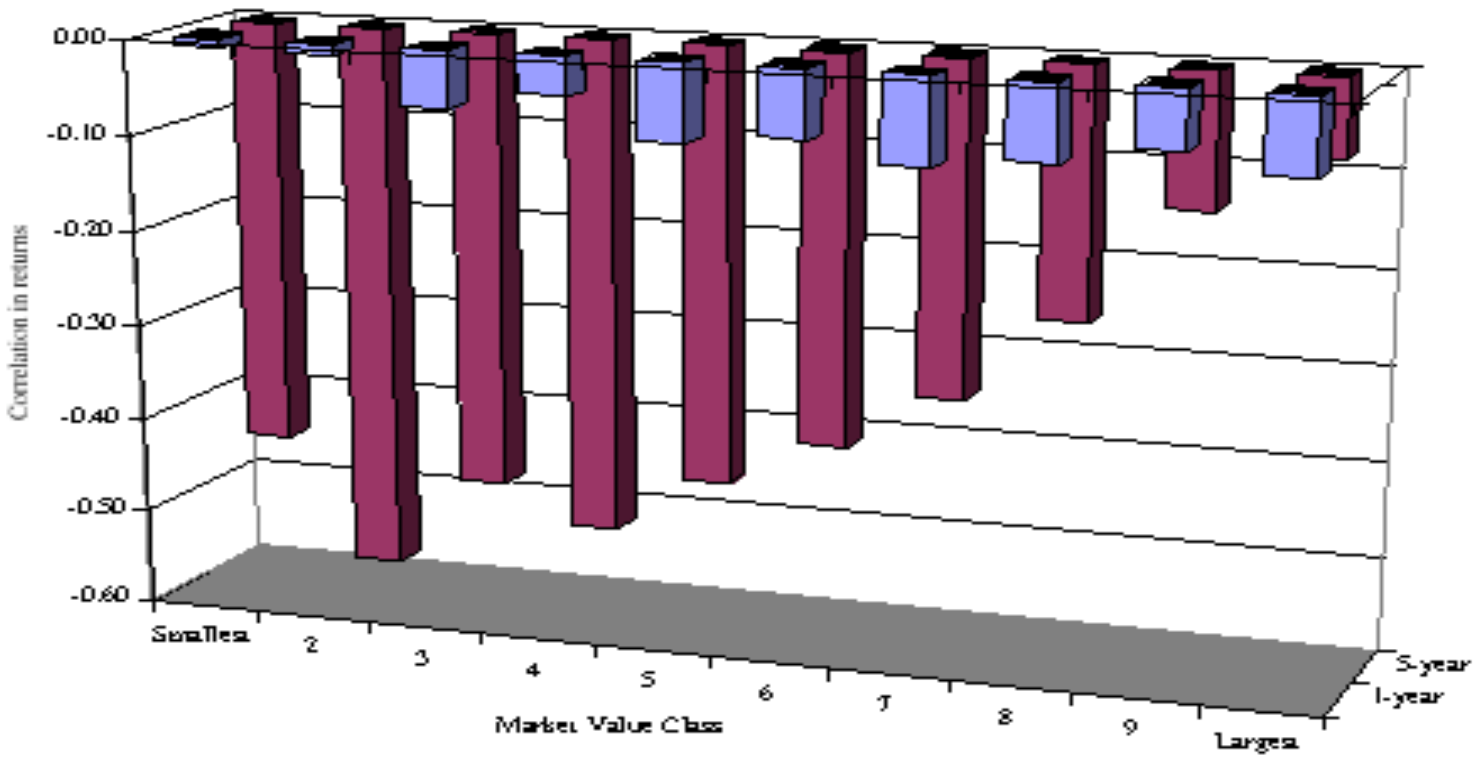
Short Term Serial Correlation: Evidence

- **Serial correlations in most markets is small**. While there may be statistical significance associated with these correlations, it is unlikely that there is enough correlation to generate excess returns.
- The serial correlation in short period returns is also **affected by price measurement issues** and the market micro-structure characteristics.
- **Non-trading** in some of the components of the index can create a **carry-over effect** from the prior time period, this can result in **positive serial correlation** in the index returns.
- The **bid-ask spread** creates a bias in the opposite direction, if transactions prices are used to compute returns, since prices have a equal chance of ending up at the bid or the ask price. The bounce that this induces in prices will result in **negative serial correlations** in returns.
  Bid-Ask Spread = $-\sqrt{2}$ (Serial Covariance in returns)
  where the serial covariance in returns measures the covariance between return changes in consecutive time periods.

Long Term Serial Correlation

- In contrast to the studies of short term correlation, there is evidence of strong correlation in long term returns.
- When long term is defined as months, there is positive correlation - a momentum effect.
- When long term is defined as years, there is negative correlation - reversal in prices. The effect is much stronger for smaller companies.

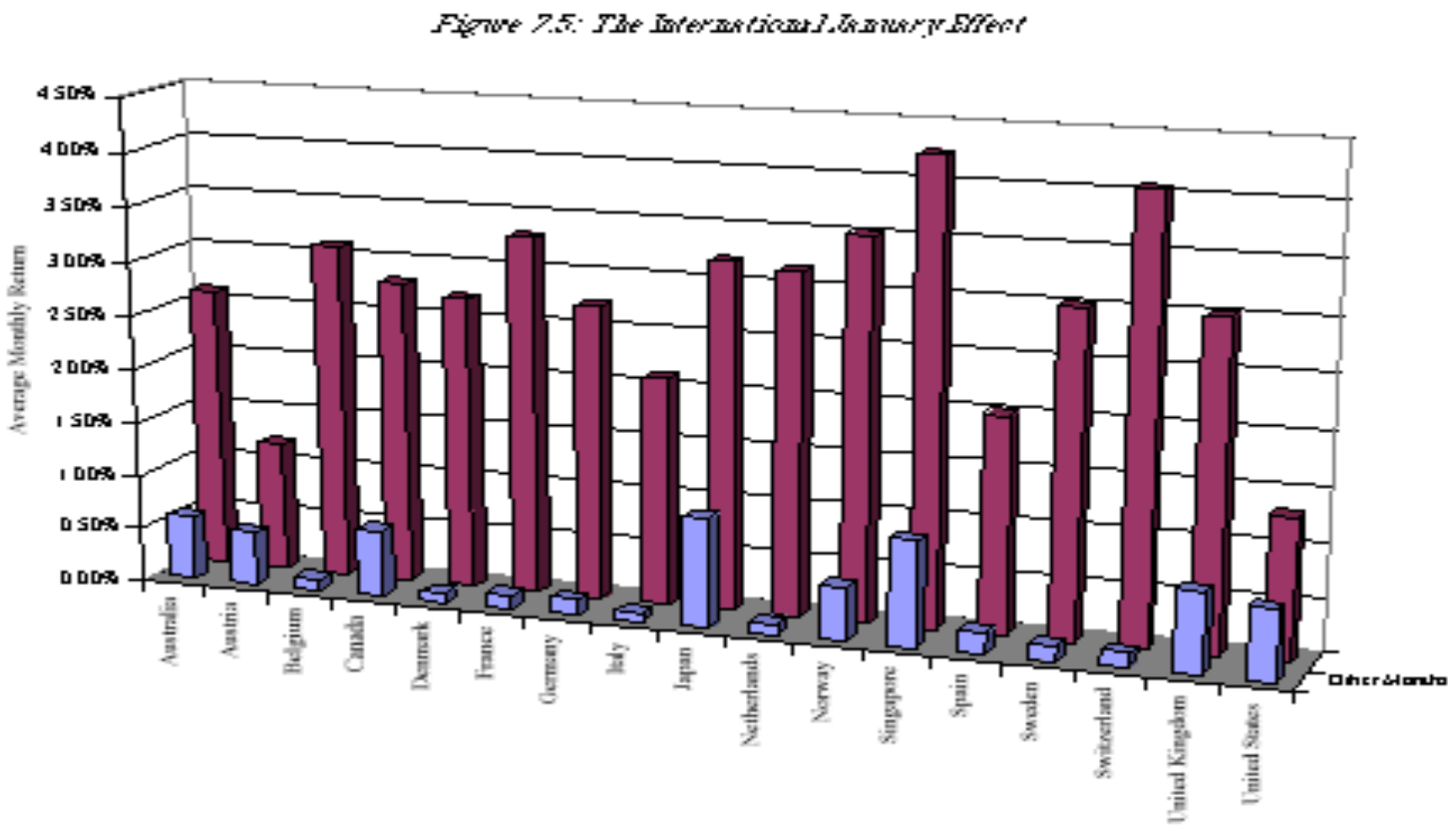
Evidence of long term correlation



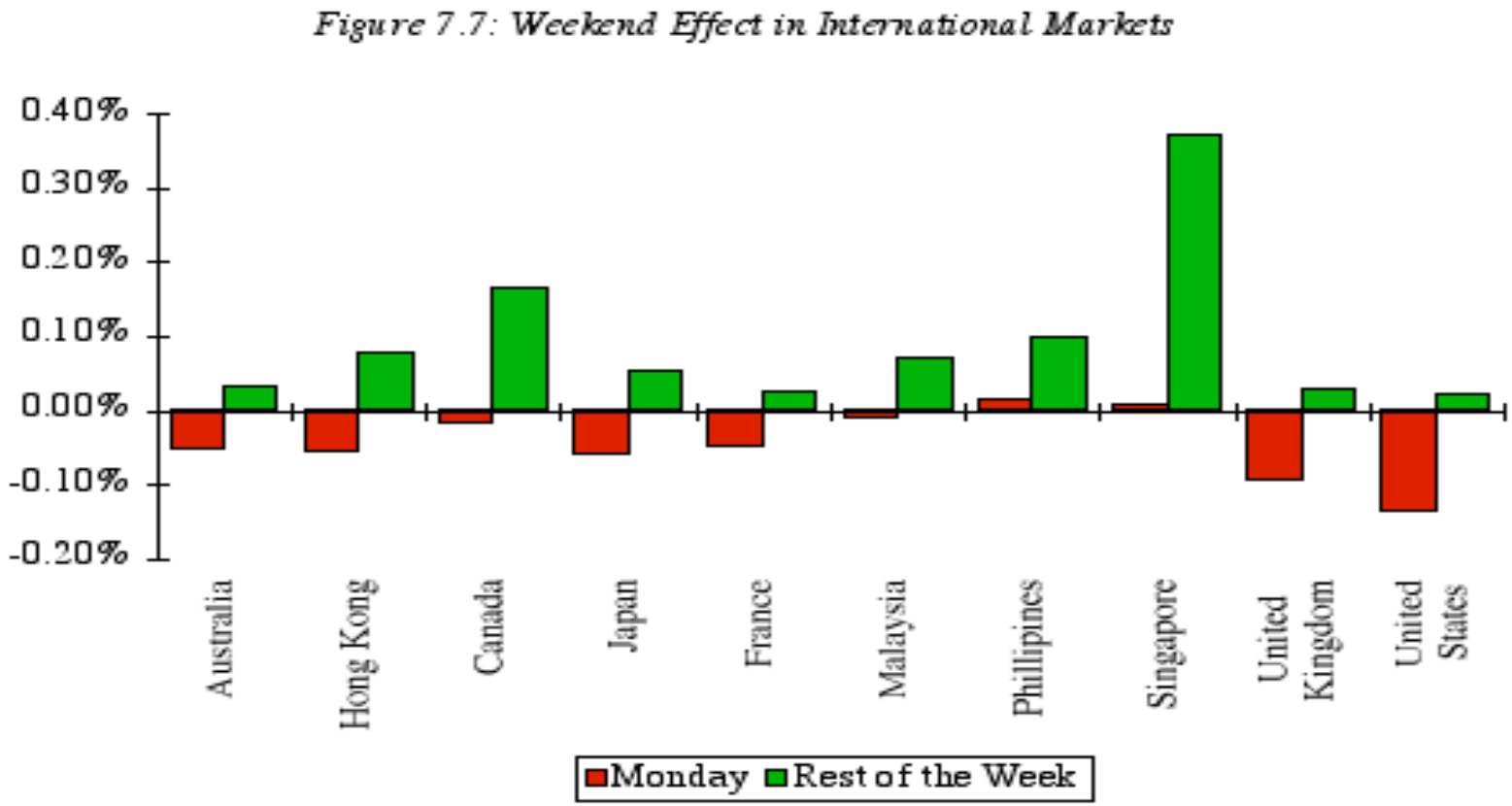
Seasonal and Temporal Effects on Prices

- Empirical studies indicate a variety of seasonal and temporal irregularities in stock prices. Among them are:
  - The January Effect: Stocks, on average, tend to do much better in January than in any other month of the year.
  - The Weekend Effect: Stocks, on average, seem to do much worse on Mondays than on any other day of the week.
  - The Mid-day Swoon: Stocks, on average, tend to do much worse in the middle of the trading day than at the beginning and end of the day.
- While these empirical irregularities provide for interesting conversation, **it is not clear that any of them can be exploited to earn excess returns**.

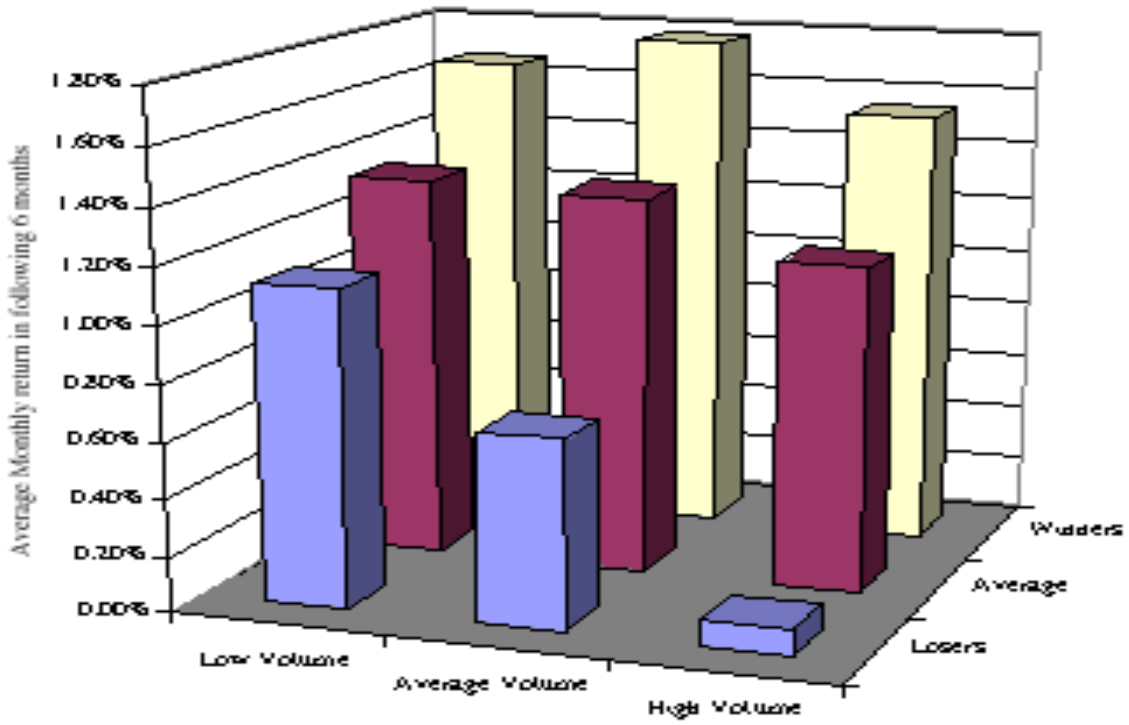
Returns in January vs Other Months - Major Financial Markets



The Weekend Effect in International Markets



Volume and Price: The Evidence



Source: Lee and Swaminathan

Foundations of Technical Analysis: What are the assumptions?

(1) **Price is determined solely by the interaction of supply & demand**

(2) **Supply and demand are governed by numerous factors both rational and irrational**. The market continually and automatically weighs all these factors. (A random walker would have no qualms about this assumption either. He would point out that any irrational factors are just as likely to be one side of the market as on the other.)

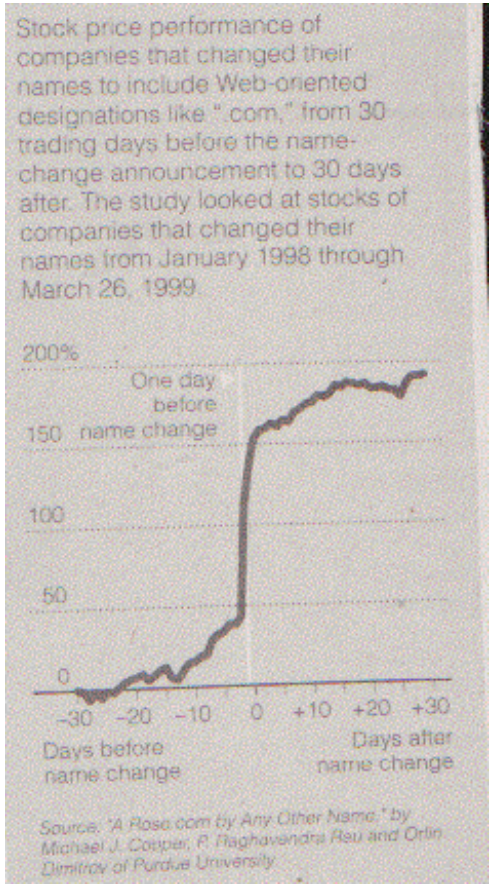
(3) **Disregarding minor fluctuations in the market, stock prices tend to move in trends which persist for an appreciable length of time.** (Random walker would disagree with this statement. For any trend to persist there has to be some collective 'irrationality')

(4) **Changes in trend are caused by shifts in demand and supply. These shifts no matter why they occur, can be detected sooner or later in the action of the market itself**. (In the financial economist's view the market (through the price) will instantaneously reflect any shifts in the demand and supply.

Are investors rational?

- Historians who have examined the behavior of financial markets over time have challenged the **assumption of rationality** that underlies much of efficient market theory.
- They point out to the frequency with **speculative bubbles have formed in financial markers**, as investors buy into fads or get-rich-quick schemes, and the crashes with these bubbles have ended, and suggest that there is nothing to prevent the recurrence of this phenomenon in today's financial markets. There is some evidence in the literature of irrationality on the part of market players.

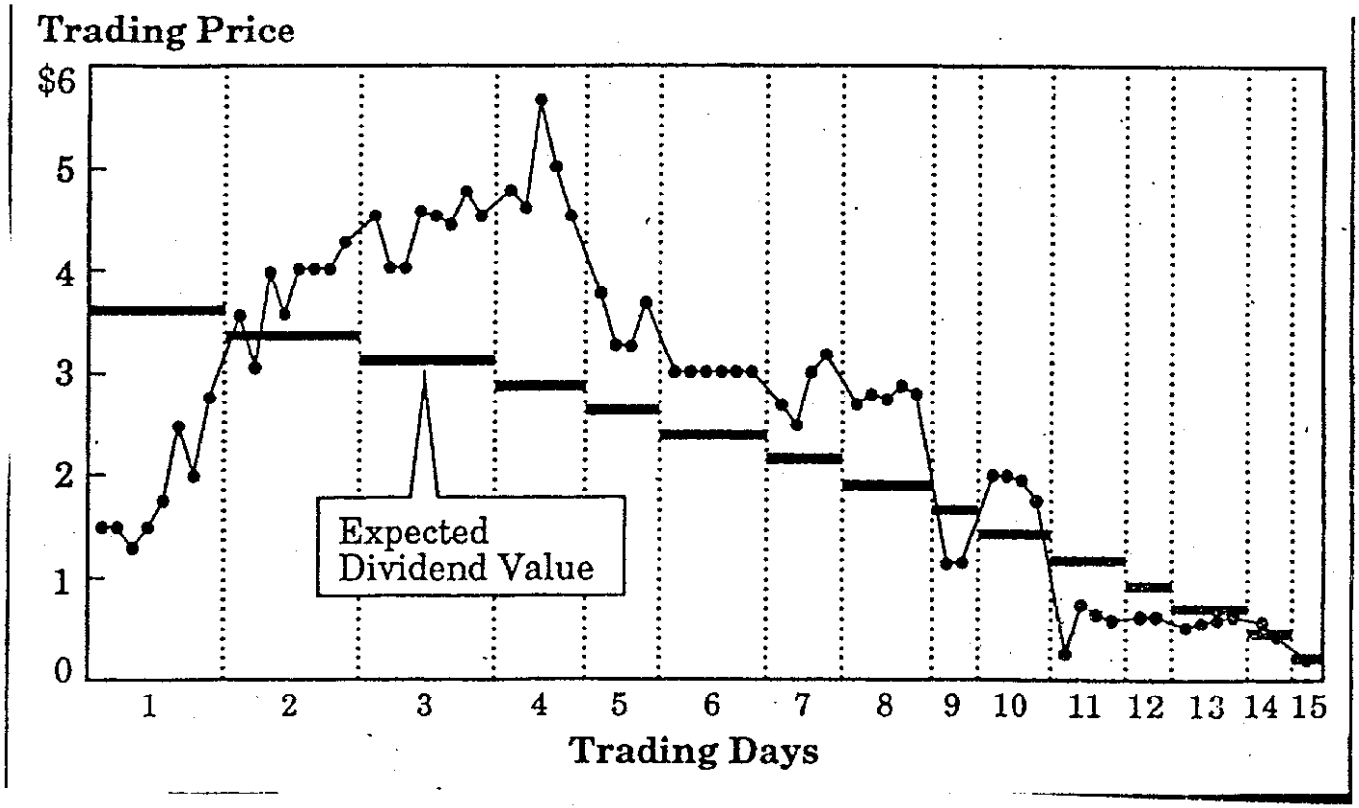
A Sobering Thought for Believers in Rationality



a. Experimental Studies of Rationality

- While most **experimental studies** suggest that traders are rational, there are some examples of irrational behavior in some of these studies.
- One such study was done at the University of Arizona. In an experimental study, traders were told that a **payout** would be declared after each trading day, determined randomly from four possibilities **- zero, eight, 28 or 60 cents**. The average payout was 24 cents. Thus the share's expected value on the first trading day of a fifteen day experiment was **$3.60** (24*15), the second day was $3.36 .... The traders were allowed to trade each day. The results of 60 such experiments is summarized in the following graph.

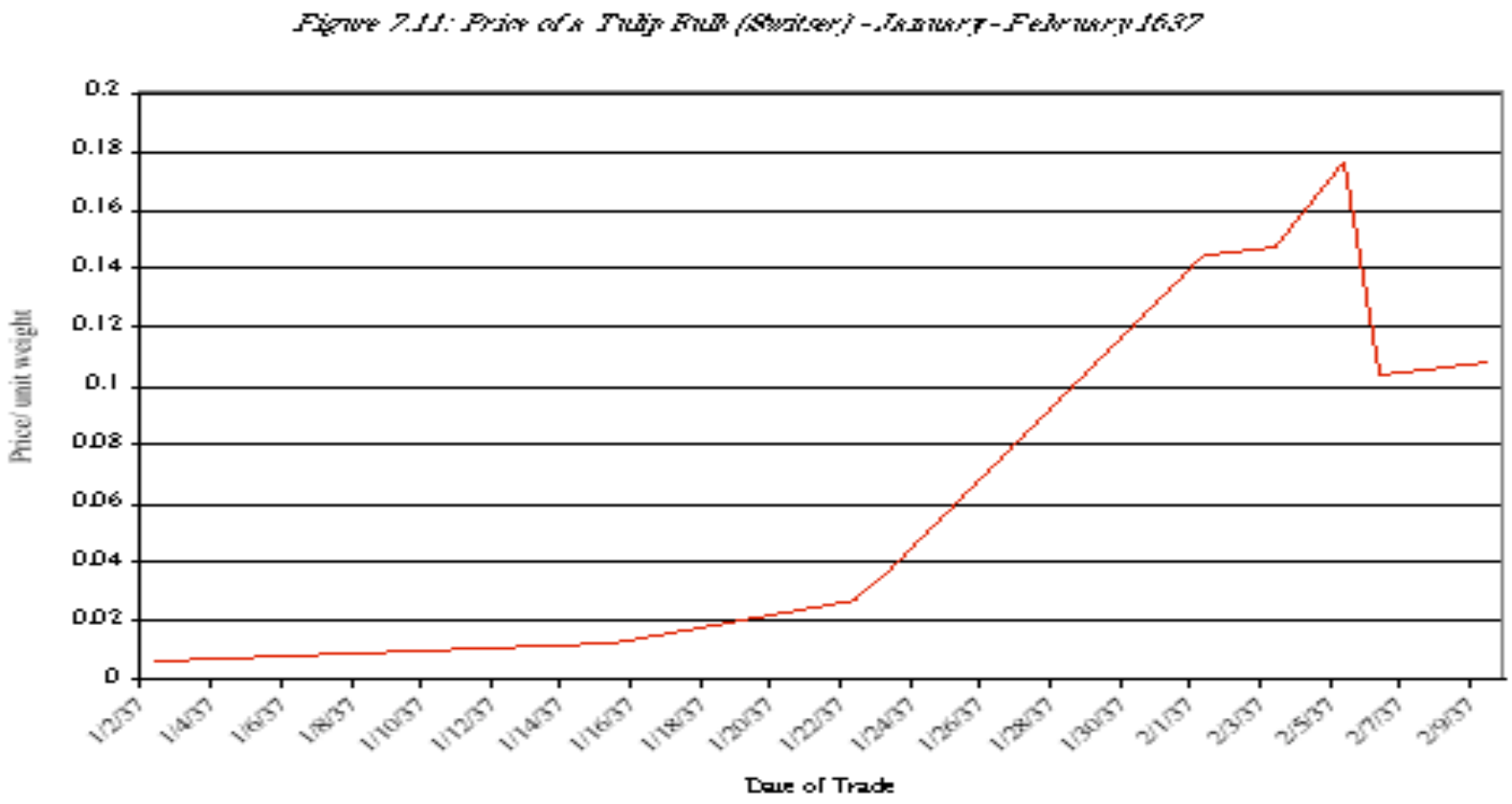
Trading Price by Trading Day



Results of Experimental Study

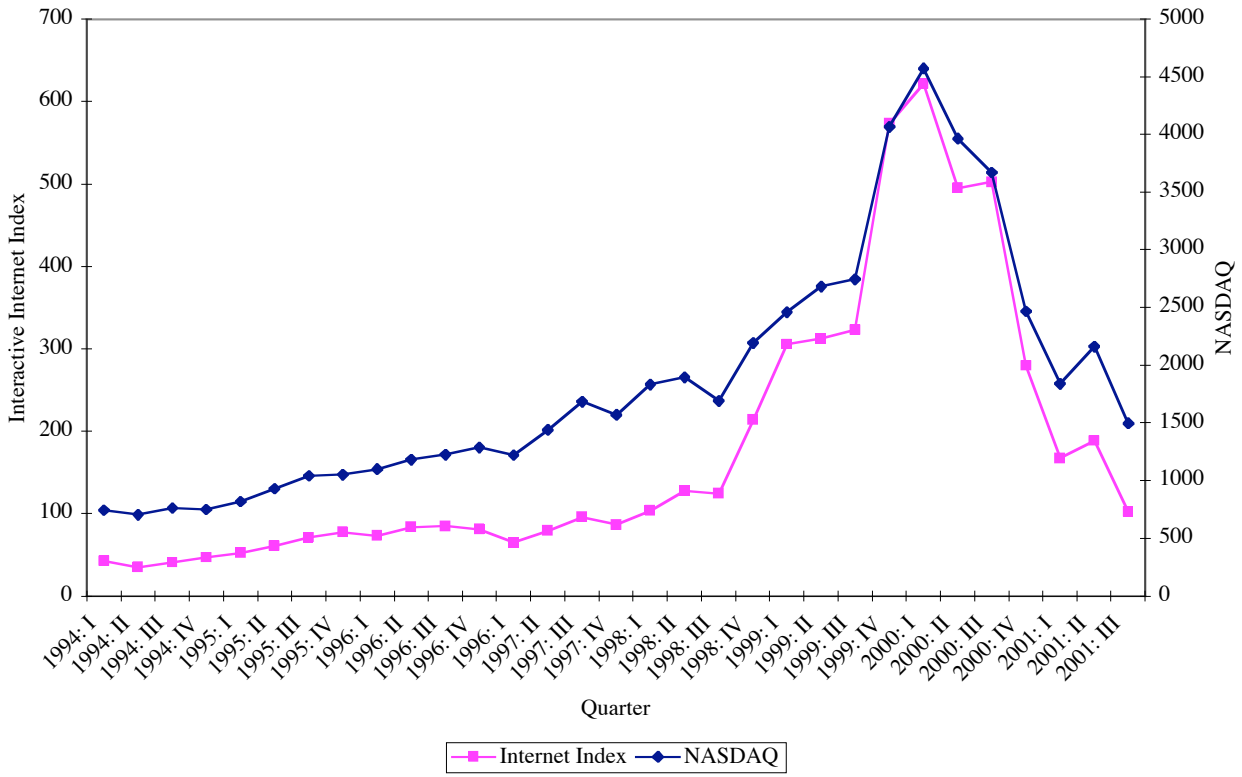
- There is clear evidence here of a **'speculative bubble'** forming during periods 3 to 5, where prices exceed expected values significantly,
- The **bubble ultimately bursts**, and prices approach expected value by the end of the period.
- If this is feasible in a simple market, where every investor obtains the same information, it **is clearly feasible in real financial markets**, where there is much more differential information and much greater uncertainty about expected value.
- Some of the experiments were run with **students,** and some with **Tucson businessmen**, with 'real world' experience. The results were similar for both groups.
- Furthermore, when **price curbs** of 15 cents were introduced, the **booms lasted even longer** because traders knew that prices would not fall by more than 15 cents in a period. Thus, the notion that price limits can control speculative bubbles seems misguided.

b. A Real Bubble?



What about this bubble?

Figure 7.12: The Tech Boom



Or this one?

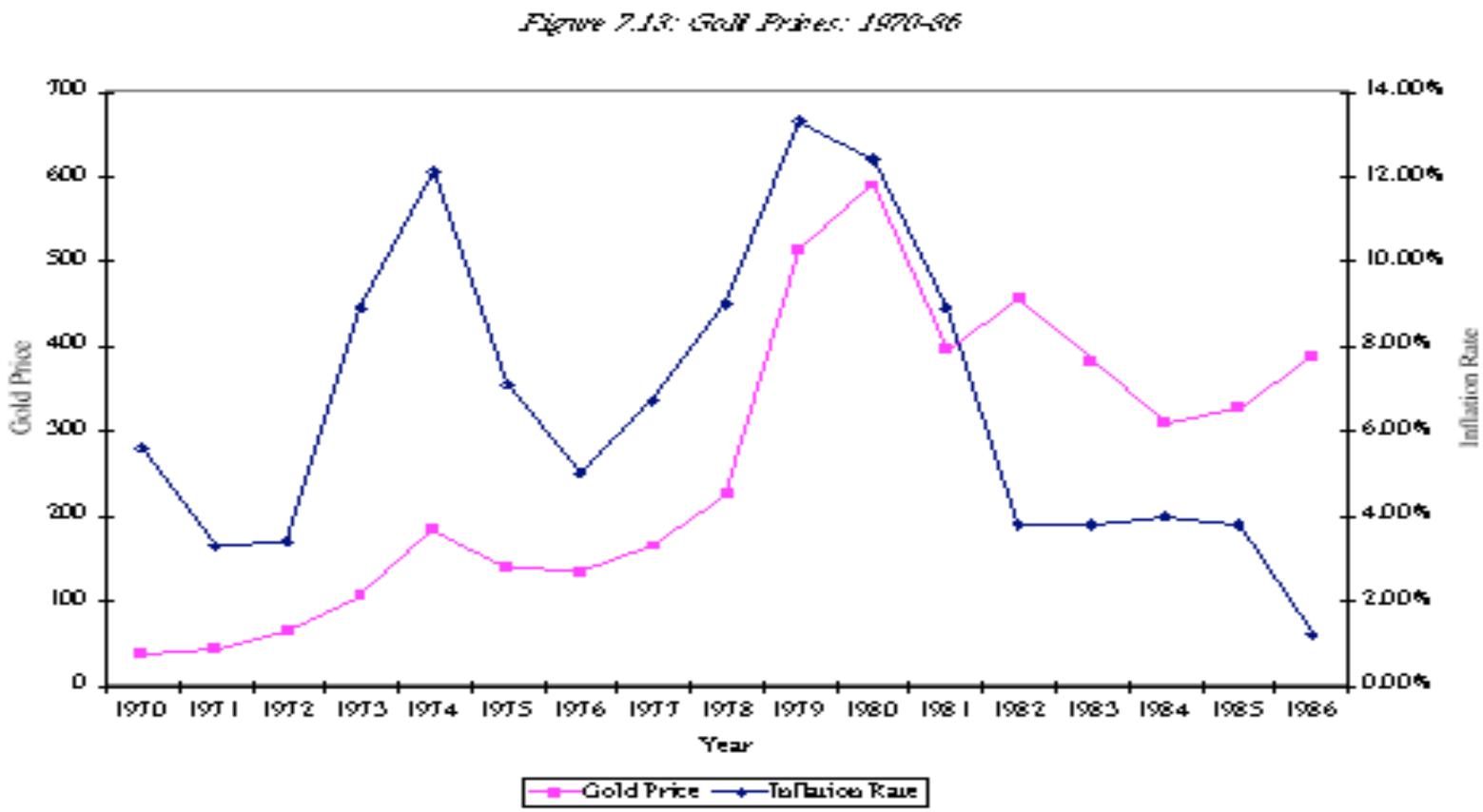


Figure 7.13: Gold Prices: 1970-86
Gold Price
Inflation Rate
Year
0
100
200
300
400
500
600
700
0.00%
2.00%
4.00%
6.00%
8.00%
10.00%
12.00%
14.00%
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
Gold Price
Inflation Rate

I. Markets overreact: The Contrarian Indicators

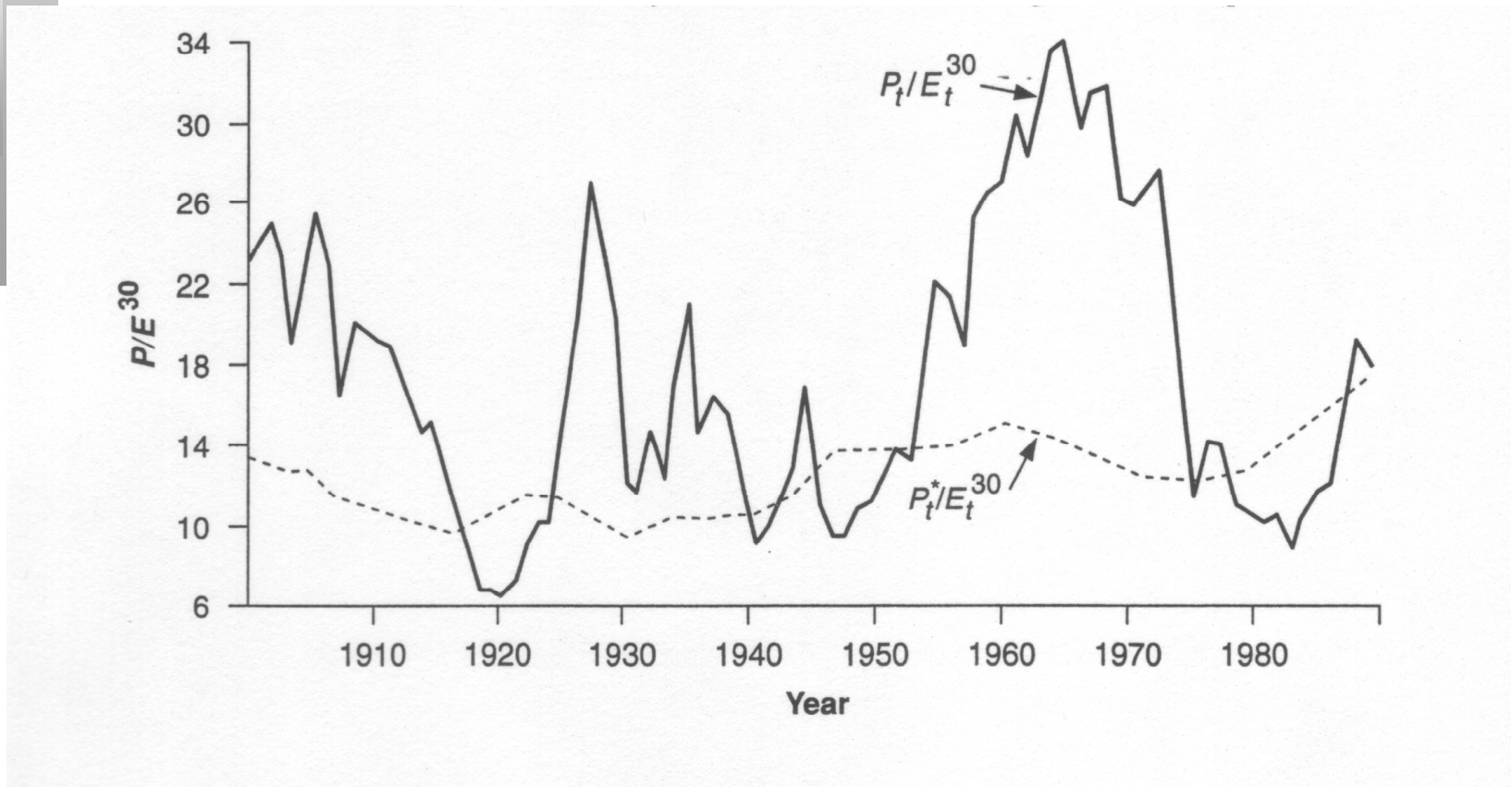
Basis: Research in experimental psychology suggests that people tend to overreact to unexpected and dramatic news events. In revising their beliefs, individuals tend to overweight recent information and underweight prior data.

Empirical evidence: If markets overreact then
(1) Extreme movements in stock prices will be followed by subsequent price movements in the opposite direction.
(2) The more extreme the price adjustment, the greater will be the subsequent adjustment

Trading Rules

1. Odd-lot trading: The odd-lot rule gives us an indication of what the man on the street thinks about the stock
2. Mutual Fund Cash positions: Historically, the argument goes, mutual fund cash positions have been greatest at the bottom of a bear market and lowest at the peak of a bull market.
3. Investment Advisory opinion: This is the ratio of advisory services that are bearish. When this ratio reaches the threshold (eg 60%) the contrarian starts buying.

II. Detecting shifts in Demand & Supply: The Lessons in Price Patterns



III. Market learn slowly: The Momentum Investors

Basis: The argument here is that markets learn slowly. Thus, investors who are a little quicker than the market in assimilating and understanding information will earn excess returns. In addition, if markets learn slowly, there will be price drifts (i.e., prices will move up or down over extended periods) and technical analysis can detect these drifts and take advantage of them.

The Evidence: There is evidence, albeit mild, that prices do drift after significant news announcements. For instance, following up on price changes after large earnings surprises provides the following evidence.

Trading Rules

1. Relative Strength: In both prices and volume
2. Trend Lines

IV. Following the Smart Investors: The Followers

Basis: This approach is the flip side of the contrarian approach. Instead of assuming that investors, on average, are likely to be be wrong, you assume that they are right. To make this assumption more palatable, you do not look at all investors but only at the smartest investors, who presumably know more than the rest of us.

Evidence: Some informed investors (insiders especially) do trade ahead of price movements.

Trading Rules:

1. Ratio of insider buying to selling
2. Short Sales by Specialists

V. Markets are controlled by external forces: The Mystics

The Elliot Wave: Elliot's theory is that the market moves in waves of various sizes, from those encompassing only individual trades to those lasting centuries, perhaps longer. "By classifying these waves and counting the various classifications it is possible to determine the relative positions of the market at all times". "There can be no bull of bear markets of one, seven or nine waves, for example.

The Dow Theory:" The market is always considered as having three movements, all going at the same time. The first is the narrow movement (daily fluctuations) from day to day. The second is the short swing (secondary movements) running from two weeks to a month and the third is the main movement (primary trends) covering at least four years in its duration.

To be a successful chartist, you need to..

- Understand investor behavior: If you decide to use a charting pattern or technical indicator, you need to be aware of the investor behavior that gives rise to its success. You can modify or abandon the indicator if the underlying behavior changes.
- Test the indicator: It is important that you back-test your indicator to ensure that it delivers the returns that are promised. In running these tests, you should pay particular attention to the volatility in performance over time and how sensitive the returns are to holding periods.
- Trade quickly: The excess returns on many of the strategies seem to depend upon timely trading. In other words, to succeed at some of these strategies, you may need to monitor prices continuously, looking for the patterns that would trigger trading.
- Be disciplined: Building on the theme of time horizons, success at charting can be very sensitive to how long you hold an investment.
- Control trading costs: The strategies that come from technical indicators are generally short-term strategies that require frequent and timely trading. Not surprisingly, these strategies also generate large trading costs that can very quickly eat into any excess returns you may have.

Small Cap and Growth Investing

Aswath Damodaran

Who is a growth investor?

- *The Conventional definition*: An investor who buys high price earnings ratio stocks or high price to book ratio stocks.
- *The Generic definition*: An investor who buys growth companies where the value of growth potential is being under estimated. In other words, both value and growth investors want to buy under valued stocks. The difference lies mostly in where they think they can find these bargains and what they view as their strengths.

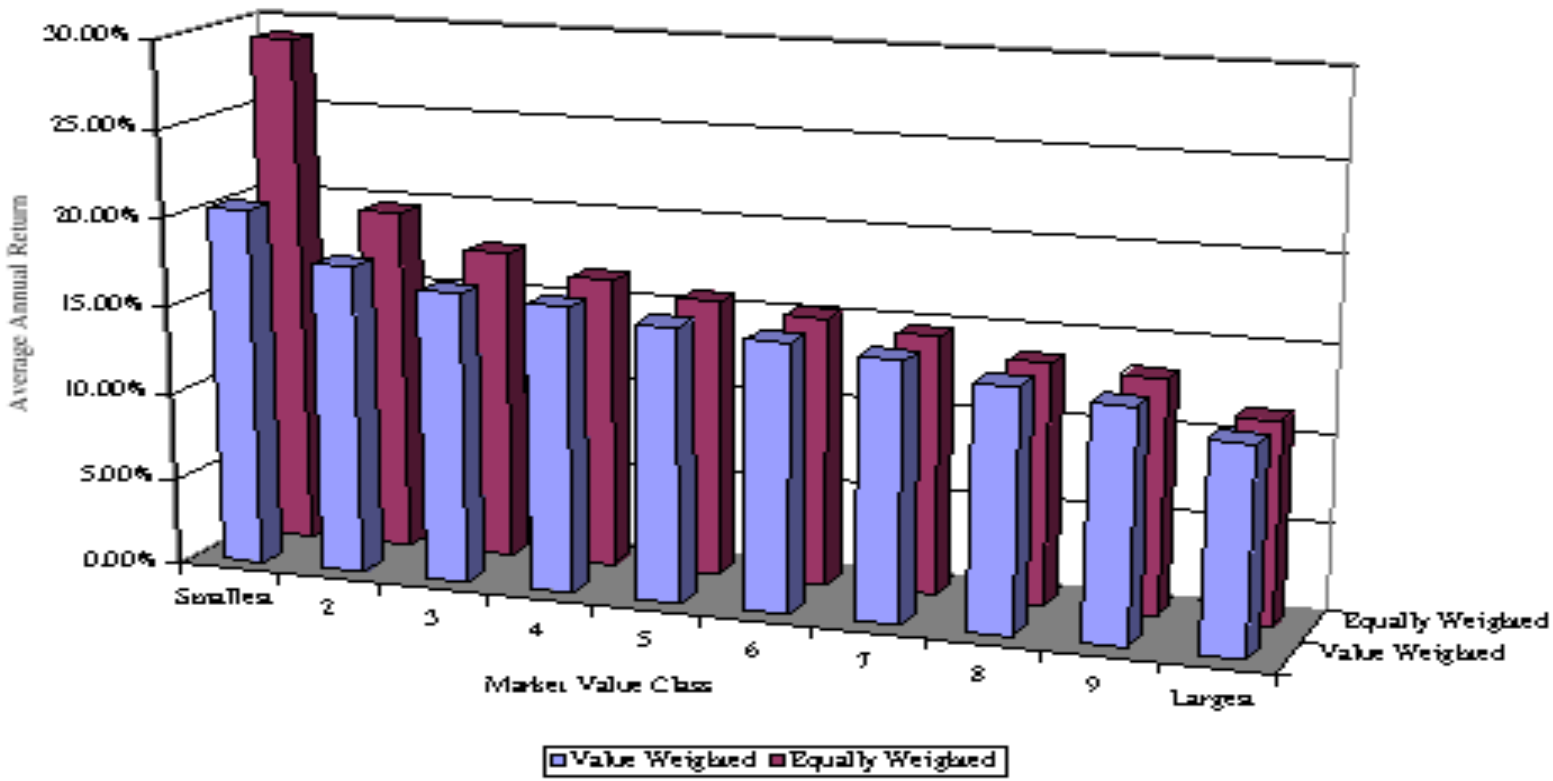
The many faces of growth investing

- *The Small Cap investor*: The simplest form of growth investing is to buy smaller companies in terms of market cap, expecting these companies to be both high growth companies and also expecting the market to under estimate the value of growth in these companies.
- *The IPO investor*: Presumably, stocks that make initial public offerings tend to be smaller, higher growth companies.
- *The Passive Screener*: Like the passive value screener, a growth screener can use screens - low PE ratios relative to expected growth, earnings momentum - to pick stocks.
- *The Activist Growth investor*: These investors take positions in young growth companies (even before they go public) and play an active role not only in how these companies are managed but in how and when to take them public.

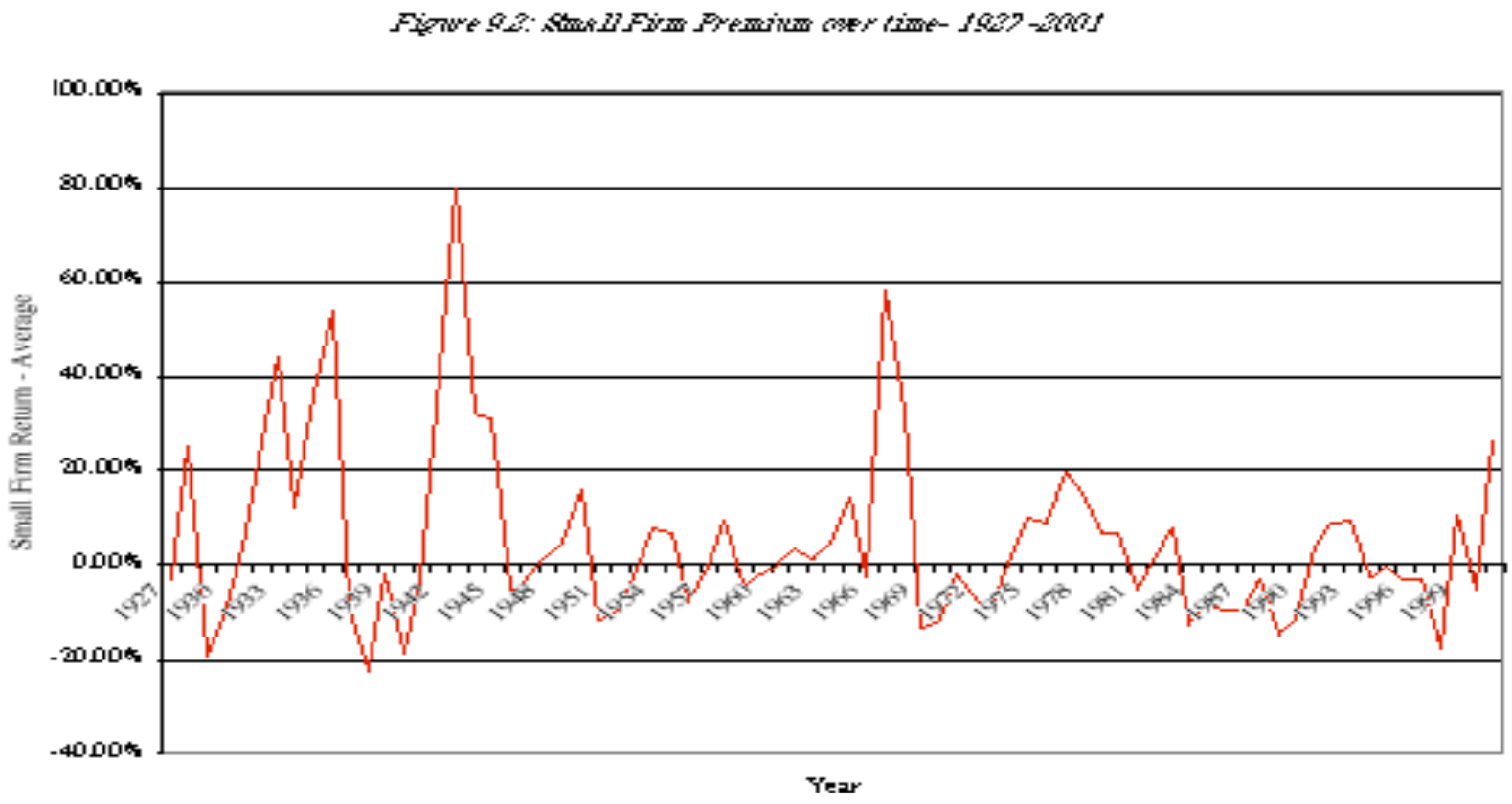
I. Small Cap Investing

- One of the most widely used passive growth strategies is the strategy of investing in small-cap companies.
- There is substantial empirical evidence backing this strategy, though it is debatable whether the additional returns earned by this strategy are really excess returns.

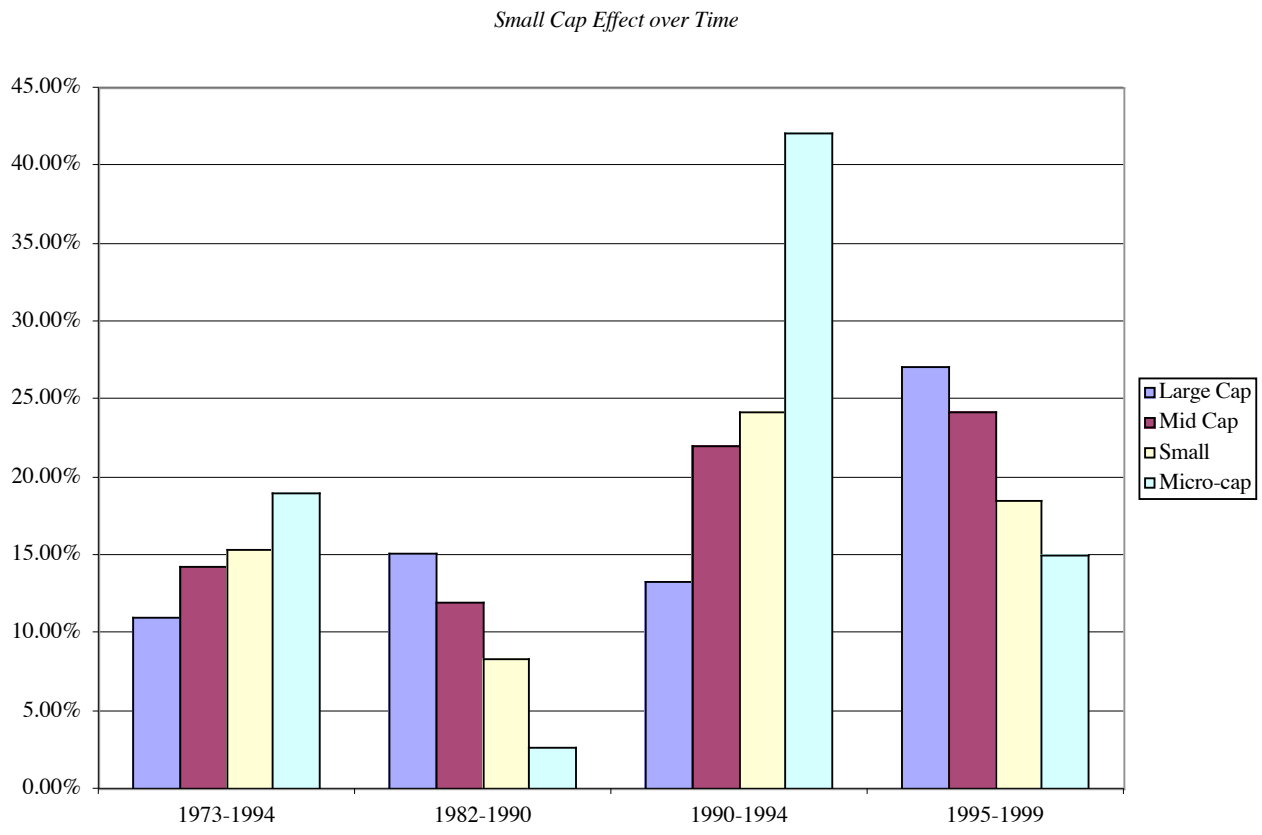
The Small Firm Effect



Small Firm Effect Over Time



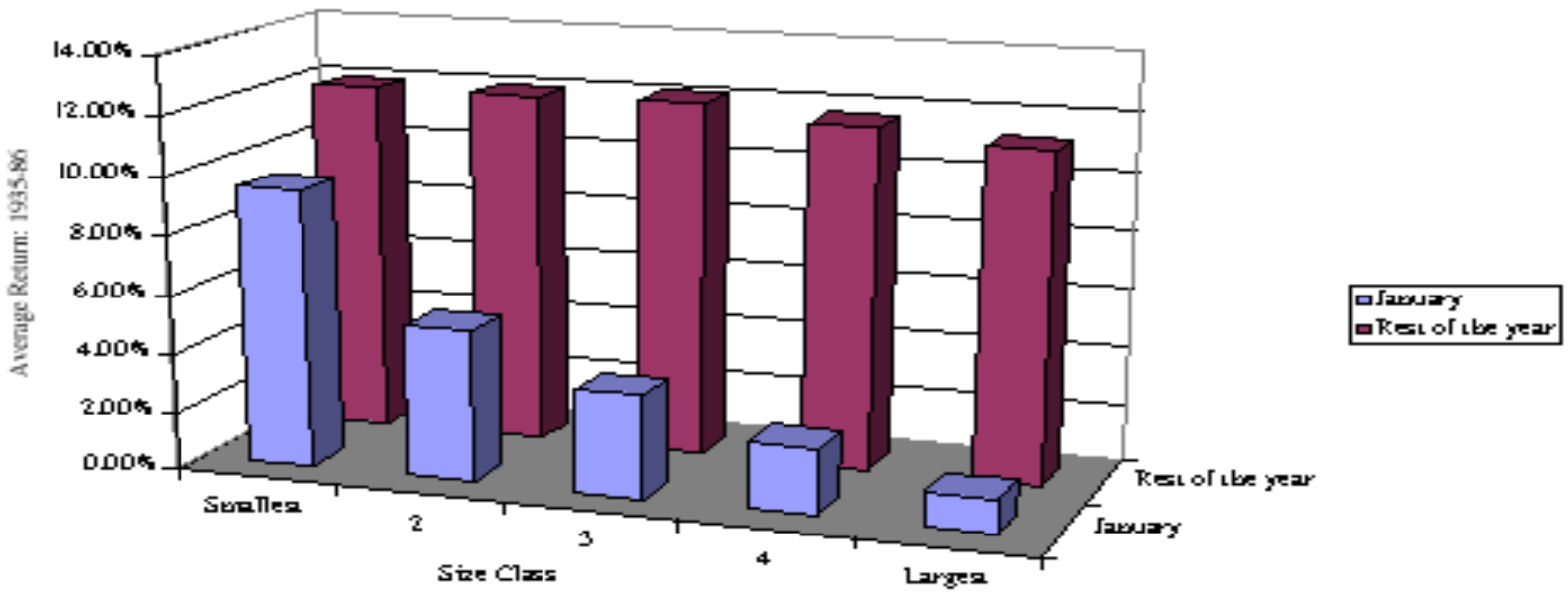
Cycles in Small Firm Premium



Has the small firm premium disappeared?

- The small stock premium has largely disappeared since 1981. Whether this is a long term shift in the small stock premium or just a temporary dip is still being debated.
- Jeremy Siegel notes in his book on the long term performance of stocks that the small stock premium can be almost entirely attributed to the performance of small stocks in the 1970s. Since this was a decade with high inflation, could the small stock premium have something to do with inflation?

The Size and January Effects

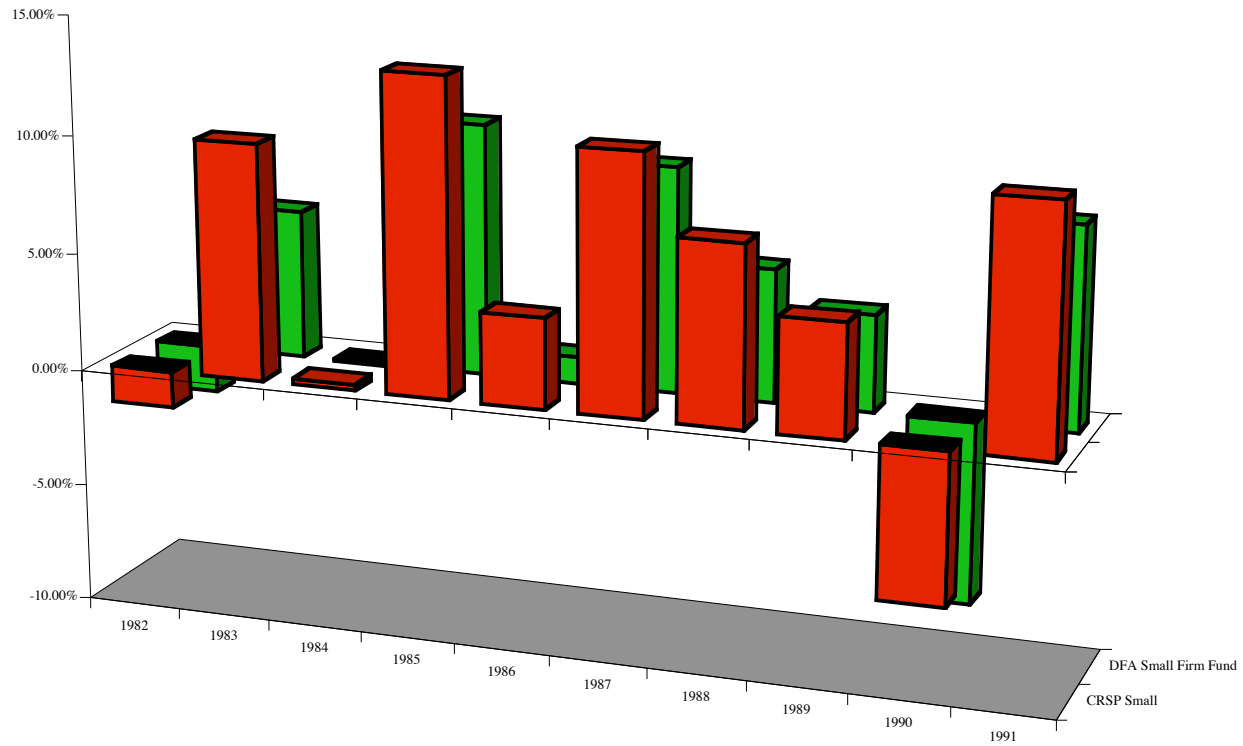


Possible Explanations

- The **transactions costs** of investing in small stocks is significantly higher than the transactions cots of investing in larger stocks, and the premiums are estimated prior to these costs. While this is generally true, the differential transactions costs are unlikely to explain the magnitude of the premium across time, and are likely to become even less critical for longer investment horizons.
- The **difficulties of replicating the small firm premiums** that are observed in the studies in real time are illustrated in Figure 9.11, which compares the returns on a hypothetical small firm portfolio (CRSP Small Stocks) with the actual returns on a small firm mutual fund (DFA Small Stock Fund), which passively invests in small stocks.

Difficulties in Replicating Small Firm Effect

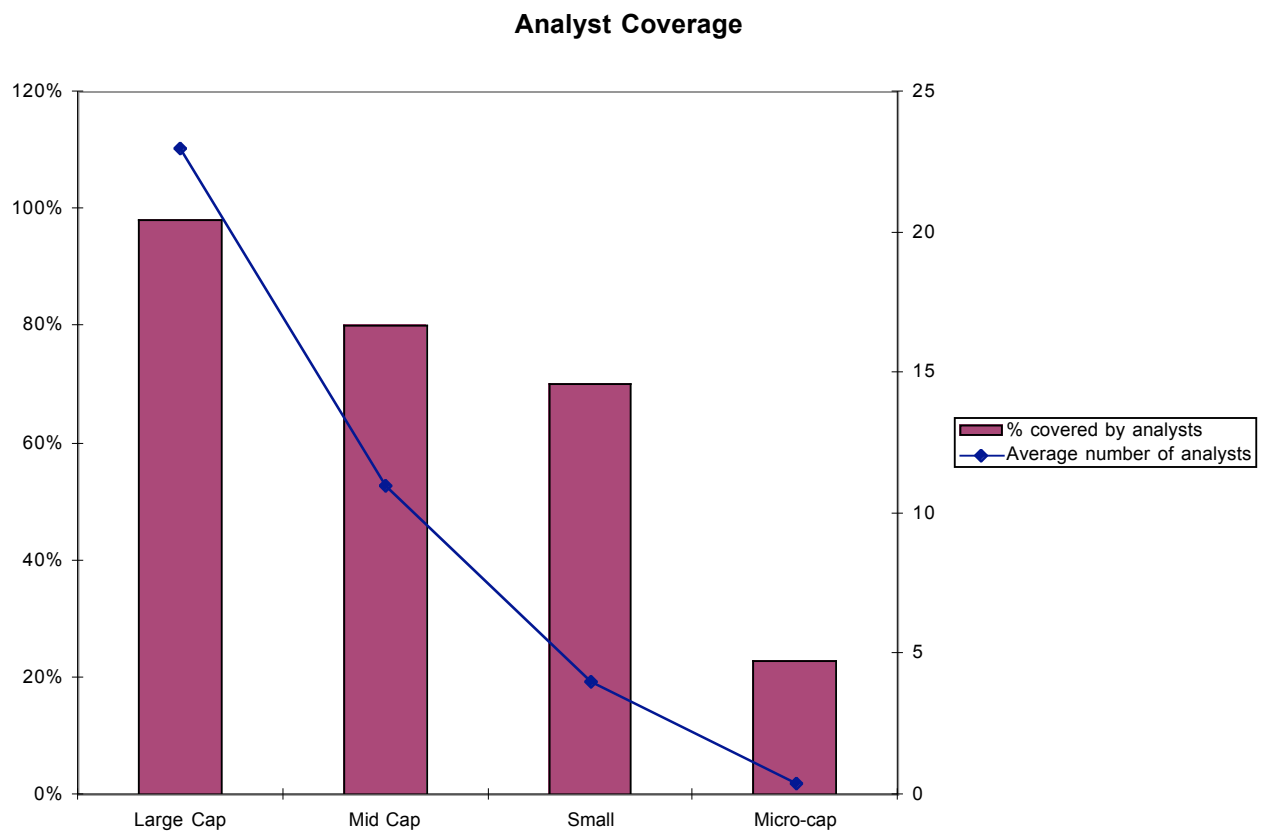
Figure 9.5: Returns on CRSP Small Stocks versus DFA Small Stock Fund



Risk Models and the Size Effect

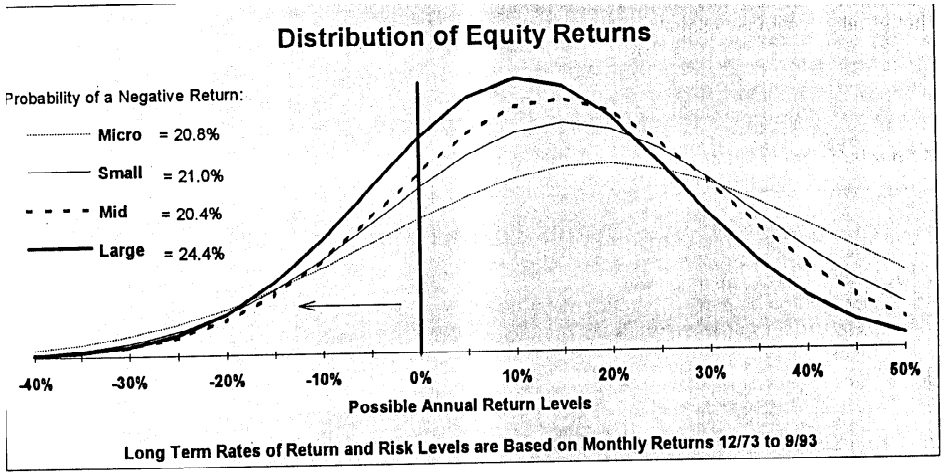
- **The capital asset pricing model may not be the right model for risk**, and betas under estimate the true risk of small stocks. Thus, the small firm premium is really a measure of the failure of beta to capture risk. The additional risk associated with small stocks may come from several sources.
  - First, the **estimation risk** associated with estimates of beta for small firms is much greater than the estimation risk associated with beta estimates for larger firms. The small firm premium may be a reward for this additional estimation risk.
  - Second, there may be additional risk in investing in small stocks because **far less information** is available on these stocks. In fact, studies indicate that stocks that are neglected by analysts and institutional investors earn an excess return that parallels the small firm premium.

There is less analyst coverage of small firms



But ..

- There is some counter-evidence on the riskiness of small stocks

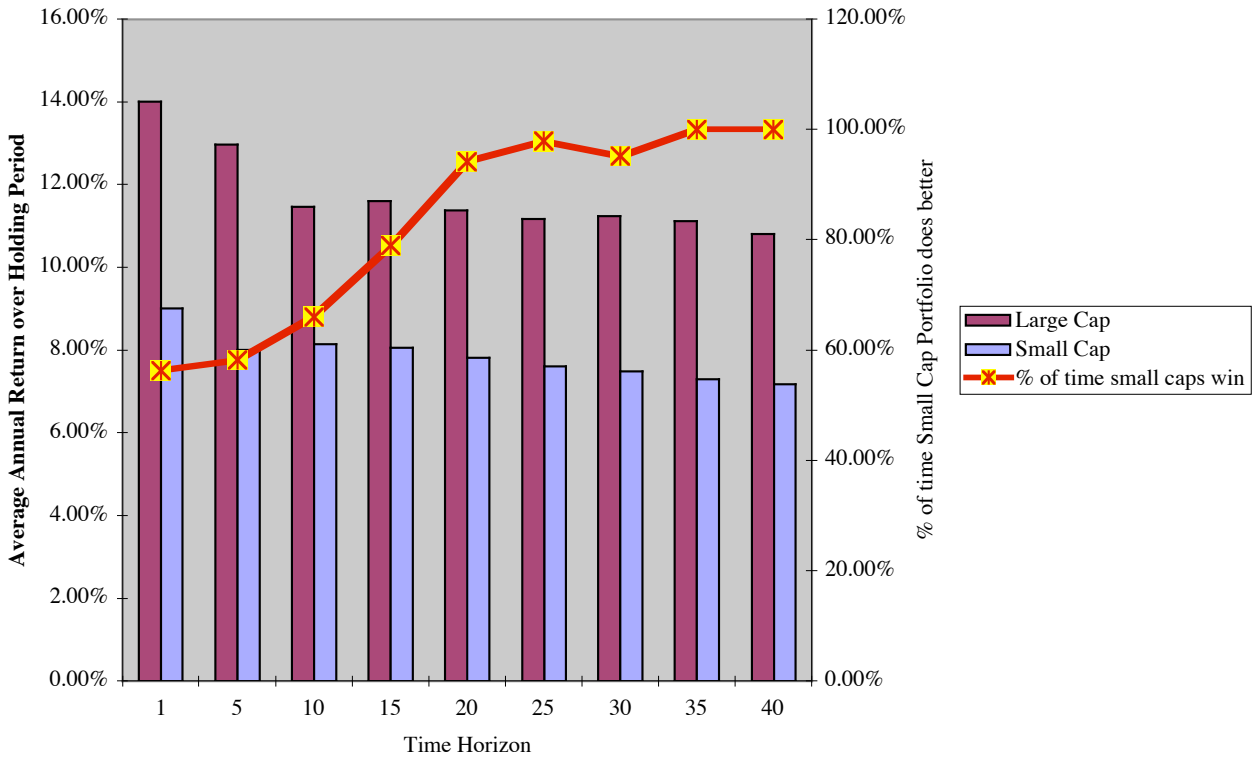


Determinants of Success at Small Cap Investing

- The importance of discipline and diversification become even greater, if you are a small cap investor. Since small cap stocks tend to be concentrated in a few sectors, you will need a much larger portfolio to be diversified with small cap stocks. In addition, diversification should also reduce the impact of estimation risk and some information risk.
- When investing in small cap stocks, the responsibility for due diligence will often fall on your shoulders as an investor, since there are often no analysts following the company. You may have to go beyond the financial statements and scour other sources (local newspapers, the firm's customers and competitors) to find relevant information about the company.
- Have a long time horizon.

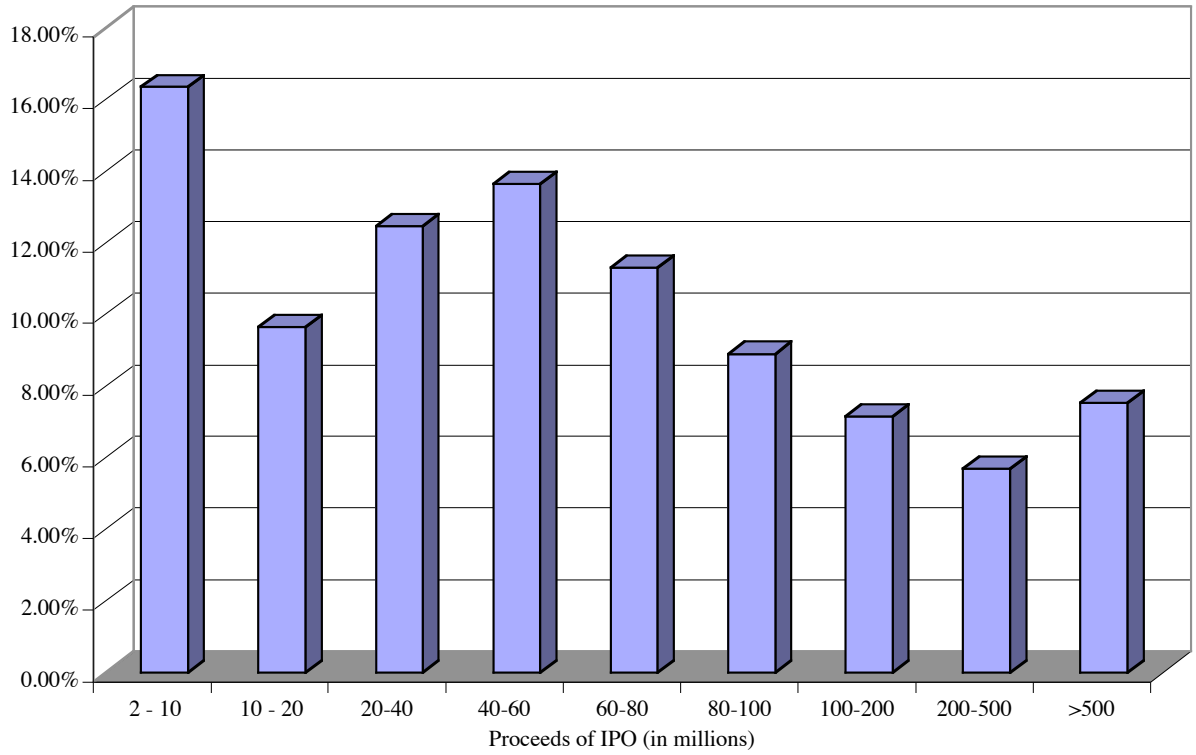
The importance of a long time horizon..

Figure 9.7: Time Horizon and the Small Firm Premium



II. Initial Public Offerings

Figure 9.9: Average Initial Return and Issue Size



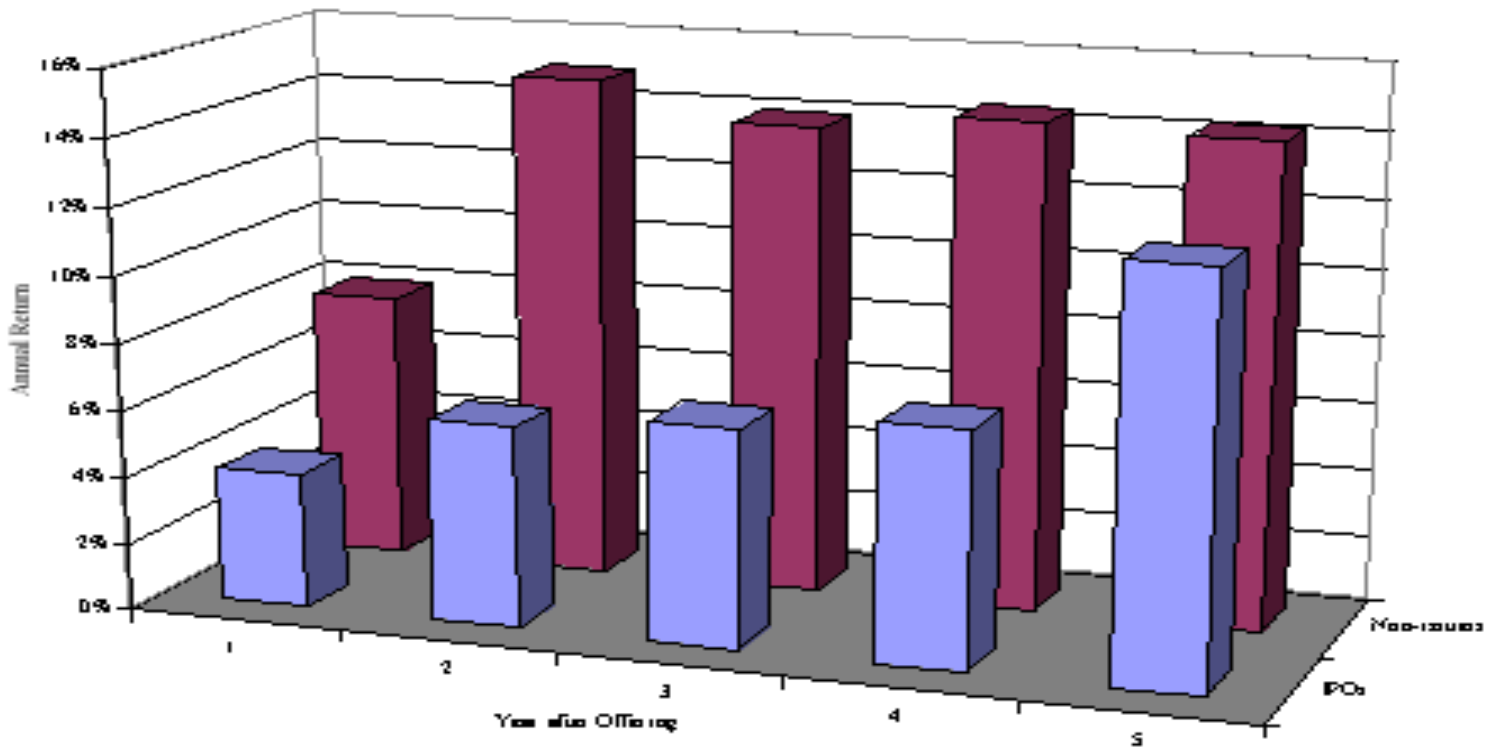
More on IPO pricing…

- The average initial return is 15.8% across a sample of 13,308 initial public offerings. However, about 15% of all initial public offerings are over priced.
- Initial public offerings where the offering price is revised upwards prior to the offering are more likely to be under priced than initial public offerings where the offering price is revised downwards.

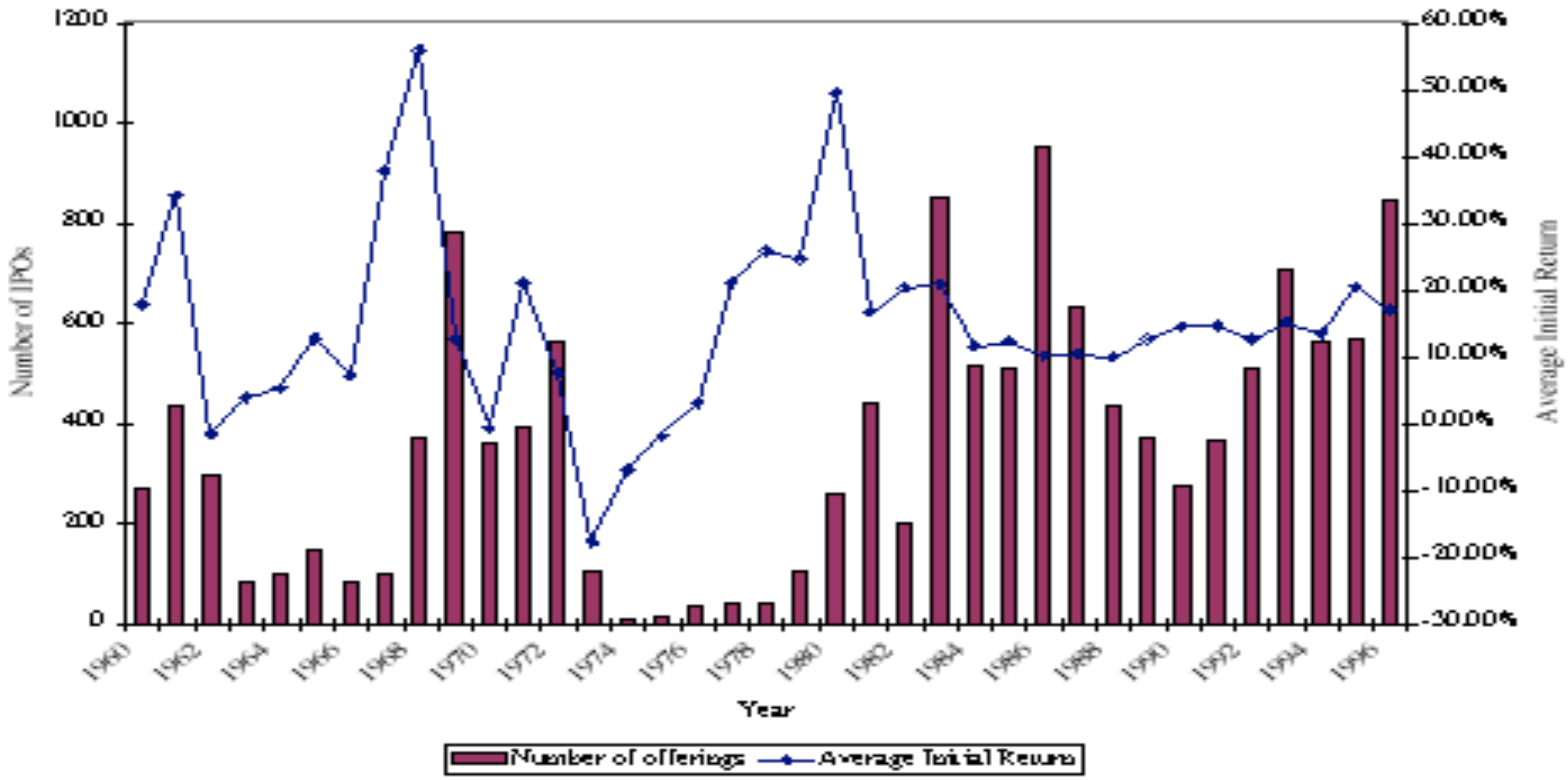
Table 9.1: Average Initial Return – Offering Price Revision

Offering price	*Number of IPOs*	*Average initial return*	*% of offerings underpriced*
Revised down	708	3.54%	53%
Revised up	642	30.22%	95%

What happens after the IPO?



The IPO Cycle



Determinants of Success at IPO investing

- Have the valuation skills to value companies with limited information and considerable uncertainty about the future, so as to be able to identify the companies that are under or over priced.
- Since this is a short term strategy, often involving getting the shares at the offering price and flipping the shares on the offering date, you will have to gauge the market mood and demand for each offering, in addition to assessing its value. In other words, a shift in market mood can leave you with a large allotment of over-priced shares in an initial public offering.
- Play the allotment game well, asking for more shares than you want in companies which you view as severely under priced and fewer or no shares in firms that are overpriced or that are priced closer to fair value.

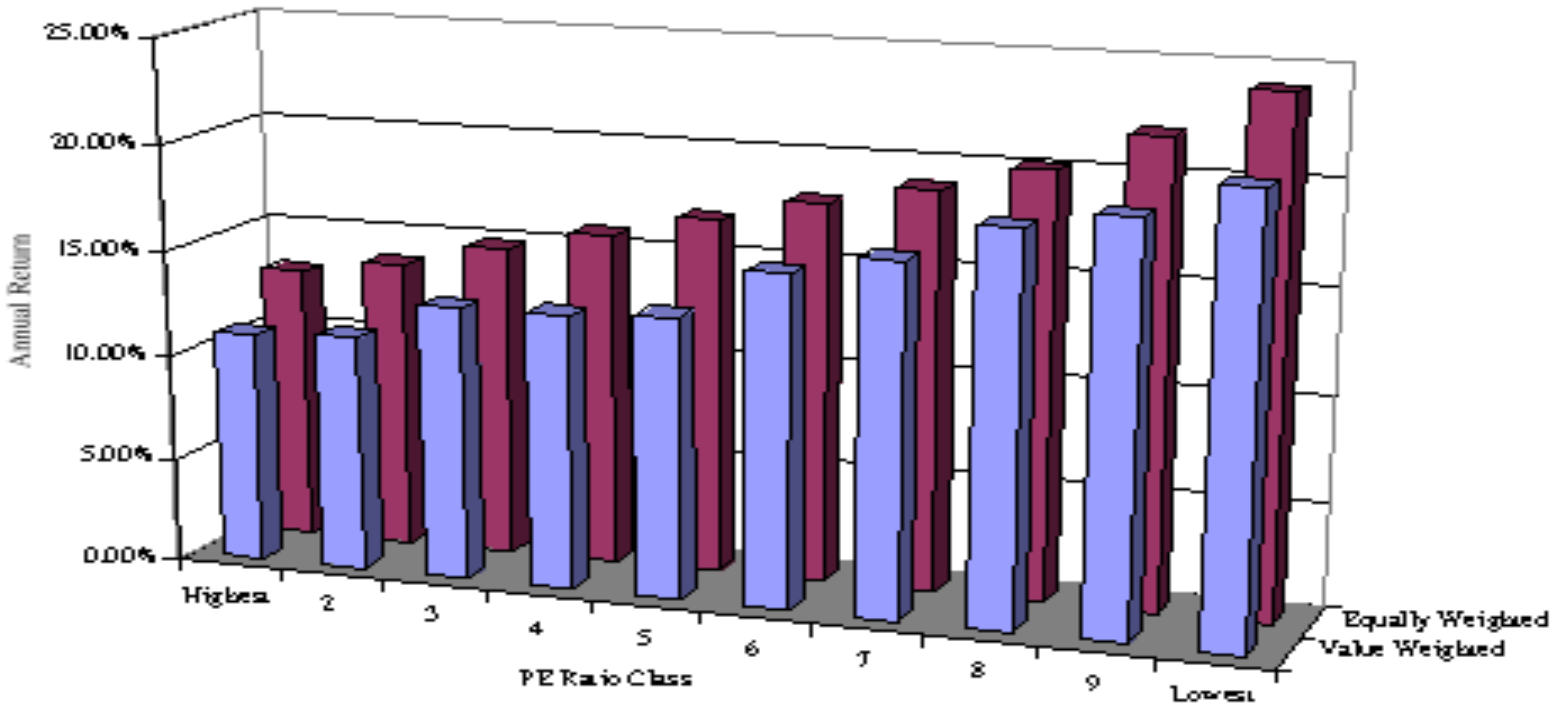
III. The Passive Screener

- In passive screening, you look for stocks that possess characteristics that you believe identify companies where growth is most likely to be under valued.
- Typical screens may include the ratio of price earnings to growth (called the PEG ratio) and earnings growth over time (called earnings momentum)

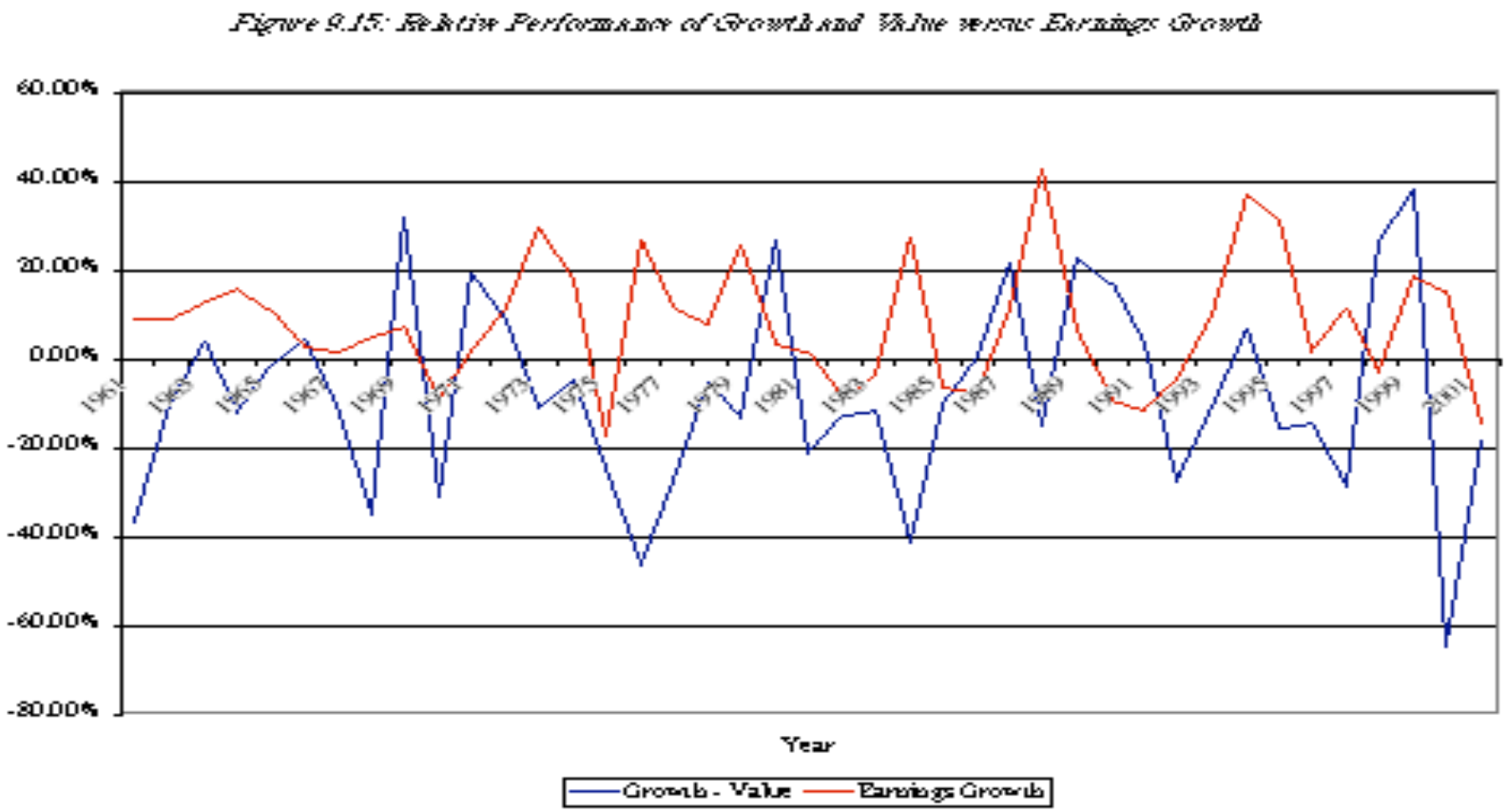
a. Earnings Growth Screens

- Historical Growth: Strategies that focus on buying stocks with high historical earnings growth show no evidence of generating excess returns because
  - Earnings growth is volatile
  - There is substantial mean reversion in earnings growth rates. The growth rates of all companies tend to move towards the average.
  - Revenue growth is more predictable than earnings growth.
- Expected Earnings Growth: Picking stocks that have high expected growth rates in earnings does not seem to yield much in terms of high returns, because the growth often is over priced.

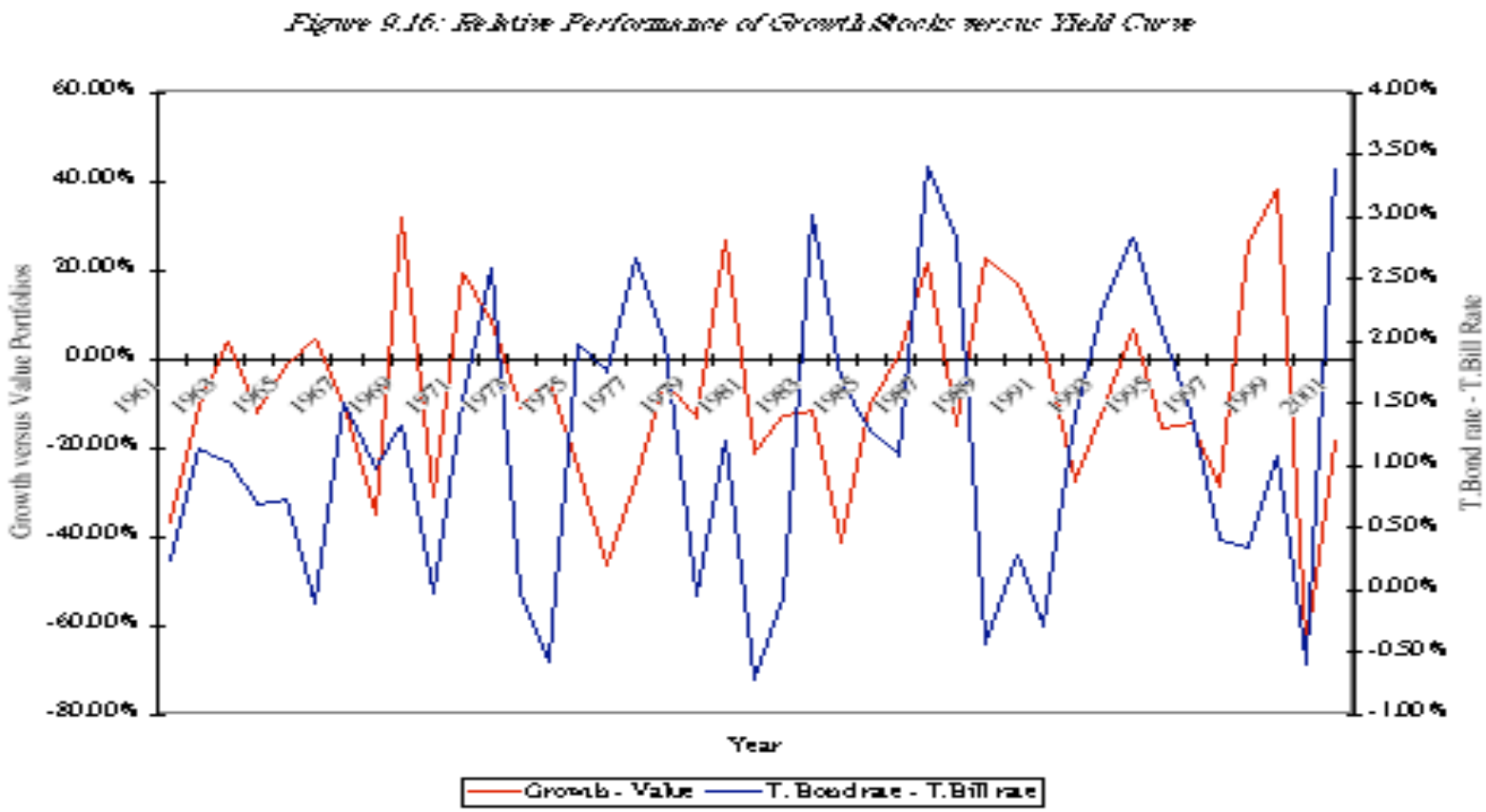
b. High PE Ratio Stocks



But there are periods when growth outperforms value..

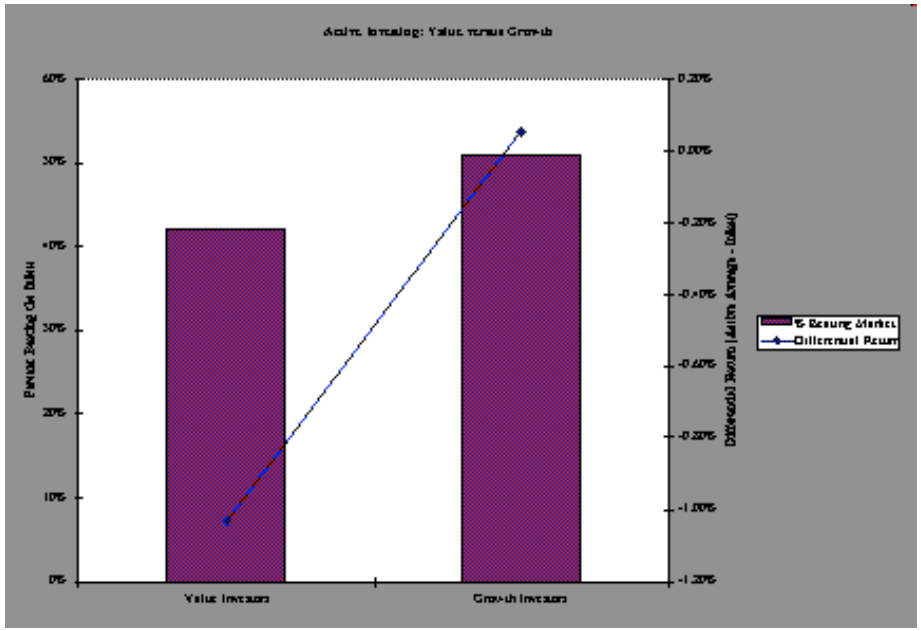


Especially when the yield curve is flat or downward sloping..



Furthermore..

- And active growth investors seem to beat growth indices more often than value investors beat value indices.



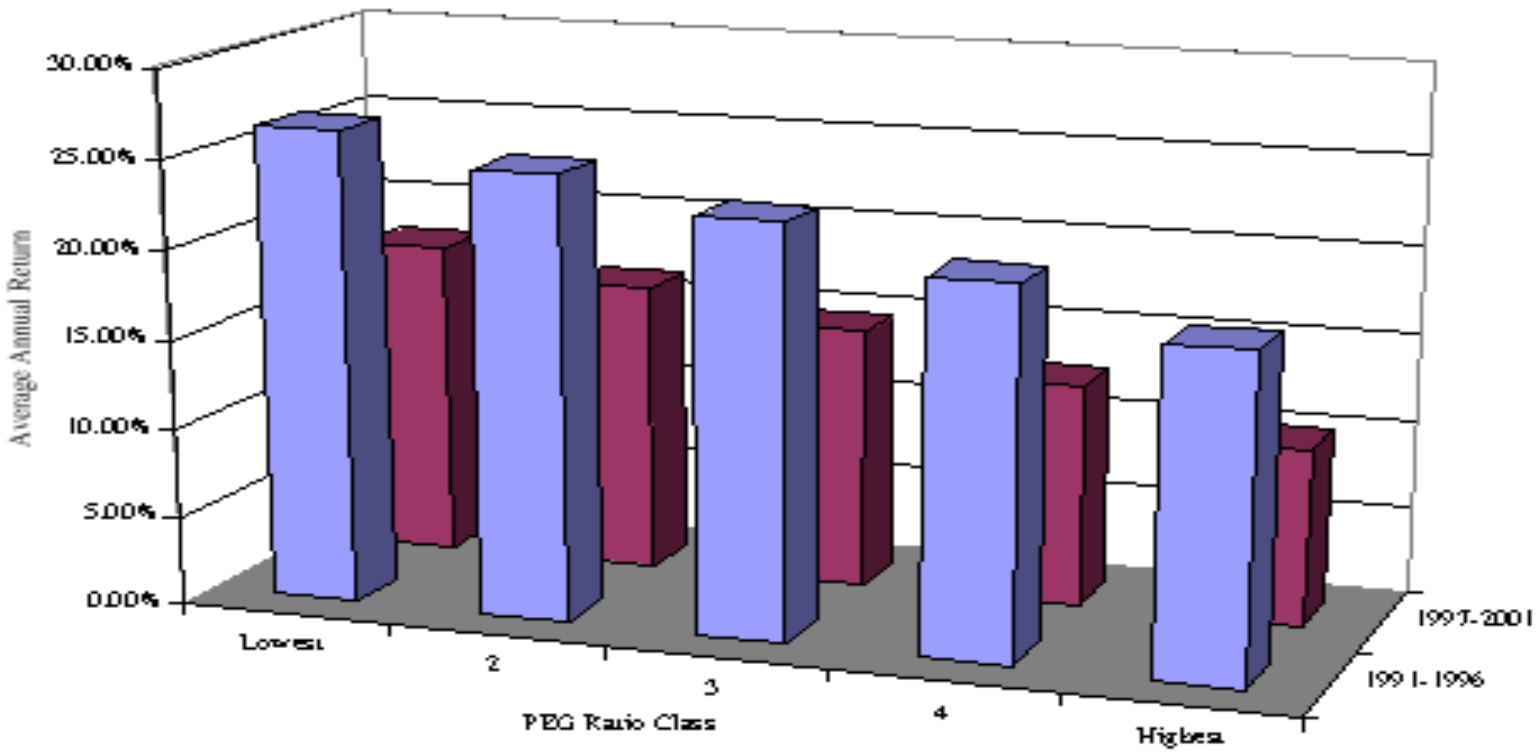
3. PE Ratios and Expected Growth Rates

- Strategy 1: Buy stocks that trade at PE ratios that are less than their expected growth rates. While there is little evidence that buying stocks with PE ratios less than the expected growth rate earns excess returns, this strategy seems to have gained credence as a viable strategy among investors. It is intuitive and simple, but not necessarily a good strategy.
- Strategy 2: Buy stocks that trade at a low ratio of PE to expected growth rate (PEG), relative to other stocks. On the PEG ratio front, the evidence is mixed. A Morgan Stanley study found that investing in stocks with low PEG ratios did earn higher returns than the S&P 500, before adjusting for risk.

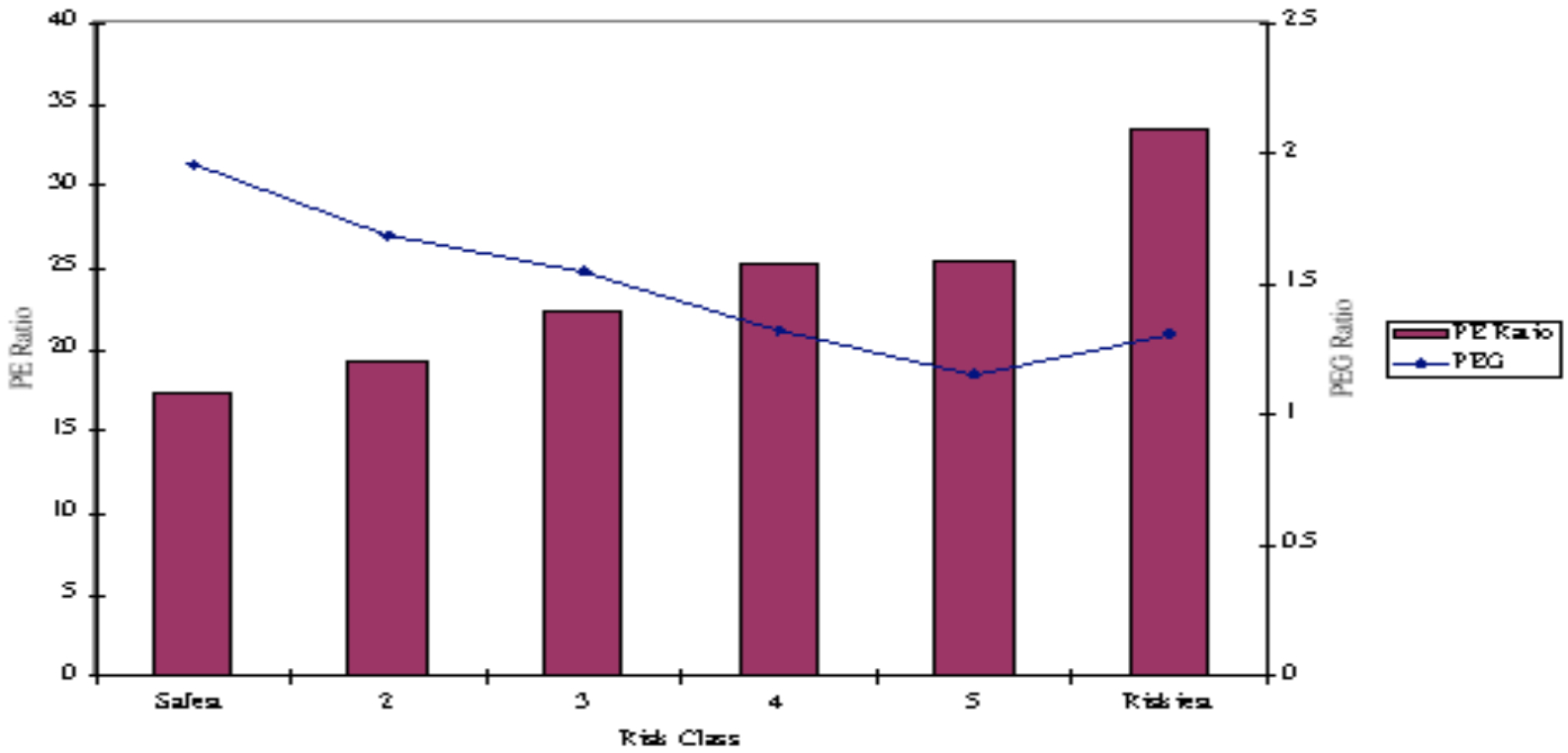
Buy if PE < Expected Growth rate?

- This strategy can be inherently dangerous. You are likely to find a lot of undervalued stocks when interest rates are high.
- Even when interest rates are low, you are likely to find very risky stocks coming through this screens as undervalued.

A Low PEG Ratio = undervalued?



But low PEG stocks tend to be risky…



To be a successful passive growth investor..

- *Superior judgments on growth prospects*: Since growth is the key dimension of value in these companies, obtaining better estimates of expected growth and its value should improve your odds of success.
- *Long Time Horizon*: If your underlying strategy is sound, a long time horizon increases your chances of earning excess returns.
- *Market Timing Skills*: There are extended cycles where the growth screens work exceptionally well and other cycles where they are counter productive. If you can time these cycles, you could augment your returns substantially. Since many of these cycles are related to how the overall market is doing, this boils down to your market timing ability.

Activist Growth Investing

- The first are venture capital funds that trace their lineage back to the 1950s. One of the first was American Research and Development that provided seed money for the founding of Digital Equipment.
- The second are leveraged buyout funds that developed during the 1980s, using substantial amounts of debt to take over publicly traded firms and make them private firms.
- Private equity funds that pool the wealth of individual investors and invest in private firms that show promise. This has allowed investors to invest in private businesses without either giving up diversification or taking an active role in managing these firms. Pension funds and institutional investors, attracted by the high returns earned by investments in private firms, have also set aside portions of their overall portfolios to invest in private equity.

The Payoff to Private Equity and Venture Capital Investing: Thru 2001

Fund Type	*1 Yr*	*3 Yr*	*5 Yr*	*10 Yr*	*20 Yr*
Early/Seed Venture Capital	-36.3	81	53.9	33	21.5
Balanced Venture Capital	-30.9	45.9	33.2	24	16.2
Later Stage Venture Capital	-25.9	27.8	22.2	24.5	17
All Venture Capital	-32.4	53.9	37.9	27.4	18.2
All Buyouts	-16.1	2.9	8.1	12.7	15.6
Mezzanine	3.9	10	10.1	11.8	11.3
All Private Equity	-21.4	16.5	17.9	18.8	16.9

To be a successful activist growth investor…

- Pick your companies (and managers) well: Good venture capitalists seem to have the capacity to find the combination of ideas and management that make success more likely.
- Diversify: The rate of failure is high among private equity investments, making it critical that you spread your bets. The earlier the stage of financing – seed money, for example – the more important it is that you diversify.
- Support and supplement management: Venture capitalists are also management consultants and strategic advisors to the firms that they invest in. If they do this job well, they can help the managers of these firms convert ideas into commercial success.
- Protect your investment as the firm grows: As the firm grows and attracts new investment, you as the venture capitalist will have to protect your share of the business from the demands of those who bring in fresh capital.
- Know when to get out: Having a good exit strategy seems to be as critical as having a good entrance strategy. Know how and when to get out of an investment is critical to protecting your returns.

Value Investing

Aswath Damodaran

Who is a value investor?

- *The Conventional Definition:* A value investor is one who invests in low price-book value or low price-earnings ratios stocks.
- *The Generic Definition:* A value investor is one who pays a price which is less than the value of the assets in place of a firm.

The Different Faces of Value Investing Today

- *Passive Screeners*: Following in the Ben Graham tradition, you screen for stocks that have characteristics that you believe identify under valued stocks. Examples would include low PE ratios and low price to book ratios.
- *Contrarian Investors*: These are investors who invest in companies that others have given up on, either because they have done badly in the past or because their future prospects look bleak.
- *Activist Value Investors*: These are investors who invest in poorly managed and poorly run firms but then try to change the way the companies are run.

I. The Passive Screener

- This approach to value investing can be traced back to Ben Graham and his screens to find undervalued stocks.
- In recent years, these screens have been refined and extended. The following section summarizes the empirical evidence that backs up each of these screens.

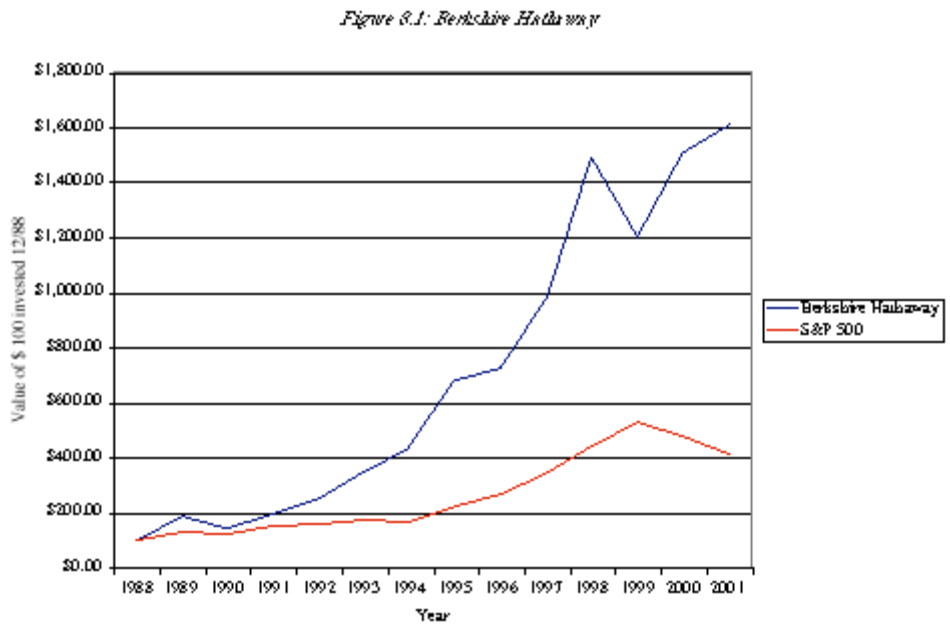
A. Ben Graham' Screens

1. PE of the stock has to be less than the inverse of the yield on AAA Corporate Bonds:
2. PE of the stock has to less than 40% of the average PE over the last 5 years.
3. Dividend Yield > Two-thirds of the AAA Corporate Bond Yield
4. Price < Two-thirds of Book Value
5. Price < Two-thirds of Net Current Assets
6. Debt-Equity Ratio (Book Value) has to be less than one.
7. Current Assets > Twice Current Liabilities
8. Debt < Twice Net Current Assets
9. Historical Growth in EPS (over last 10 years) > 7%
10. No more than two years of negative earnings over the previous ten years.

How well do Graham's screen's perform?

- A study by Oppenheimer concluded that stocks that passed the Graham screens would have earned a return well in excess of the market.
- Mark Hulbert who evaluates investment newsletters concluded that newsletters that used screens similar to Graham's did much better than other newsletters.
- However, an attempt by James Rea to run an actual mutual fund using the Graham screens failed to deliver the promised returns.
- Graham's best claim to fame comes from the success of the students who took his classes at Columbia University. Among them were Charlie Munger and Warren Buffett.

The Buffett Mystique



Buffett's Tenets

- *Business Tenets*:
  - The business the company is in should be simple and understandable.
  - The firm should have a consistent operating history, manifested in operating earnings that are stable and predictable.
  - The firm should be in a business with favorable long term prospects.
- *Management Tenets:*
  - The managers of the company should be candid. As evidenced by the way he treated his own stockholders, Buffett put a premium on managers he trusted. • The managers of the company should be leaders and not followers.
- *Financial Tenets:*
  - The company should have a high return on equity. Buffett used a modified version of what he called owner earnings

    Owner Earnings = Net income + Depreciation & Amortization – Capital Expenditures
  - The company should have high and stable profit margins.
- *Market Tenets:*
  - Use conservative estimates of earnings and the riskless rate as the discount rate.
  - In keeping with his view of Mr. Market as capricious and moody, even valuable companies can be bought at attractive prices when investors turn away from them.

Be like Buffett?

- Markets have changed since Buffett started his first partnership. Even Warren Buffett would have difficulty replicating his success in today's market, where information on companies is widely available and dozens of money managers claim to be looking for bargains in value stocks.
- In recent years, Buffett has adopted a more activist investment style and has succeeded with it. To succeed with this style as an investor, though, you would need substantial resources and have the credibility that comes with investment success. There are few investors, even among successful money managers, who can claim this combination.
- The third ingredient of Buffett's success has been patience. As he has pointed out, he does not buy stocks for the short term but businesses for the long term. He has often been willing to hold stocks that he believes to be under valued through disappointing years. In those same years, he has faced no pressure from impatient investors, since stockholders in Berkshire Hathaway have such high regard for him.

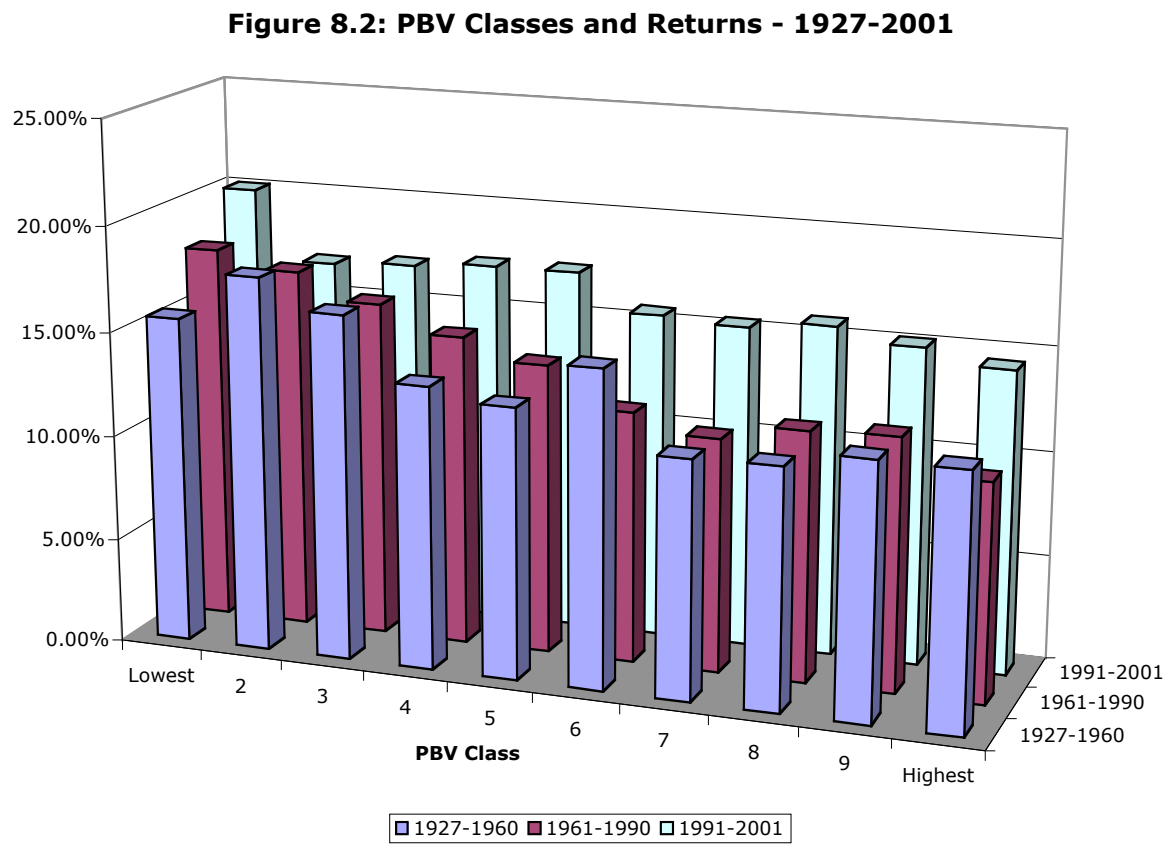
Value Screens

- Price to Book ratios: Buy stocks where equity trades at less than or at least a low multiple of the book value of equity.
- Price earnings ratios: Buy stocks where equity trades at a low multiple of equity earnings.
- Price to sales ratio: Buy stocks where equity trades at a low multiple of revenues.
- Dividend Yields: Buy stocks with high dividend yields.

1. Price/Book Value Screens

- A low price book value ratio has been considered a reliable indicator of undervaluation in firms.
- The empirical evidence suggests that over long time periods, low price-book values stocks have outperformed high price-book value stocks and the overall market.

Low Price/BV Ratios and Excess Returns



Low PBV Effect in International Markets

- Their annualized estimates of the return differential earned by stocks with low price-book value ratios, over the market index, were as follows:

Country	*Added Return to low P/BV portfolio*
France	3.26%
Germany	1.39%
Switzerland	1.17%
U.K	1.09%
Japan	3.43%
U.S.	1.06%
Europe	1.30%
Global	1.88%

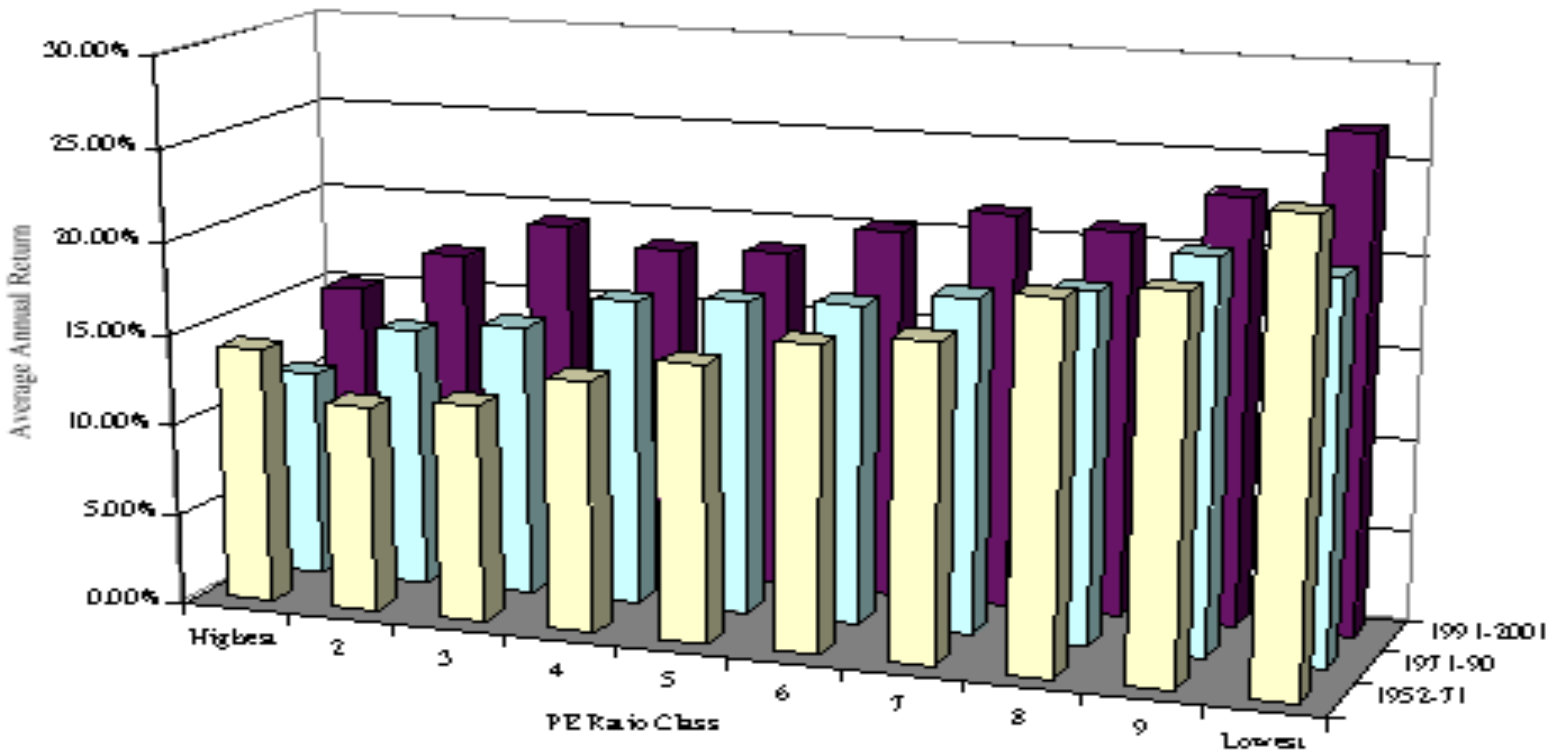
Improving on the Price to Book Screen: Looking for stocks with low Price to book and high ROE

Year	*Undervalued Portfolio*	*Overvalued Portfolio*	*S & P 500*
1982	37.64%	14.64%	40.35%
1983	34.89%	3.07%	0.68%
1984	20.52%	-28.82%	15.43%
1985	46.55%	30.22%	30.97%
1986	33.61%	0.60%	24.44%
1987	-8.80%	-0.56%	-2.69%
1988	23.52%	7.21%	9.67%
1989	37.50%	16.55%	18.11%
1990	-26.71%	-10.98%	6.18%
1991	74.22%	28.76%	31.74%
1982-91	*25.60%*	*10.61%*	*17.49%*

2. Price/Earnings Ratio Screens

- Investors have long argued that stocks with low price earnings ratios are more likely to be undervalued and earn excess returns. For instance, this is one of Ben Graham's primary screens.
- Studies which have looked at the relationship between PE ratios and excess returns confirm these priors.

The Low PE Effect



The International PE Effect

Country	*Annual Premium earned by lowest P/E Stocks (bottom quintile)*
Australia	3.03%
France	6.40%
Germany	1.06%
Hong Kong	6.60%
Italy	14.16%
Japan	7.30%
Switzerland	9.02%
U.K.	2.40%

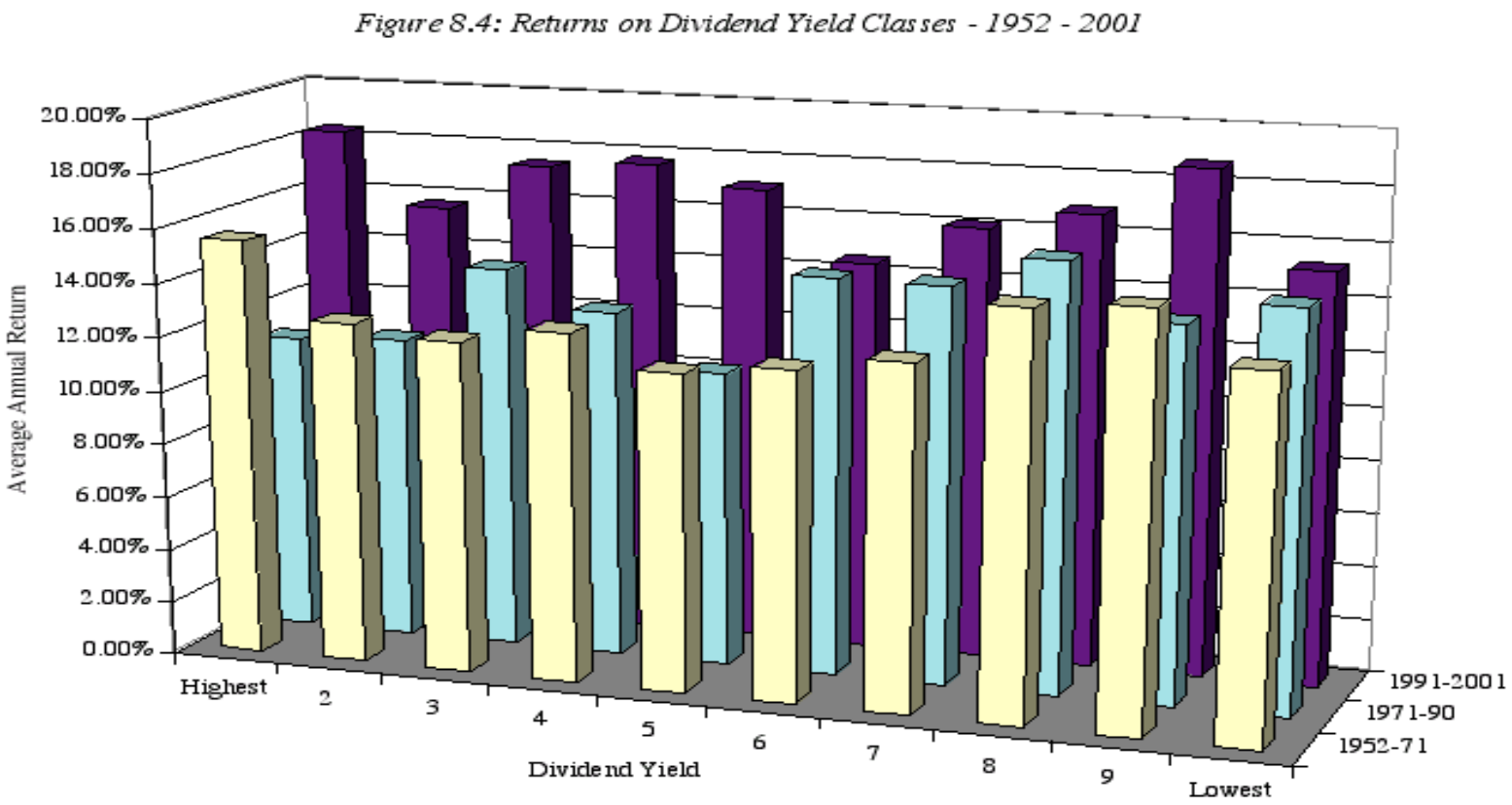
3. Price/Sales Ratio Screens

- Senchack and Martin (1987) compared the performance of low price-sales ratio portfolios with low price-earnings ratio portfolios, and concluded that the low price-sales ratio portfolio outperformed the market but not the low price-earnings ratio portfolio.
- Jacobs and Levy (1988a) concluded that low price-sales ratios, by themselves, yielded an excess return of 0.17% a month between 1978 and 1986, which was statistically significant. Even when other factors were thrown into the analysis, the price-sales ratios remained a significant factor in explaining excess returns (together with price-earnings ratio and size)

Composite Screens: Stocks with low price to sales ratios and high margins

Year	*Undervalued Portfolio*	*Overvalued Portfolio*	*S & P 500*
1982	50.34%	17.72%	40.35%
1983	31.04%	6.18%	0.68%
1984	12.33%	-25.81%	15.43%
1985	53.75%	28.21%	30.97%
1986	27.54%	3.48%	24.44%
1987	-2.28%	8.63%	-2.69%
1988	24.96%	16.24%	9.67%
1989	16.64%	17.00%	18.11%
1990	-30.35%	-17.46%	6.18%
1991	91.20%	55.13%	31.74%
1982-91	23.76%	15.48%	17.49%

4. Dividend Yields



To be a successful passive value investor…

1. **Have a long time horizon**. All the studies quoted above look at returns over time horizons of five years or greater. In fact, low price-book value stocks have underperformed high price-book value stocks over shorter time periods.
2. **Choose your screens wisely**: Too many screens can undercut the search for excess returns since the screens may end up eliminating just those stocks that create the positive excess returns.
3. **Be diversified**: The excess returns from these strategies often come from a few holdings in large portfolio. Holding a small portfolio may expose you to extraordinary risk and not deliver the same excess returns.
4. **Watch out for taxes and transactions costs**: Some of the screens may end up creating a portfolio of low-priced stocks, which, in turn, create larger transactions costs.

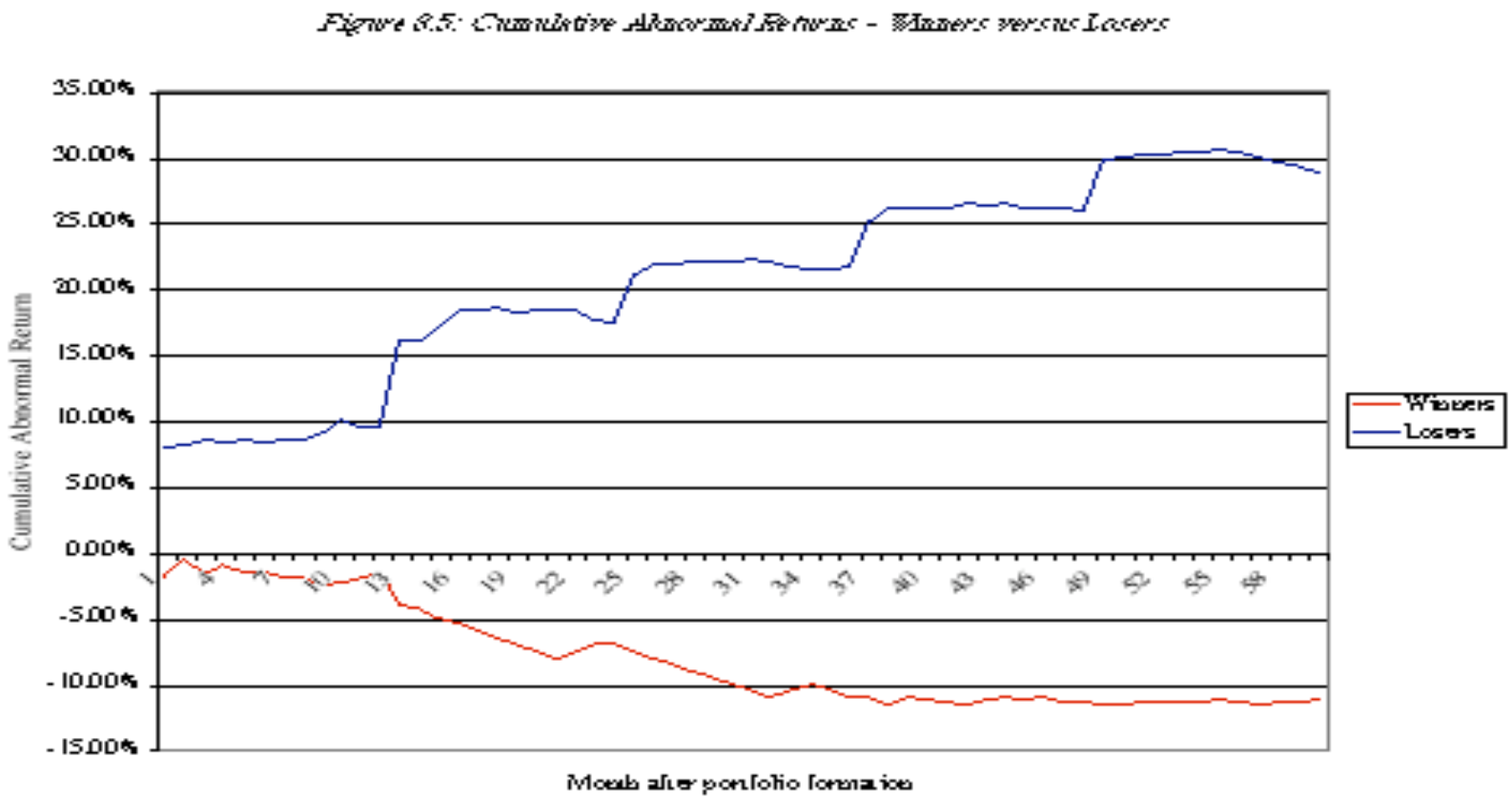
II. Contrarian Value Investing: Buying the Losers

- In contrarian value investing, you begin with the proposition that markets over react to good and bad news. Consequently, stocks that have had bad news come out about them (earnings declines, deals that have gone bad) are likely to be under valued.
- Evidence that Markets Overreact to News Announcements
  - Studies that look at returns on markets over long time periods chronicle that there is significant negative serial correlation in returns, I.e, good years are more likely to be followed by bad years and vice versal.
  - Studies that focus on individual stocks find the same effect, with stocks that have done well more likely to do badly over the next period, and vice versa.

1. Winner and Loser portfolios

- Since there is evidence that prices reverse themselves in the long term for entire markets, it might be worth examining whether such price reversals occur on classes of stock within a market.
- For instance, are stocks which have gone up the most over the last period more likely to go down over the next period and vice versa?
- To isolate the effect of such price reversals on the extreme portfolios, DeBondt and Thaler constructed a winner portfolio of 35 stocks, which had gone up the most over the prior year, and a loser portfolio of 35 stocks, which had gone down the most over the prior year, each year from 1933 to 1978,
- They examined returns on these portfolios for the sixty months following the creation of the portfolio.

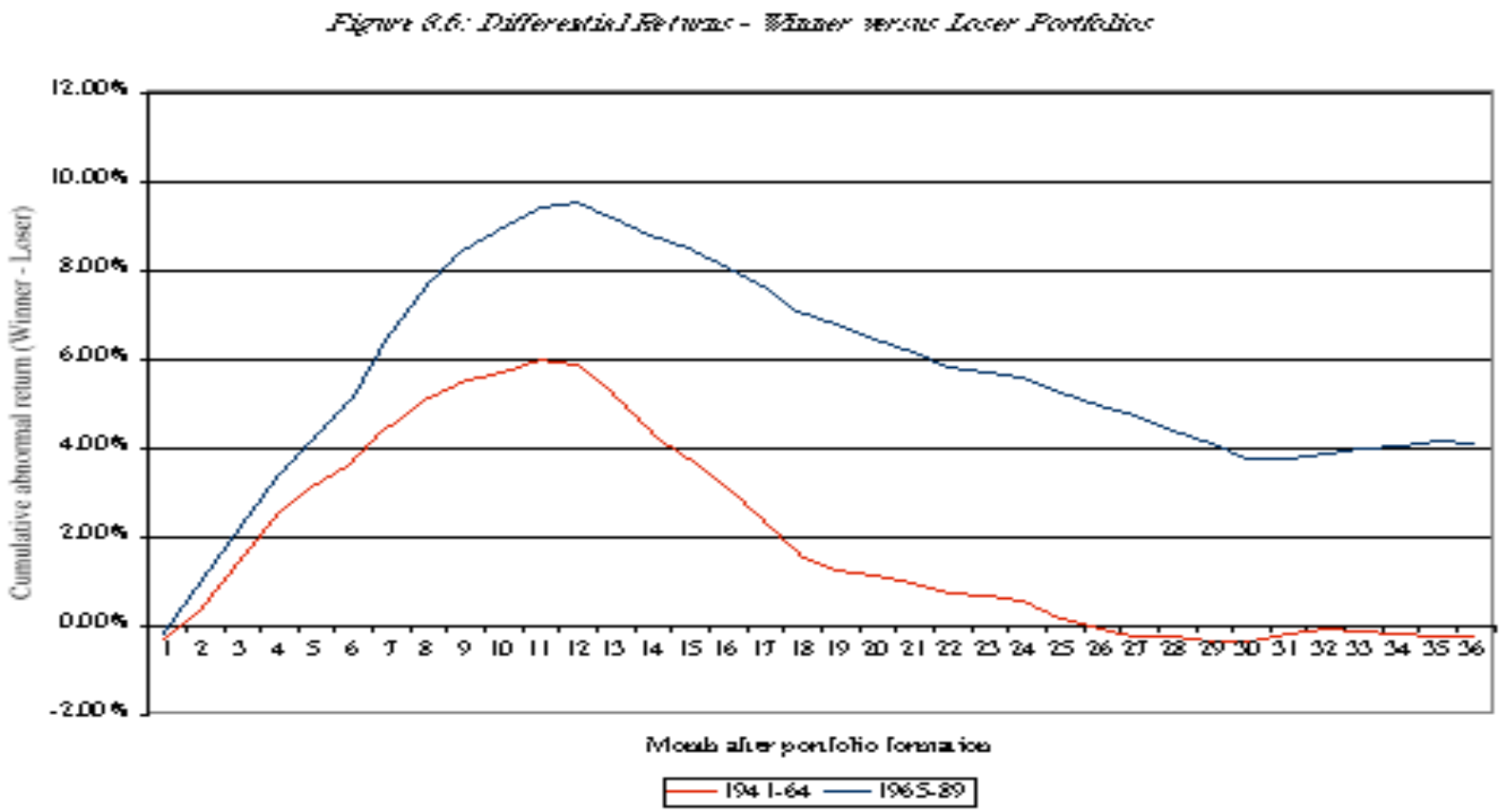
Excess Returns for Winner and Loser Portfolios



More on Winner and Loser Portfolios

- This analysis suggests that loser portfolio clearly outperform winner portfolios in the sixty months following creation. This evidence is consistent with market overreaction and correction in long return intervals.
- There are many, academics as well as practitioners, who suggest that these findings may be interesting but that they overstate potential returns on 'loser' portfolios.
- There is evidence that loser portfolios are more likely to contain low priced stocks (selling for less than $5), which generate higher transactions costs and are also more likely to offer heavily skewed returns, i.e., the excess returns come from a few stocks making phenomenal returns rather than from consistent performance.
- Studies also seem to find loser portfolios created every December earn significantly higher returns than portfolios created every June.
- Finally, you need a long time horizon for the loser portfolio to win out.

Loser Portfolios and Time Horizon

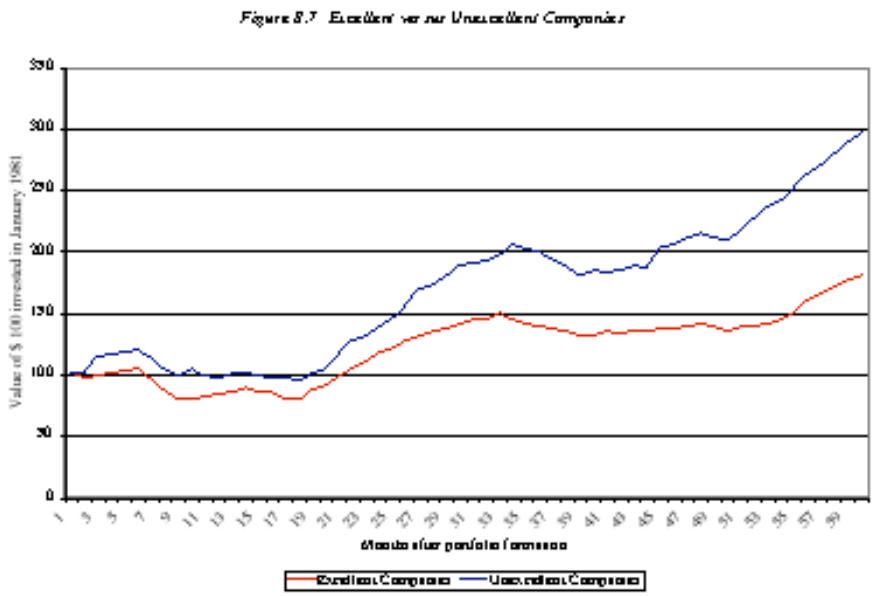


2. Good Companies are not necessarily Good Investments

- Any investment strategy that is based upon buying well-run, good companies and expecting the growth in earnings in these companies to carry prices higher is dangerous, since it ignores the reality that the current price of the company may reflect the quality of the management and the firm.
- If the current price is right (and the market is paying a premium for quality), the biggest danger is that the firm loses its lustre over time, and that the premium paid will dissipate.
- If the market is exaggerating the value of the firm, this strategy can lead to poor returns even if the firm delivers its expected growth.
- It is only when markets under estimate the value of firm quality that this strategy stands a chance of making excess returns.

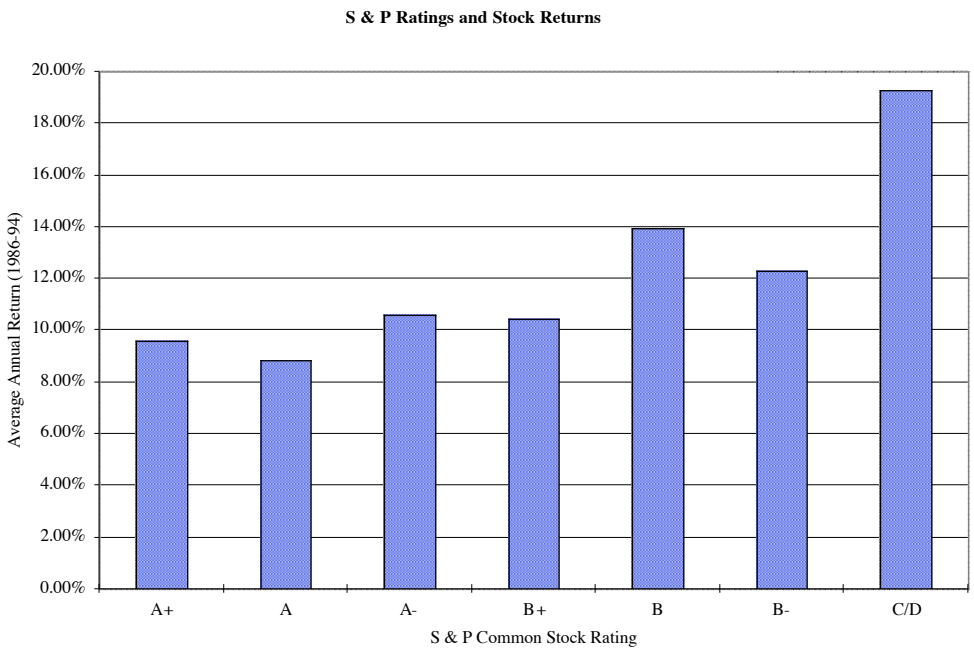
1. Excellent versus Unexcellent Companies

- There is evidence that well managed companies do not always make great investments. For instance, there is evidence that excellent companies (using the Tom Peters standard) earn poorer returns than "unexcellent companies".



2. *Risk/Return by S&P Quality Indices*

- Conventional ratings of company quality and stock returns seem to be negatively correlated.



To be a successful contrarian value investor…

1. **Self Confidence**: Investing in companies that everybody else views as losers requires a self confidence that comes either from past success, a huge ego or both.
2. **Clients/Investors who believe in you**: You either need clients who think like you do and agree with you, or clients that have made enough money of you in the past that their greed overwhelms any trepidiation you might have in your portfolio.
3. **Patience**: These strategies require time to work out. For every three steps forward, you will often take two steps back.
4. **Stomach for Short-term Volatility**: The nature of your investment implies that there will be high short term volatility and high profile failures.
5. **Watch out for transactions costs**: These strategies often lead to portfolios of low priced stocks held by few institutional investors. The transactions costs can wipe out any perceived excess returns quickly.

III. Activist Value Investing

- An activist value investor having acquired a stake in an "undervalued" company which might also be "badly" managed then pushes the management to adopt those changes which will unlock this value. For instance,
- If the value of the firm is less than its component parts:
  - push for break up of the firm, spin offs, split offs etc.
- If the firm is being too conservative in its use of debt:
  - push for higher leverage and recapitalization
- If the firm is accumulating too much cash:
  - push for higher dividends, stock repurchases ..
- If the firm is being badly managed:
  - push for a change in management or to be acquired
- If there are gains from a merger or acquisition
  - push for the merger or acquisition, even if it is hostile

a. Breaking up is hard to do… Effects of Spin offs, Split offs, Divestitures on Value

- The overall empirical evidence is that spin offs, split offs and divestitures all have a positive effect on value.
- Linn and Rozeff (1984) examined the price reaction to announcements of divestitures by firms and reported an average excess return of 1.45% for 77 divestitures between 1977 and 1982.

More on Spin Offs, Split Offs etc..

- Markets view firms that are evasive about reasons for and proceeds from divestitures with skepticism. Linn and Rozeff report the following -
- *Market Reaction to Divestiture Announcements*

	Price Announced	*Motive Announced*
	Yes	No
Yes	3.92%	2.30%
No	0.70%	0.37%

- Schipper and Smith (1983) examined 93 firms that announced **spin offs** between 1963 and 1981 and reported an average excess return of **2.84%** in the two days surrounding the announcement. Further, there is evidence that excess returns **increase with the magnitude of the spun off entity**.
- Finally, Schipper and Smith find evidence that the **excess returns are greater** for firms in which the spin off is motivated by **tax and regulatory concerns**.

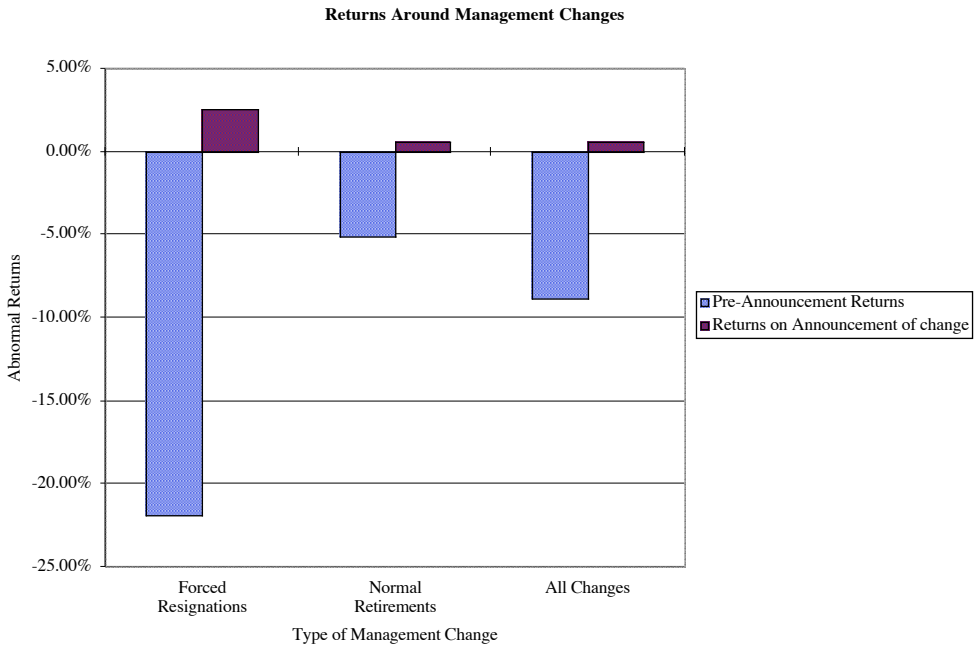
b. Some firms have too little debt…Effects of Leverage Increasing and Decreasing Transactions

- The overall empirical evidence suggest that leverage increasing transactions increase value whereas leverage reducing transactions decrease value.

Type of transaction	*Security Issued*	*Security Retired*	*Sample Size*	*2-Day Return*
Leverage-Increasing Transactions				
Stock Repurchase	Debt	Common	45	21.9%
Exchange Offer	Debt	Common	52	14.0%
Exchange Offer	Preferred	Common	9	8.3%
Exchange Offer	Debt	Preferred	24	2.2%
Exchange Offer	Bonds	Preferred	24	2.2%
Transactions with no change in leverage				
Exchange Offer	Debt	Debt	36	0.6%
Security Sale	Debt	Debt	83	0.2%
Leverage-Reducing Transactions				
Conversion-forcing call	Common	Convertible	57	-0.4%
Conversion-forcing call	Common	Preferred	113	-2.1%
Security Sale	Conv. Debt	Conv. Debt	15	-2.4%
Exchange Offer	Common	Debt	30	-2.6%
Exchange Offer	Preferred	Preferred	9	-7.7%
Security Sale	Common	Debt	12	-4.2%
Exchange Offer	Common	Debt	20	-9.9%

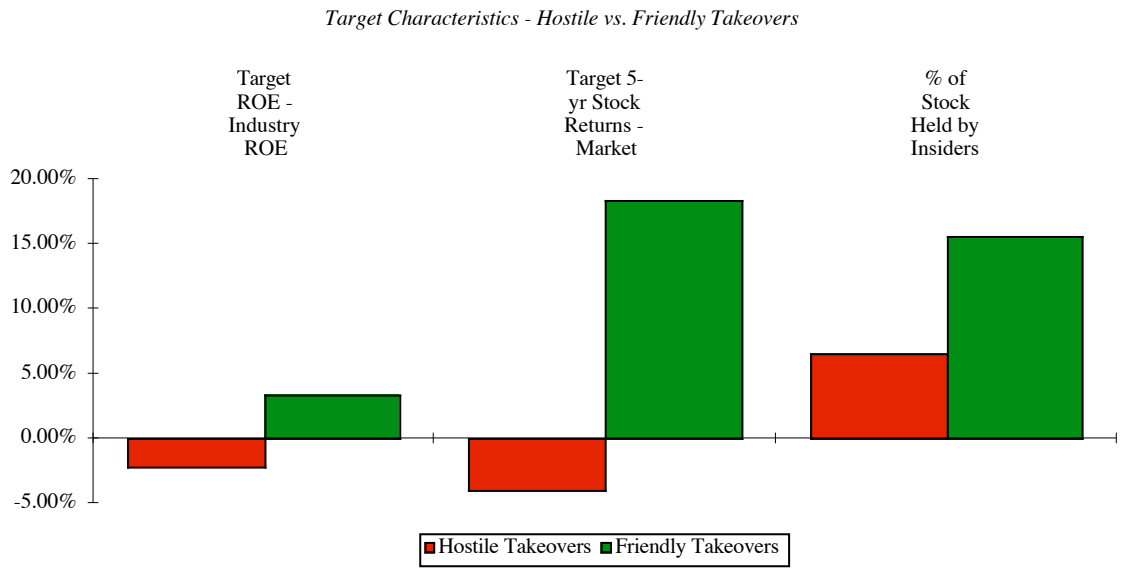
c. Effects of Management Changes on Firm Value

- The overall empirical evidence suggests that changes in management are generally are viewed as good news.

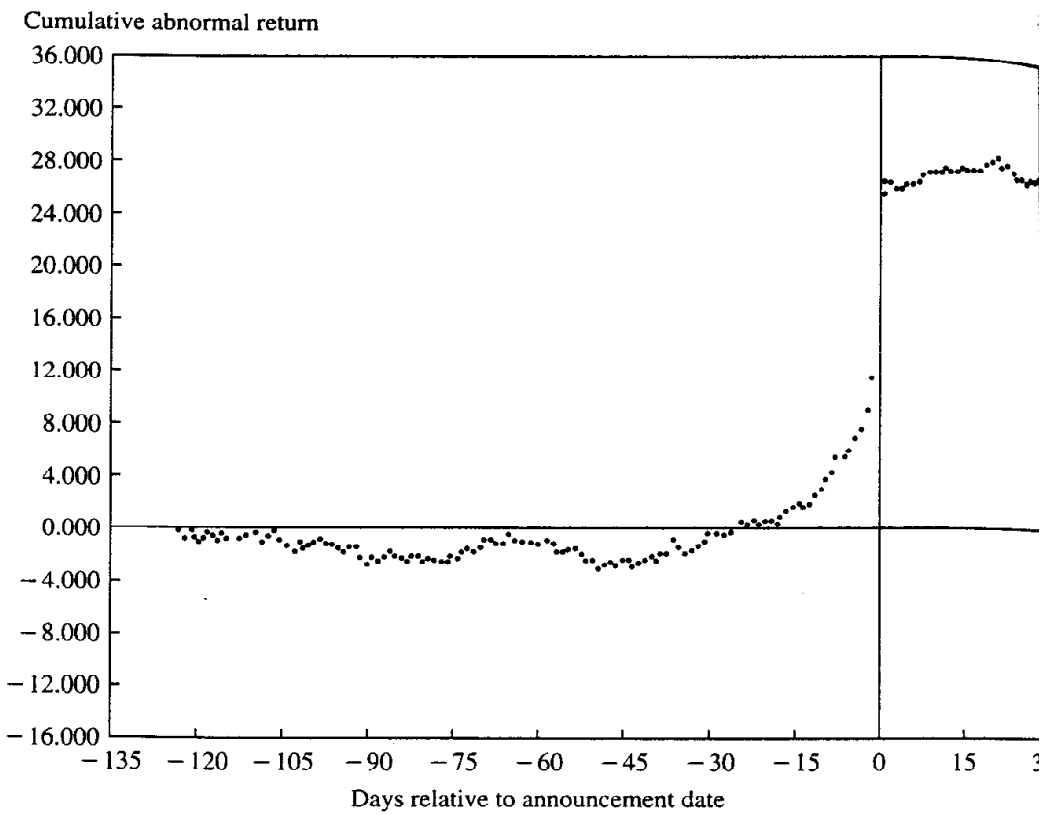


d. The Effects of Hostile Acquisitions on the Target Firm

- Badly managed firms are much more likely to be targets of acquistions than well managed firms



And acquisitions are clearly good for the target firm's stockholders



To be a successful activist value investor…

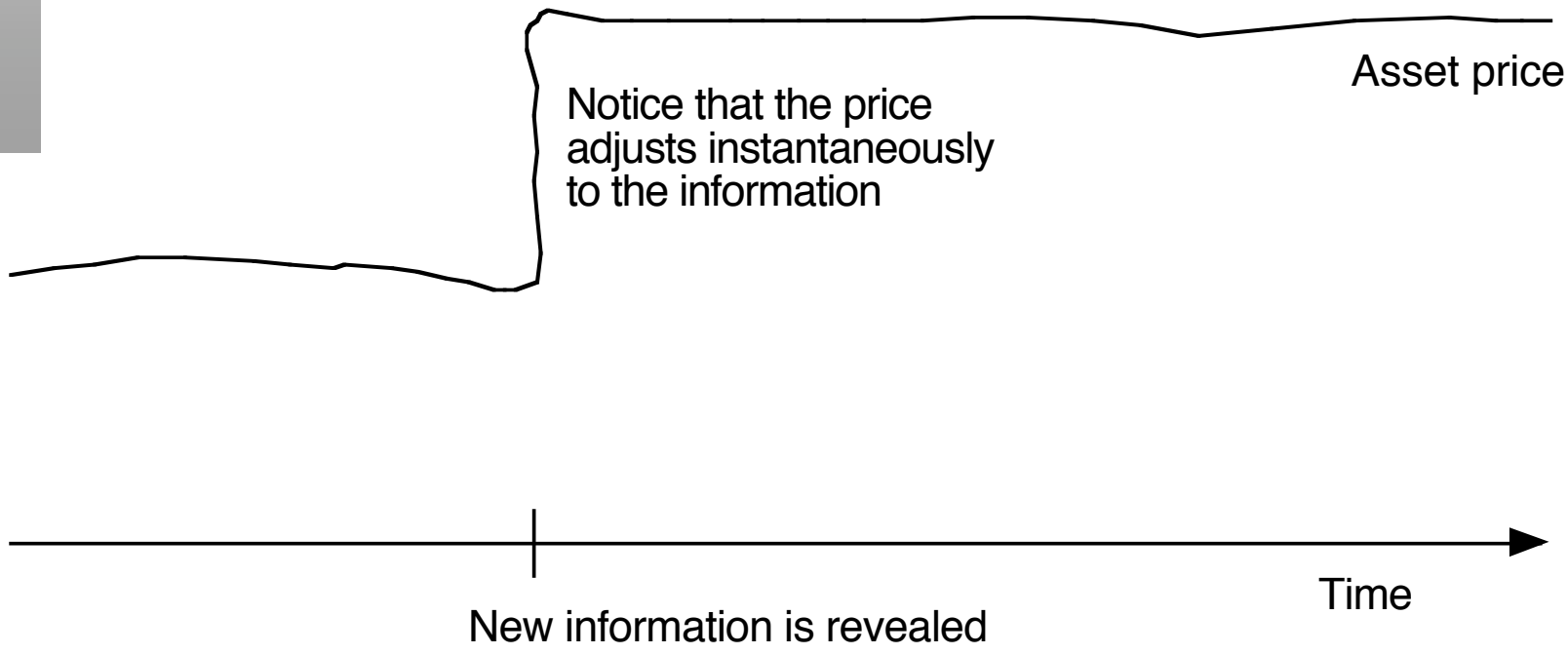
1. **Have lots of capital**: Since this strategy requires that you be able to put pressure on incumbent management, you have to be able to take significant stakes in the companies.
2. **Know your company well**: Since this strategy is going to lead a smaller portfolio, you need to know much more about your companies than you would need to in a screening model.
3. **Understand corporate finance**: You have to know enough corporate finance to understand not only that the company is doing badly (which will be reflected in the stock price) but what it is doing badly.
4. **Be persistent**: Incumbent managers are unlikely to roll over and play dead just because you say so. They will fight (and fight dirty) to win. You have to be prepared to counter.
5. **Do your homework**: You have to form coalitions with other investors and to organize to create the change you are pushing for.

Information Trading

Aswath Damodaran

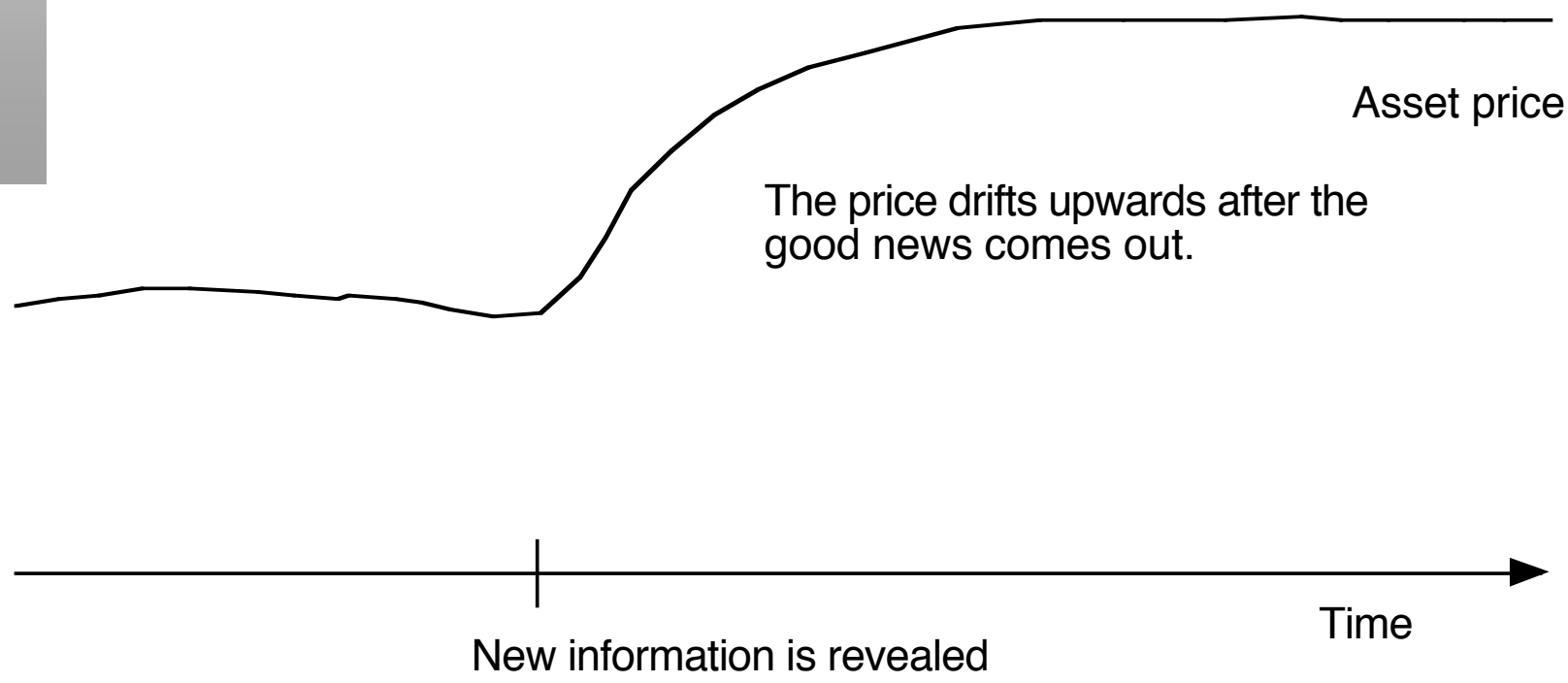
Information and Prices in an Efficient Market

Figure 10.1: Price Adjustment in an Efficient Market



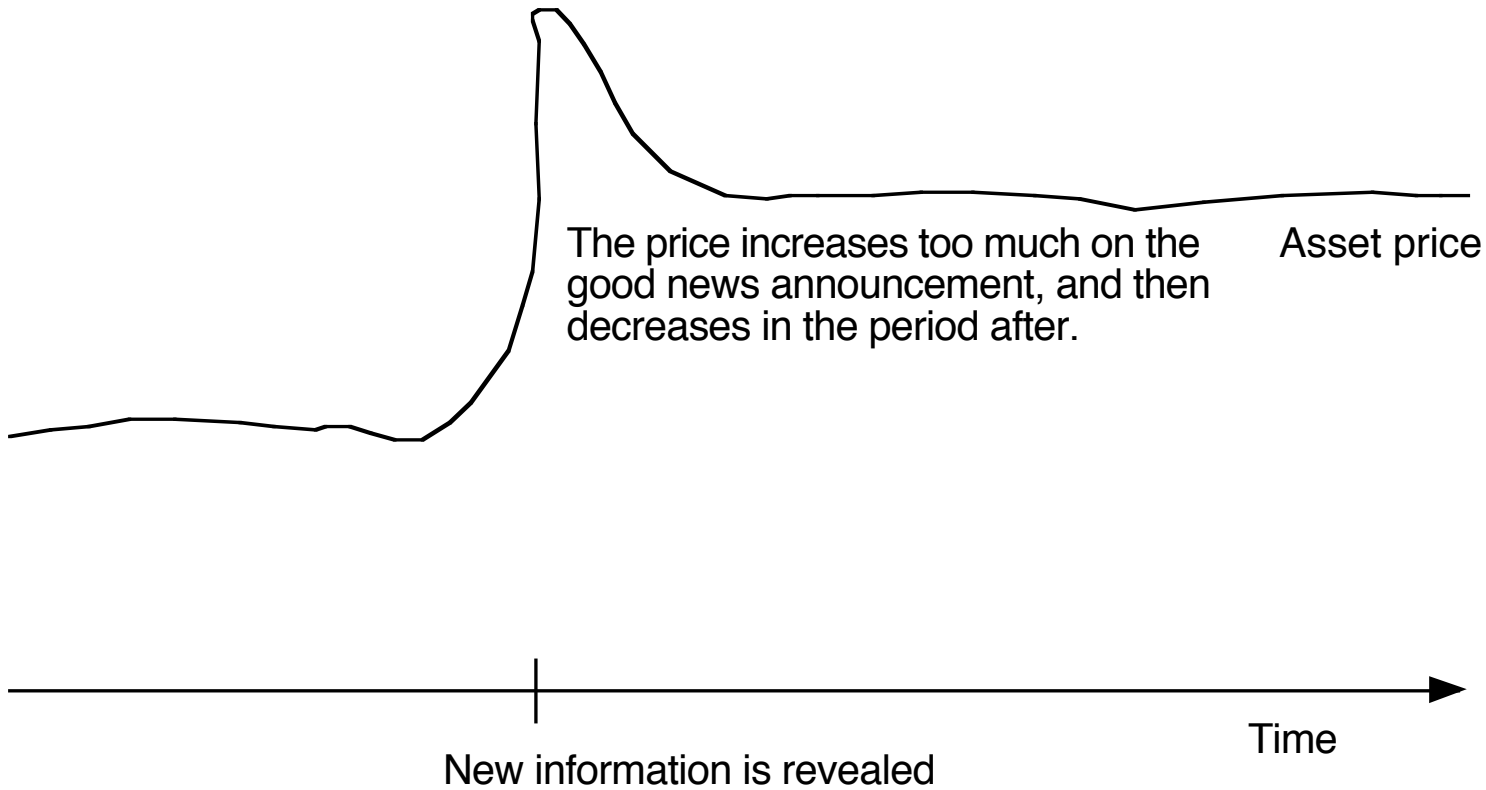
A Slow Learning Market…

Figure 10.2 A Slow Learning Market



An Overreacting Market

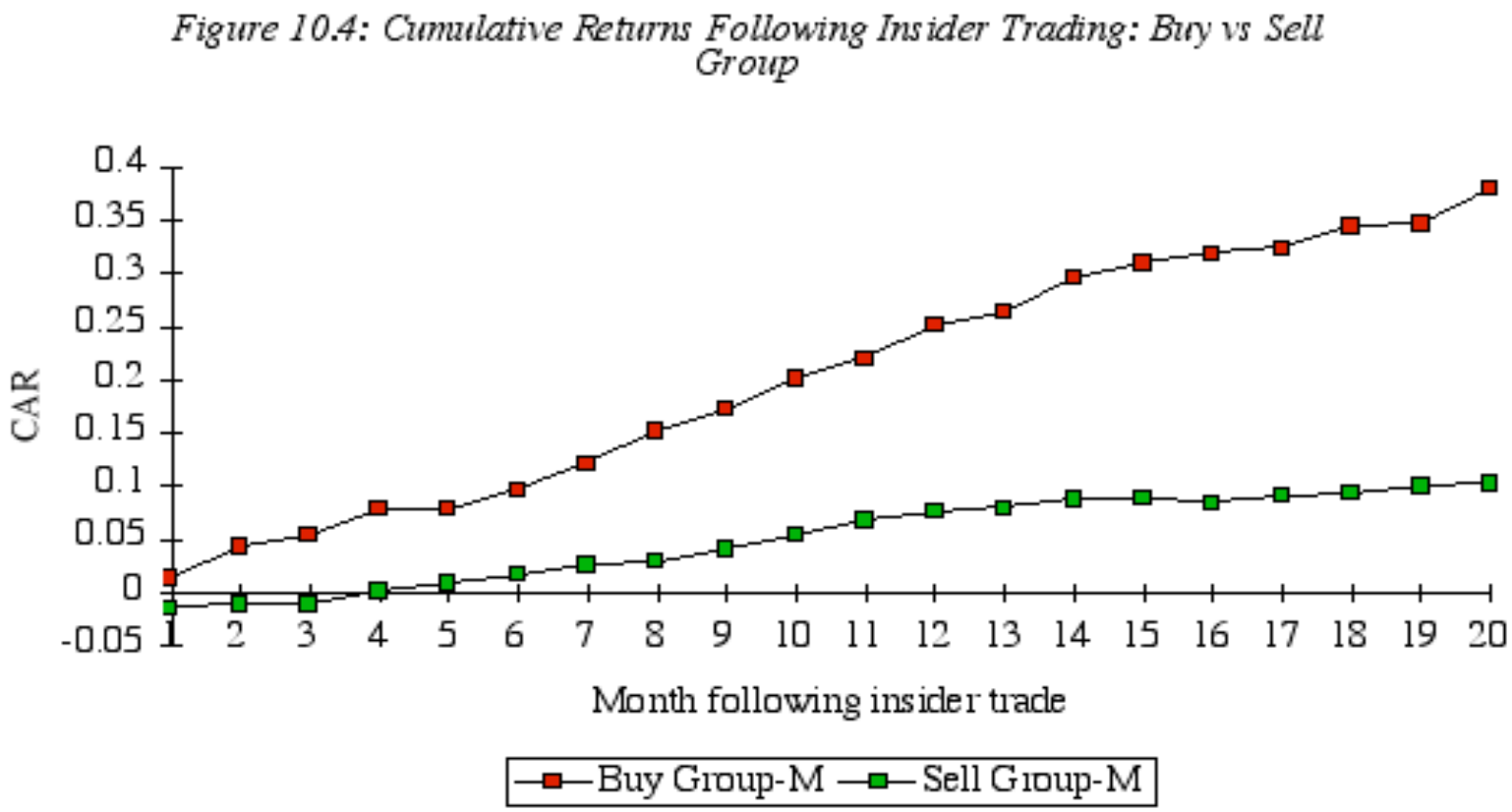
Figure 10.3: An Overreacting Market



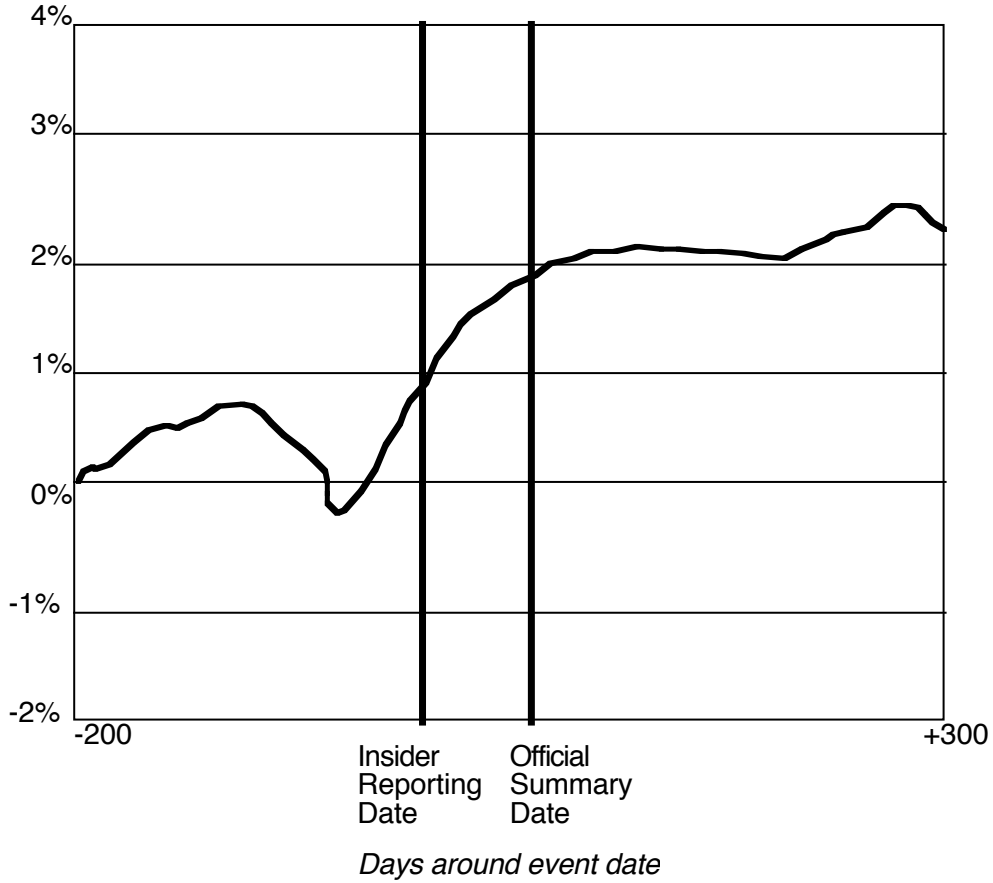
Trading on Private Information

- Insiders are managers, directors or major stockholders in firms.
- Analysts operate at the nexus of private and public information.
- One way to examine whether private information can be used to earn excess returns is to look at whether insiders and analysts earn excess returns.

Insider Trading as a Leading Indicator of Stock prices..



Can you follow insiders and make money?



Are some insiders more inside than others?

- Not all insiders have equal access to information. Top managers and members of the board should be privy to much more important information and thus their trades should be more revealing. A study by Bettis, Vickrey and Vickery finds that investors who focus only on large trades made by top executives, rather than total insider trading may, in fact, be able to earn excess returns.
- As investment alternatives to trading on common stock have multiplied, insiders have also become more sophisticated about using these alternatives. As an outside investor, you may be able to add more value by tracking these alternative investments. For instance, Bettis, Bizjak and Lemmon find that insider trading in derivative securities (options specifically) to hedge their common stock positions increases immediately following price run-ups and prior to poor earnings announcements. In addition, they find that stock prices tend to go down after insiders take these hedging positions.

Illegal Insider Trading: Is it profitable?

- When insiders are caught trading illegally, they almost invariably have made a killing on their investment. Clearly, some insiders made significant returns off their privileged positions.
- Almost all major news announcements made by firms are preceded by a price run-up (if it is good news) or a price drop (if it is bad news). While this may indicate a very prescient market, it is much more likely that someone with access to the privileged information (either at the firm or the intermediaries helping the firm) is using the information to trade ahead of the news. In fact, the other indicator of insider trading is the surge in trading volume in both the stock itself and derivatives prior to big news announcements.
- In addition to having access to information, insiders are often in a position to time the release of relevant information to financial markets. One study find that insiders sell stock between 3 and 9 quarters before their firms report a break in consecutive earnings increases. They also find, for instance, that insider selling increases at growth firms prior to periods of declining earnings.

Analysts

- Analysts have access to public information and to the managers of the firm (and thus to private information).
- Analysts make earnings forecasts for firms (and revise them) and recommendations on buy and sell.

I. Earnings Forecasts

- Analysts spend a considerable amount of time estimating the earnings per share that companies will report in the next quarter. They also provide forecasts of earnings further out - up to 5 years.
- Analysts also constantly update these forecasts as new information comes out. To the extent that there is information in these revisions, stock prices should react.

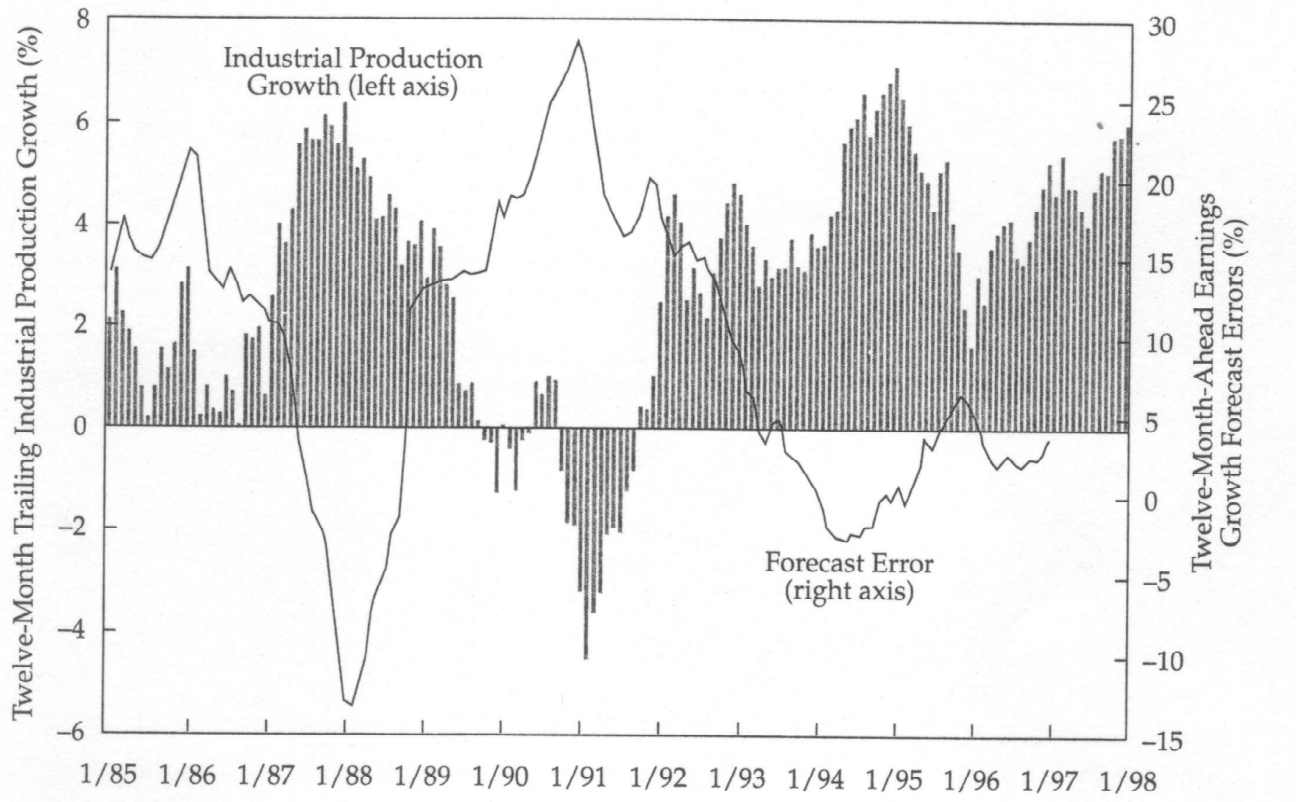
Information in Earnings Forecasts

1. Firm-specific information that has been made public since the last earnings report: Analysts can use information that has come out about the firm since the last earnings report, to make predictions about future growth.
2. Macro-economic information that may impact future growth *:* Analysts can update their projections of future growth as new information comes out about the overall economy and about changes in fiscal and monetary policy.
3. Information revealed by competitors on future prospects*:* Analysts can also condition their growth estimates for a firm on information revealed by competitors on pricing policy and future growth.
4. Private information about the firm: Analysts sometimes have access to private information about the firms they follow which may be relevant in forecasting future growth.
5. Public information other than earnings: It has been shown, for instance, that other financial variables such as earnings retention, profit margins and asset turnover are useful in predicting future growth. Analysts can incorporate information from these variables into their forecasts.

I. Earnings Forecasts

- The general consensus from studies that have looked at short-term forecasts (one quarter ahead to four quarters ahead) of earnings is that analysts provide better forecasts of earnings than models that depend purely upon historical data. The mean relative absolute error, which measures the absolute difference between the actual earnings and the forecast for the next quarter, in percentage terms, is smaller for analyst forecasts than it is for forecasts based upon historical data.
- A study in 1978 measured the squared forecast errors by month of the year and computed the ratio of analyst forecast error to the forecast error from time-series models of earnings. It found that the time series models actually outperform analyst forecasts from April until August, but underperform them from September through January.
- The other study by O'Brien (1988) found that analyst forecasts outperform the time series model for one-quarter ahead and two-quarter ahead forecasts, do as well as the time series model for three-quarter ahead forecasts and do worse than the time series model for four-quarter ahead forecasts.

Analyst Errors seem to be related to macroeconomic conditions…



How about long term forecasts?

- There is little evidence to suggest that analysts provide superior forecasts of earnings when the forecasts are over three or five years. An early study by Cragg and Malkiel compared long-term forecasts by five investment management firms in 1962 and 1963 with actual growth over the following three years to conclude that analysts were poor long term forecasters.
- This view was contested in 1988 by Vander Weide and Carleton who found that the consensus prediction of five-year growth in the I/B/E/S was superior to historically oriented growth measures in predicting future growth.

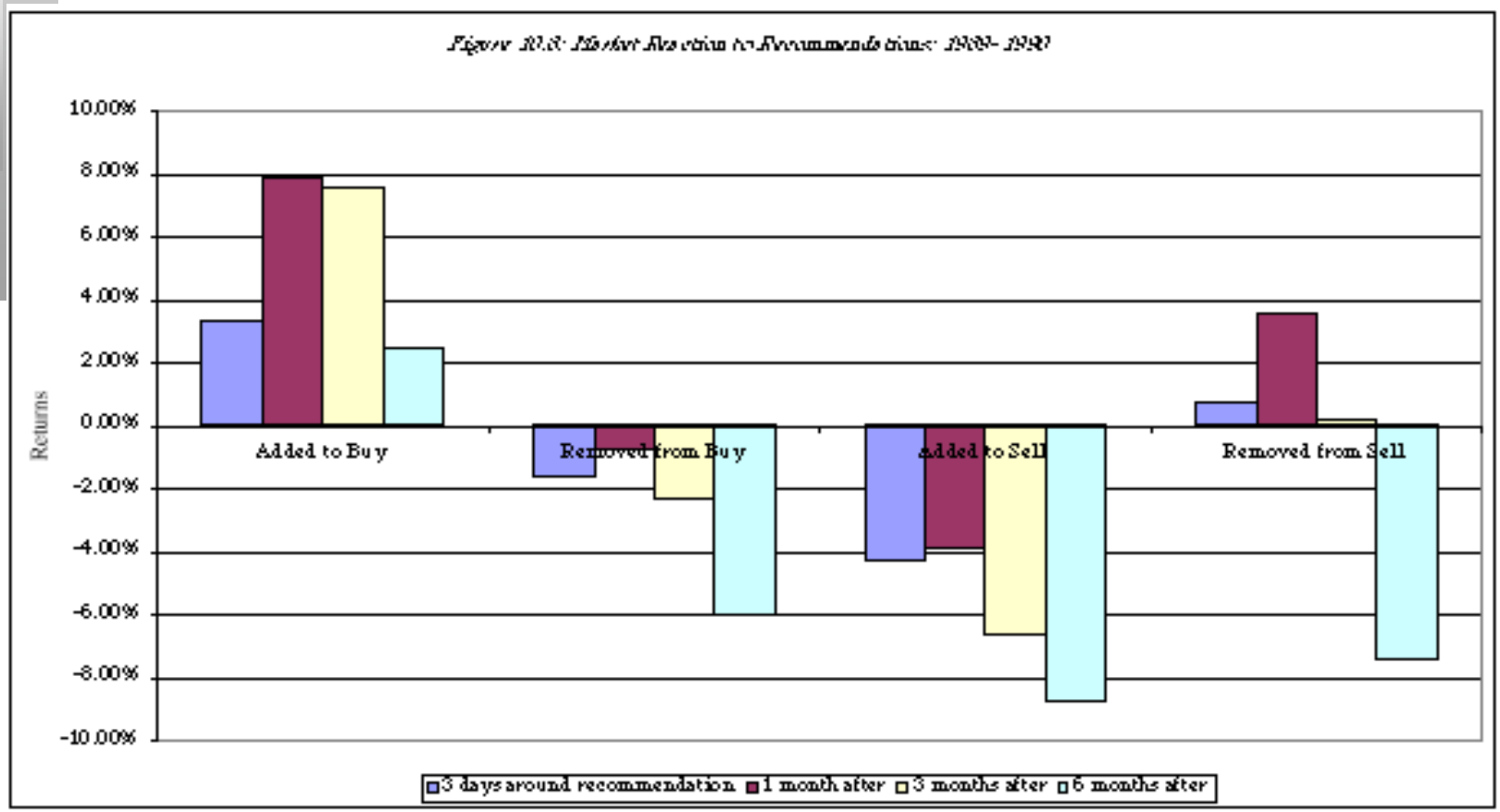
II. Earnings Revisions…

- In one of the earliest studies of this phenomenon, Givoly and Lakonishok created portfolios of 49 stocks in three sectors, based upon earnings revisions, and reported earning an excess return on 4.7% over the following four months on the stocks with the most positive revisions.
- Hawkins, in 1983, reported that a portfolio of stocks with the 20 largest upward revisions in earnings on the I/B/E/S database would have earned an annualized return of 14% as opposed to the index return of only 7%.
- In another study, Cooper, Day and Lewis report that much of the excess returns is concentrated in the weeks around the revision – 1.27% in the week before the forecast revision, and 1.12% in the week after, and that analysts that they categorize as leaders (based upon timeliness, impact and accuracy) have a much greater impact on both trading volume and prices.
- In 2001, Capstaff, Paudyal and Rees expanded the research to look at earnings forecasts in other countries and concluded that you could have earned excess returns of 4.7% in the U.K, 2% in France and 3.3% in Germany from buying stocks with the most positive revisions.

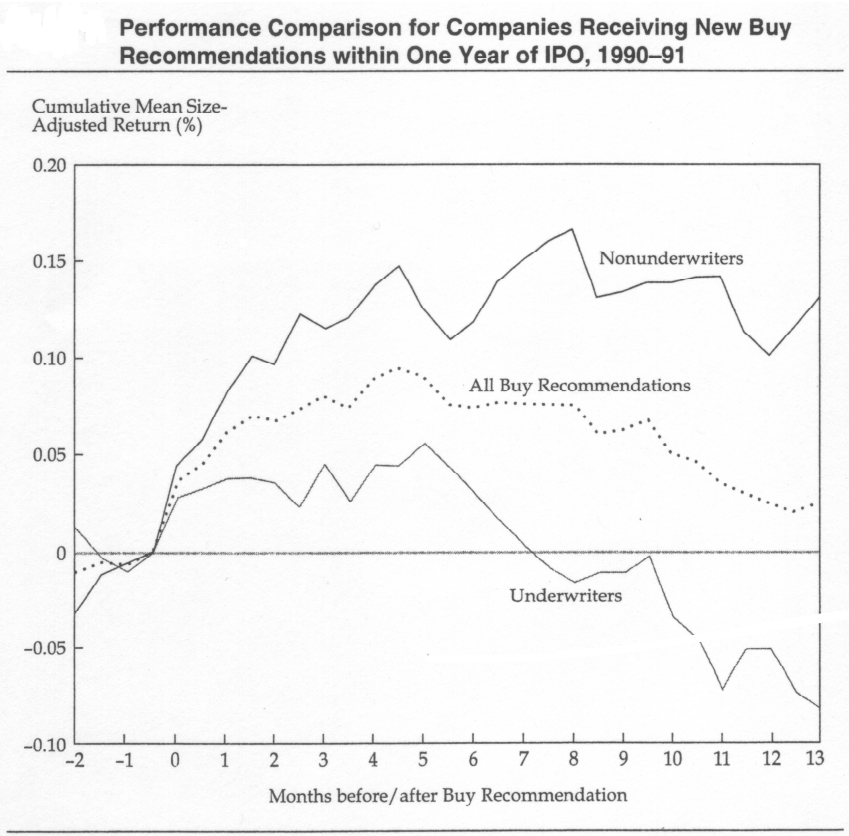
Potential Pitfalls and possible use…

- The limitation of an earnings momentum strategy is its dependence on two of the weakest links in financial markets –earnings reports that come from firms (where accounting games skew earnings)and analyst forecasts of these earnings (which are often biased).
- To the extent that analysts influence trades made by their clients, they are likely to affect prices when they revise earnings. The more influential they are, the greater the effect they will have on prices, but the question is whether the effect is lasting.
- It is a short-term strategy that yields fairly small excess returns over investment horizons ranging from a few weeks to a few months.
- One way you may be able to earn higher returns from this strategy is to identify key analysts and build an investment strategy around forecast revisions made by them, rather than looking at consensus estimates made by all analysts. While forecast revisions and earnings surprises by themselves are unlikely to generate lucrative portfolios, they can augment other more long-term screening strategies.

III. Analyst Recommendations…



Tempered by fears of bias…



Source: Based on data from Michaely and Womack (1999).

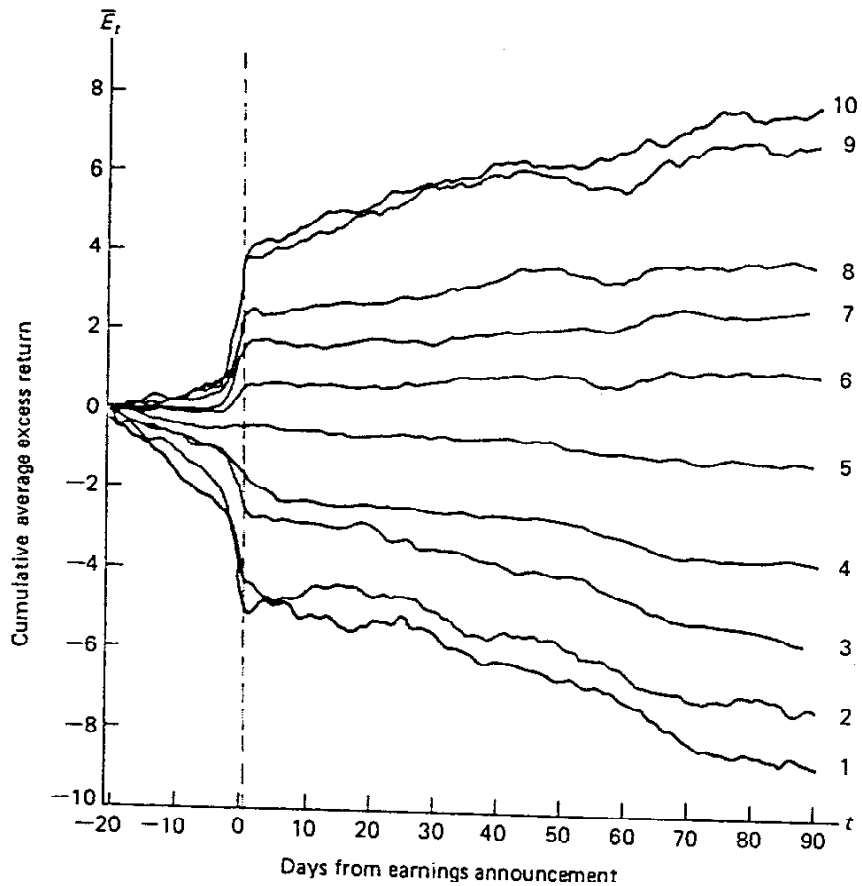
Using Analyst Recommendations…

- Can you make money off analyst recommendations? Even if there were no new information contained in recommendations, there is the self-fulfilling prophecy created by clients who trade on these recommendations, pushing up stock prices after buy recommendations and pushing them down after sell recommendations. If this is the only reason for the stock price reaction, though, the returns are not only likely to be small but could very quickly dissipate, leaving you with large transactions costs and little to show for them.
- You should begin by identifying the analysts who are not only the most influential but also have the most content (private information) in their recommendations. In addition, you may want to screen out analysts where the potential conflicts of interest may be too large for the recommendations to be unbiased. You should invest based upon their recommendations, preferably at the time the recommendations are made. Assuming that you still attach credence to the views of the recommending analysts, you should watch the analysts for signals that they have changed or are changing their minds. Since these signals are often subtle, you can easily miss them.

Trading on Public Information

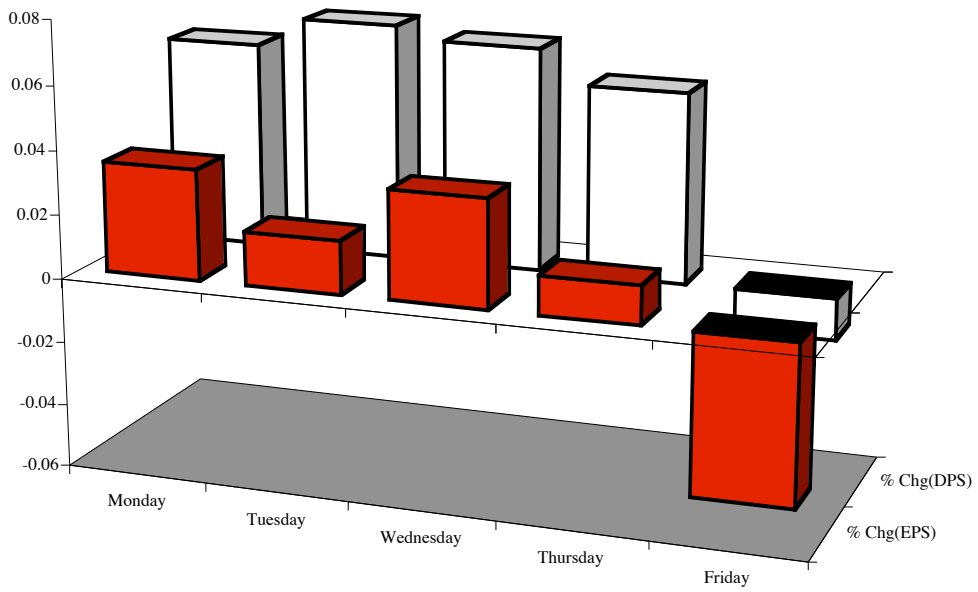
- There is substantial information that comes out about stocks. Some of the information comes from the firm - earnings and dividend announcements, acquisitions and other news - and some comes from competitors.
- Prices generally react to this information.

I. Earnings Reports

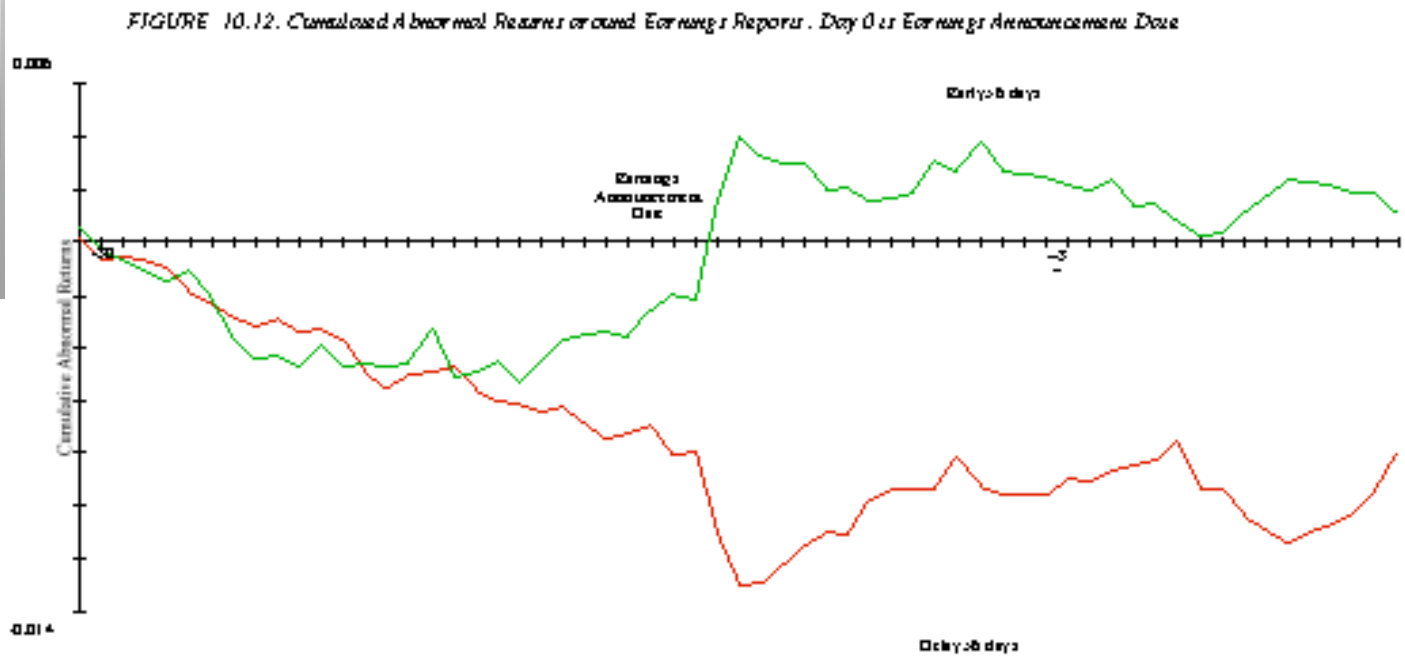


By day of the week..

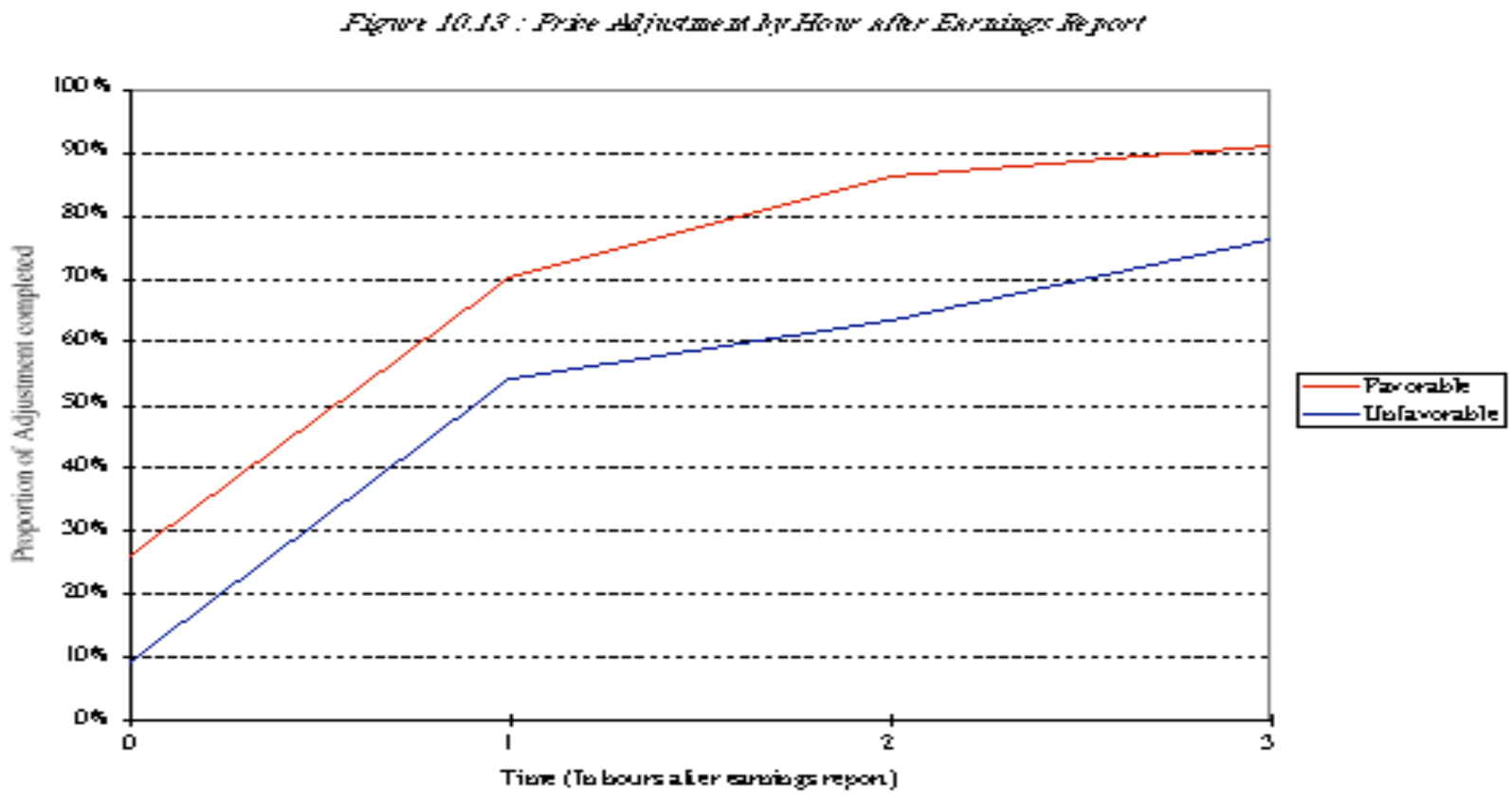
Figure 10.11: Earnings and Dividend Reports by Day of the Week



The Consequence of Delays…



The Intraday reaction..



And earnings quality matters…

- As firms play the earnings game, the quality of earnings has also diverged across companies. A firm that beats earnings estimates because it has more efficient operating should be viewed more favorably than one that beats estimates because it changed the way it valued inventory.
- Chan, Chan, Jegadeesh and Lakonishok examined firms that reported high accruals – i.e. the difference between accounting earnings and cash flows and argued that firms report high earnings without a matching increase in cashflow have poorer quality earnings. When they tracked a portfolio composed of these firms, they discovered that the high accrual year was usually the turning point in the fortunes of this firm, with subsequent years bring declining earnings and negative stock returns.

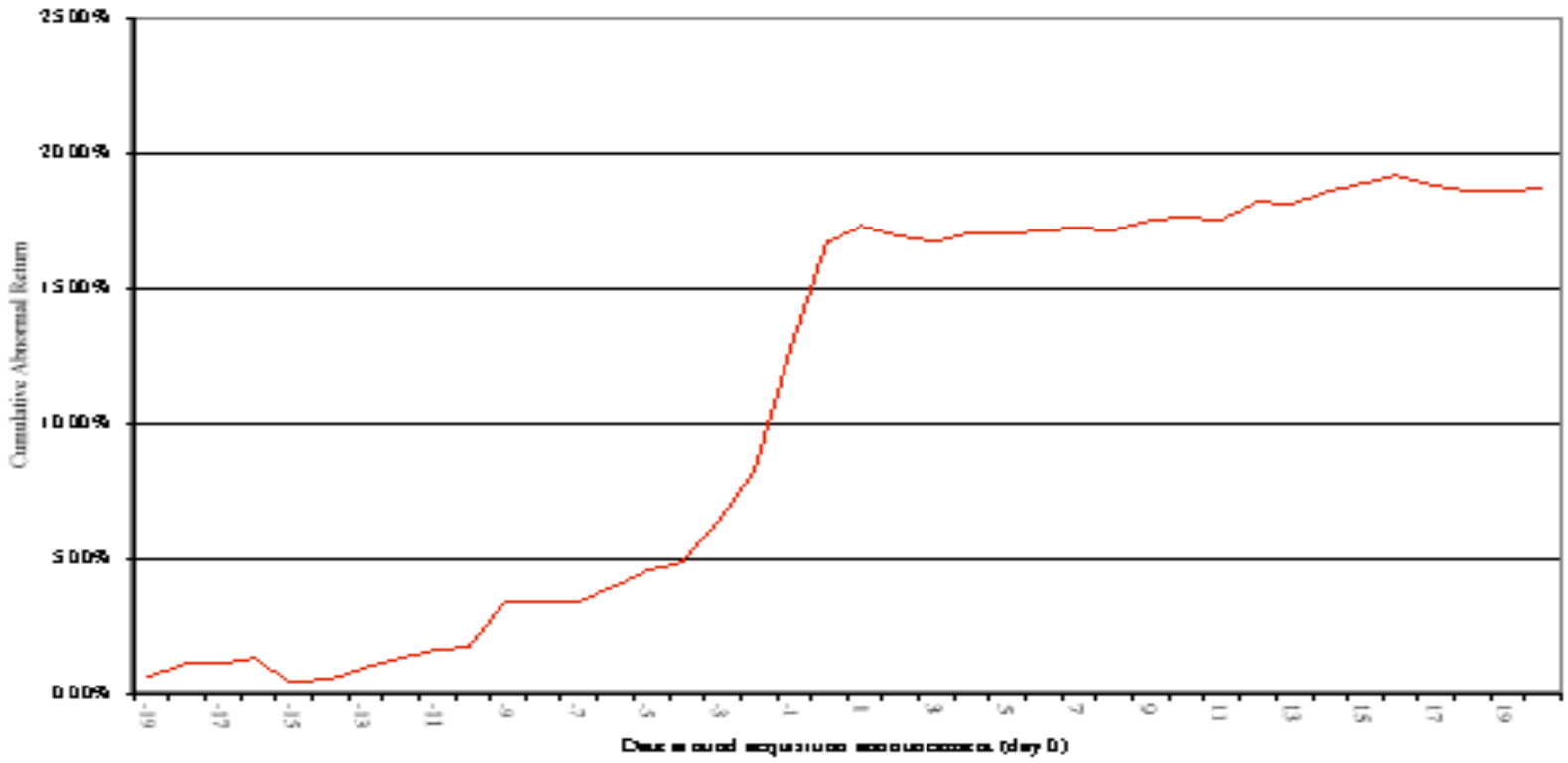
Can you make money of earnings announcements?

- One strategy is to buy stocks that report large positive earnings surprises, hoping to benefit from the drift. The evidence indicates that across all stocks, the potential for excess returns from buying after earnings announcements is very small.
- You can concentrate only on earnings announcements made by smaller, less liquid companies where the drift is more pronounced. In addition, you can try to direct your money towards companies with higher quality earnings surprises by avoiding firms with large accruals.
- Your biggest payoff is in investing in companies before large positive earnings surprises. You may be able to use a combination of quantitative techniques (time series models that forecast next quarter's earnings based upon historical earnings) and trading volume (insiders do create blips in the volume) to try to detect these firms. Even if you are right only 55% of the time, you should be able to post high excess returns.

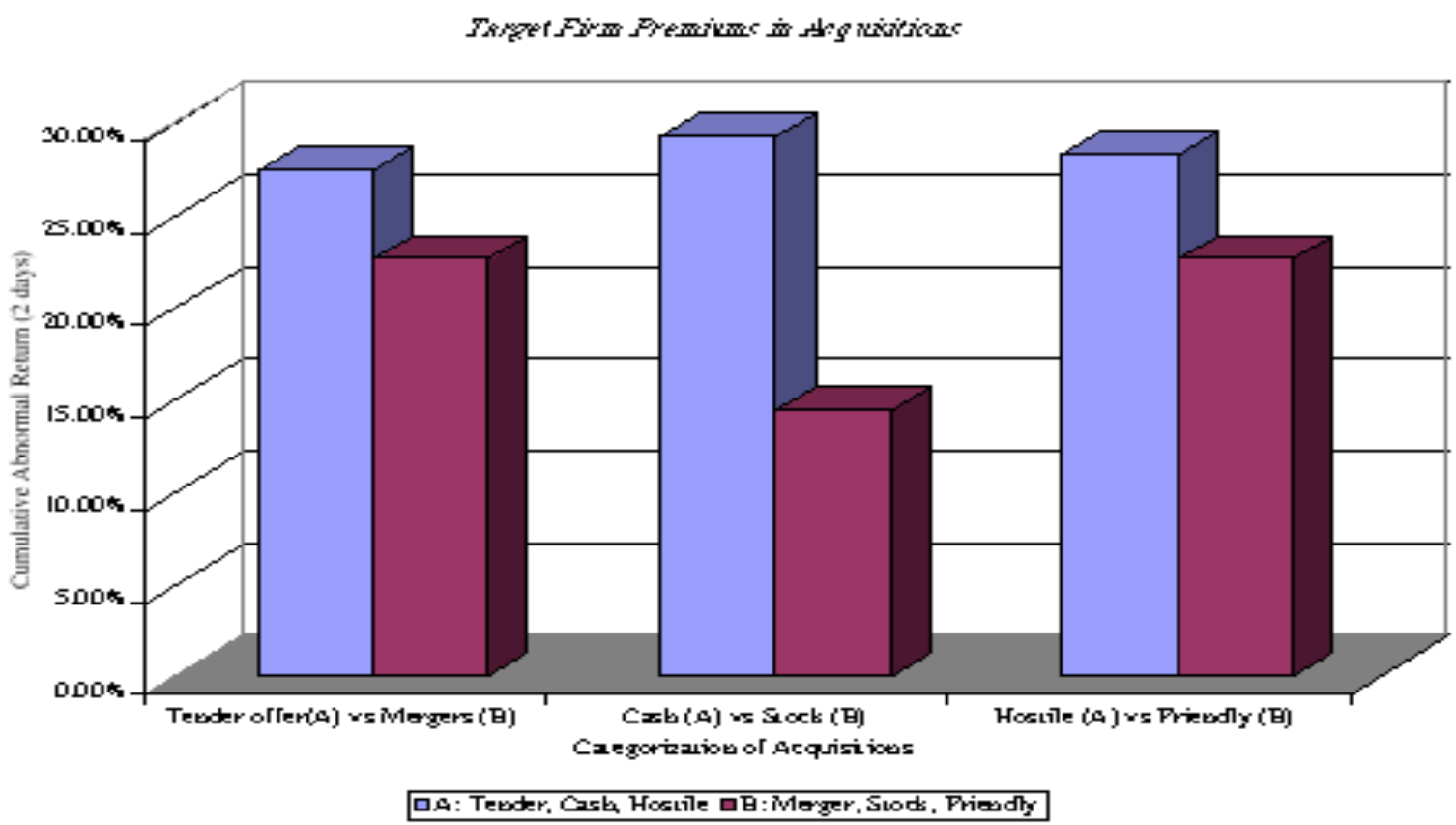
Acquisitions

- Acquisitions involve large investments and tend to have large price impact. Consequently, information-based strategies are often focused on acquisitions and market reactions to them.

II. Acquisitions: Evidence on Target Firms



Across different types of acquisitions…



The Effect on Acquirers..

- Jensen and Ruback report excess returns of 4% for bidding firm stockholders around tender offers and no excess returns around mergers. Jarrell, Brickley and Netter, in their examination of tender offers from 1962 to 1985, note a decline in excess returns to bidding firm stockholders from 4.4% in the 1960s to 2% in the 1970s to -1% in the 1980s.
- Other studies indicate that approximately half of all bidding firms earn negative excess returns around the announcement of takeovers, suggesting that shareholders are skeptical about the perceived value of the takeover in a significant number of cases.

After the acquisition… Operating Evidence

- McKinsey and Co. examined 58 acquisition programs between 1972 and 1983 for evidence on two questions: (1) Did the return on the amount invested in the acquisitions exceed the cost of capital? (2) Did the acquisitions help the parent companies outperform the competition? They concluded that 28 of the 58 programs failed both tests, and six failed at least one test.
- In a follow-up study of 115 mergers in the U.K. and the U.S. in the 1990s, McKinsey concluded that 60% of the transactions earned returns on capital less than the cost of capital, and that only 23% earned excess returns.
- In 1999, KPMG examined 700 of the most expensive deals between 1996 and 1998 and concluded that only 17% created value for the combined firm, 30% were value neutral and 53% destroyed value.

After the acquisition… Divestitures

- The most damaging piece of evidence on the outcome of acquisitions is the large number of acquisitions that are reversed within fairly short time periods. Mitchell and Lehn note that 20.2% of the acquisitions made between 1982 and 1986 were divested by 1988. In a study published in1992, Kaplan and Weisbach found that 44% of the mergers they studied were reversed, largely because the acquirer paid too much or because the operations of the two firms did not mesh.
- Studies that have tracked acquisitions for longer time periods (ten years or more) have found the divestiture rate of acquisitions rises to almost 50%, suggesting that few firms enjoy the promised benefits from acquisitions do not occur. In another study,

Takeover based investment strategies

- The first and most lucrative, if you can pull it off, is to find a way to invest in a target firm before the acquisition is announced.
- The second is to wait until after the takeover is announced and then try to take advantage of the price drift between the announcement date and the day the deal is consummated. This is often called risk arbitrage.
- The third is also a post-announcement strategy, but it is a long-term strategy where you invest in firms that you believe have the pieces in place to deliver the promised synergy or value creation.

Preannouncement Trading

- Research indicates that the typical target firm in a hostile takeover has the following characteristics:
  - It has under performed other stocks in its industry and the overall market, in terms of returns to its stockholders in the years preceding the takeover.
  - It has been less profitable than firms in its industry in the years preceding the takeover.
  - It has a much lower stock holding by insiders than do firms in its peer groups.
  - It has a low price to book ratio & a low ratio of value to replacement cost.
- There are two ways in which we can use the findings of these studies to identify potential target firms.
  - Develop a set of screens that incorporate the variables mentioned above. You could, for instance, invest in firms with market capitalizations below $ 5 billion, with low insider holdings, depressed valuations (low price to book ratios) and low returns on equity.
  - The second and slightly more sophisticated variant is to estimate the probability of being taken over for every firm in the market using statistical techniques

Post-Announcement Trading

- In this strategy, you buy companies after acquisitions or mergers are completed because you believe that they will be able to deliver what they promise at the time of the merger – higher earnings growth and synergy.
- The likelihood of success seems to be greater
  - In hostile acquisitions, where the management is replaced.
  - In mergers of like businesses than in conglomerate mergers
  - In cost-saving mergers than in growth-oriented mergers
  - In mergers where plans for synergy are made before the merger
  - In acquisitions of small companies by larger companies (as opposed to mergers of equals)

To be a successful information trader…

- *Identify the information around which your strategy will be built*: Since you have to trade on the announcement, it is critical that you determine in advance the information that will trigger a trade.
- *Invest in an information system that will deliver the information to you instantaneous*: Many individual investors receive information with a time lag – 15 to 20 minutes after it reaches the trading floor and institutional investors. While this may not seem like a lot of time, the biggest price changes after information announcements occur during these periods.
- *Execute quickly*: Getting an earnings report or an acquisition announcement in real time is of little use if it takes you 20 minutes to trade. Immediate execution of trades is essential to succeeding with this strategy.
- *Keep a tight lid on transactions costs*: Speedy execution of trades usually goes with higher transactions costs, but these transactions costs can very easily wipe out any potential you may see for excess returns).
- *Know when to sell*: Almost as critical as knowing when to buy is knowing when to sell, since the price effects of news releases may begin to fade or even reverse after a while.

Arbitrage

Aswath Damodaran

The Essence of Arbitrage

- In pure arbitrage, you invest no money, take no risk and walk away with sure profits.
- You can categorize arbitrage in the real world into three groups:
  - Pure arbitrage, where, in fact, you risk nothing and earn more than the riskless rate.
  - Near arbitrage, where you have assets that have identical or almost identical cash flows, trading at different prices, but there is no guarantee that the prices will converge and there exist significant constraints on the investors forcing convergence.
  - Speculative arbitrage, which may not really be arbitrage in the first place. Here, investors take advantage of what they see as mispriced and similar (though not identical) assets, buying the cheaper one and selling the more expensive one.

Pure Arbitrage

- For pure arbitrage, you have two assets with identical cashflows and different market prices makes pure arbitrage difficult to find in financial markets.
- There are two reasons why pure arbitrage will be rare:
  - Identical assets are not common in the real world, especially if you are an equity investor.
  - Assuming two identical assets exist, you have to wonder why financial markets would allow pricing differences to persist.
  - If in addition, we add the constraint that there is a point in time where the market prices converge, it is not surprising that pure arbitrage is most likely to occur with derivative assets – options and futures and in fixed income markets, especially with default-free government bonds.

Markets where pure arbitrage may be feasible…

- Futures Markets: The basic arbitrage relationship can be derived fairly easily for futures contracts on any asset, by estimating the cashflows on two strategies that deliver the same end result – the ownership of the asset at a fixed price in the future.
  - In the first strategy, you buy the futures contract, wait until the end of the contract period and buy the underlying asset at the futures price.
  - In the second strategy, you borrow the money and buy the underlying asset today and store it for the period of the futures contract.
- Options Markets: There are three kinds of arbitrage opportunities
  - Exercise arbitrage: When the option price is less than the exercise value.
  - Pricing arbitrage: When options are mispriced relative to the underlying asset or to each other.
- Fixed Income Markets: Fixed income securities lend themselves to arbitrage more easily than equity because they have finite lives and fixed cash flows. This is especially so, when you have default free bonds, where the fixed cash flows are also guaranteed.

Evidence on pure arbitrage opportunities…

- They are uncommon
- The pricing errors tend to be small
- They are fleeting
- They occur most often when a new security is introduced into the market.

Special Features of Futures Markets

- The first is the existence of margins. While we assumed, when constructing the arbitrage, that buying and selling futures contracts would create no cashflows at the time of the transaction, you would have to put up a portion of the futures contract price (about 5-10%) as a margin in the real world. To compound the problem, this margin is recomputed every day based upon futures prices that day – this process is called marking to market - and you may be required to come up with more margin if the price moves against you (down, if you are a buyer and up, if you are a seller). If this margin call is not met, your position can be liquidated and you may never to get to see your arbitrage profits.
- The second is that the futures exchanges generally impose 'price movement limits' on most futures contracts.

Feasibility of Futures Arbitrage

- In the commodity futures market, for instance, Garbade and Silber (1983) find little evidence of arbitrage opportunities and their findings are echoed in other studies. In the financial futures markets, there is evidence that indicates that arbitrage is indeed feasible but only to a sub-set of investors.
- Note, though, that the returns are small even to these large investors and that arbitrage will not be a reliable source of profits, unless you can establish a competitive advantage on one of three dimensions.
  - You can try to establish a transactions cost advantage over other investors, which will be difficult to do since you are competing with other large institutional investors.
  - You may be able to develop an information advantage over other investors by having access to information earlier than others. Again, though much of the information is pricing information and is public.
  - You may find a quirk in the data or pricing of a particular futures contract before others learn about it.

Options Arbitrage

- Options represent rights rather than obligations – calls gives you the right to buy and puts gives you the right to sell. Consequently, a key feature of options is that the losses on an option position are limited to what you paid for the option, if you are a buyer.
- Since there is usually an underlying asset that is traded, you can, as with futures contracts, construct positions that essentially are riskfree by combining options with the underlying asset.

1. Exercise Arbitrage

- The easiest arbitrage opportunities in the option market exist when options violate simple pricing bounds. No option, for instance, should sell for less than its exercise value.
  - With a call option: Value of call > Value of Underlying Asset – Strike Price
  - With a put option: Value of put > Strike Price – Value of Underlying Asset
- You can tighten these bounds for call options, if you are willing to create a portfolio of the underlying asset and the option and hold it through the option's expiration. The bounds then become:
  - With a call option: Value of call > Value of Underlying Asset – Present value of Strike Price
  - With a put option: Value of put > Present value of Strike Price – Value of Underlying Asset

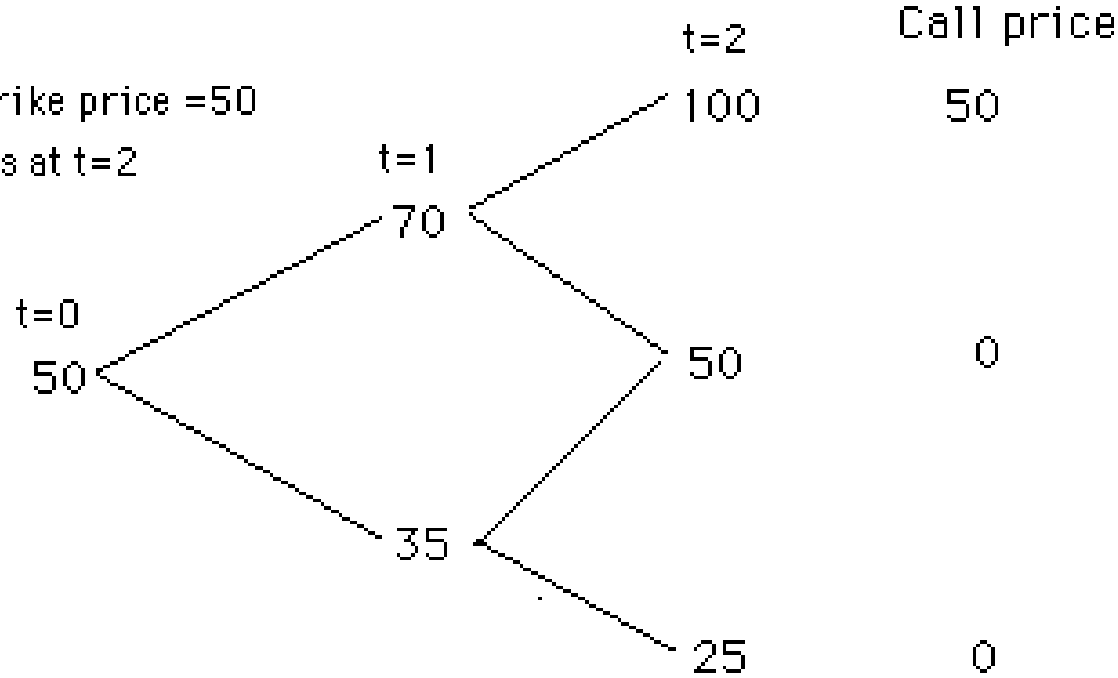
2. Pricing Arbitrage (Replication)

- A portfolio composed of the underlying asset and the riskless asset could be constructed to have exactly the same cash flows as a call or put option. This portfolio is called the replicating portfolio.
- Since the replicating portfolio and the traded option have the same cash flows, they would have to sell at the same price.

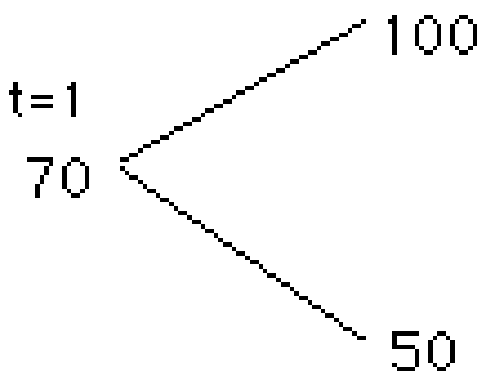
An Example

Call strike price =50

Expires at t=2



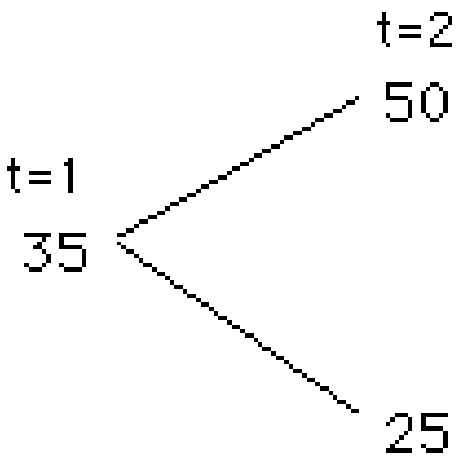
If stock price = $ 70 at t = 1



Call Value	Replicating portfolio
50	(100 X D) - (1.11 X B) = 50
0	(50 X D) - (1.11 X B) = 0

Solving for D and B
D = 1 ; B = 45
Buy 1 share; Borrow $ 45

If stock price = $ 35 at t = 1

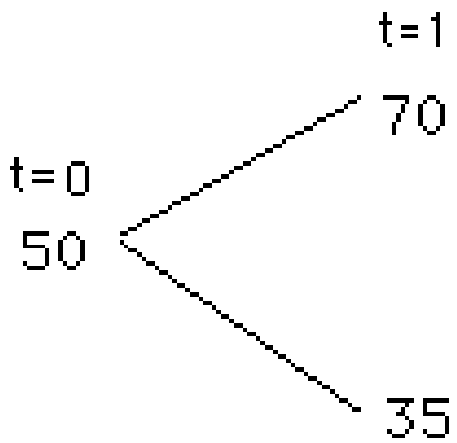


Call Value	Replicating portfolio
0	(50 X D) - (1.11 X B) = 0
0	(25 X D) - (1.11 X B) = 0

Solving for D and B

D = 0 ; B = 0

Replicating Portfolio at t = 0



Replicating portfolio

(70 X D) - (B X 1.11) = 25 (from step 1)

(35 X D) - (1.11 X B) = 0 (from step 1)

|

Solving for D and B

D = 5/7; B = 22.5;

Buy 5/7 shares; Borrow 22.5;

Pricing the Option and Arbitrage Possibilities

- Borrowing $22.5 and buying 5/7 of a share today will provide the same cash flows as a call with a strike price of $50. The value of the call therefore has to be the same as the cost of creating this position.

Value of Call = Cost of replicating position =

$$\left(\frac{5}{7}\right)(\text{Current Stock Price}) - 22.5 = \left(\frac{5}{7}\right)(50) - 22.5 = 13.21$$

- If the call traded at less than $13.21, say $ 13.00. You would buy the call for $13.00 and sell the replicating portfolio for $13.21 and claim the difference of $0.21. Since the cashflows on the two positions are identical, you would be exposed to no risk and make a certain profit.
- If the call trade for more than $13.21, say $13.50, you would buy the replicating portfolio, sell the call and claim the $0.29 difference. Again, you would not have been exposed to any risk.

3a. Arbitrage Across Options: Put Call Parity

- You can create a riskless position by selling the call, buying the put and buying the underlying asset at the same time.

Position	Payoffs at t if S*>K	Payoffs at t if S*<K
Sell call	-(S*-K)	0
Buy put	0	K-S*
Buy stock	S*	S*
Total	*K*	*K*

- Since this position yields K with certainty, the cost of creating this position must be equal to the present value of K at the riskless rate ($K e^{-rt}$).

  $S+P-C = K e^{-rt}$

  $C - P = S - K e^{-rt}$

Does put call parity hold?

- A study in 1977 and 1978 of options traded on the CBOE found violations of put-call parity, but the violations were small and persisted only for short periods.
- A more recent study by Kamara and Miller of options on the S&P 500 (which are European options) between 1986 and 1989 finds fewer violations of put-call parity and the deviations tend to be small, even when there are violations.

3b. Mispricing across strike prices and maturities

- *Strike Prices*: A call with a lower strike price should never sell for less than a call with a higher strike price, assuming that they both have the same maturity. If it did, you could buy the lower strike price call and sell the higher strike price call, and lock in a riskless profit. Similarly, a put with a lower strike price should never sell for more than a put with a higher strike price and the same maturity.
- *Maturity*: A call (put) with a shorter time to expiration should never sell for more than a call (put) with the same strike price with a long time to expiration. If it did, you would buy the call (put) with the shorter maturity and sell the call (put) with the longer maturity (i.e, create a calendar spread) and lock in a profit today. When the first call expires, you will either exercise the second call (and have no cashflows) or sell it (and make a further profit).

Fixed Income Arbitrage

- Fixed income securities lend themselves to arbitrage more easily than equity because they have finite lives and fixed cash flows. This is especially so, when you have default free bonds, where the fixed cash flows are also guaranteed.
- For instance, you could replicate a 10-year treasury bond's cash flows by buying zero-coupon treasuries with expirations matching those of the coupon payment dates on the treasury bond.
- With corporate bonds, you have the extra component of default risk. Since no two firms are exactly identical when it comes to default risk, you may be exposed to some risk if you are using corporate bonds issued by different entities.

Does fixed income arbitrage pay?

- Grinblatt and Longstaff, in an assessment of the treasury strips program – a program allowing investors to break up a treasury bond and sell its individual cash flows – note that there are potential arbitrage opportunities in these markets but find little evidence of trading driven by these opportunities.
- A study by Balbas and Lopez of the Spanish bond market examined default free and option free bonds in the Spanish market between 1994 and 1998 and concluded that there were arbitrage opportunities especially surrounding innovations in financial markets.
- The opportunities for arbitrage with fixed income securities are probably greatest when new types of bonds are introduced – mortgage backed securities in the early 1980s, inflation- indexed treasuries in the late 1990s and the treasury strips program in the late 1980s. As investors become more informed about these bonds and how they should be priced, arbitrage opportunities seem to subside.

Determinants of Success at Pure Arbitrage

- The nature of pure arbitrage – two identical assets that are priced differently – makes it likely that it will be short lived. In other words, in a market where investors are on the look out for riskless profits, it is very likely that small pricing differences will be exploited quickly, and in the process, disappear. Consequently, the first two requirements for success at pure arbitrage are access to real-time prices and instantaneous execution.
- It is also very likely that the pricing differences in pure arbitrage will be very small – often a few hundredths of a percent. To make pure arbitrage feasible, therefore, you can add two more conditions.
  - The first is access to substantial debt at favorable interest rates, since it can magnify the small pricing differences. Note that many of the arbitrage positions require you to be able to borrow at the riskless rate.
  - The second is economies of scale, with transactions amounting to millions of dollars rather than thousands.

Near Arbitrage

- In near arbitrage, you either have two assets that are very similar but not identical, which are priced differently, or identical assets that are mispriced, but with no guaranteed price convergence.
- No matter how sophisticated your trading strategies may be in these scenarios, your positions will no longer be riskless.

1. Same Stock listed in Multiple Markets

- If you can buy the same stock at one price in one market and simultaneously sell it at a higher price in another market, you can lock in a riskless profit.
- We will look at two scenarios:
  - Dual or Multiple listed stocks
  - Depository receipts

a. Dual Listed Stocks

- Many large companies trade on multiple markets on different continents.
- Since there are time periods during the day when there is trading occurring on more than one market on the same stock, it is conceivable (though not likely) that you could buy the stock for one price in one market and sell the same stock at the same time for a different (and higher price) in another market.
- The stock will trade in different currencies, and for this to be a riskless transaction, the trades have to at precisely the same time and you have to eliminate any exchange rate risk by converting the foreign currency proceeds into the domestic currency instantaneously.
- Your trade profits will also have to cover the different bid-ask spreads in the two markets and transactions costs in each.

Evidence of Mispricing?

- Swaicki and Hric examine 84 Czech stocks that trade on the two Czech exchanges – the Prague Stock Exchange (PSE) and the Registration Places System (RMS)- and find that prices adjust slowly across the two markets, and that arbitrage opportunities exist (at least on paper) –the prices in the two markets differ by about 2%. These arbitrage opportunities seem to increase for less liquid stocks.
- While the authors consider transactions cost, they do not consider the price impact that trading itself would have on these stocks and whether the arbitrage profits would survive the trading.

b. Depository Receipts

- Depository receipts create a claim equivalent to the one you would have had if you had bought shares in the local market and should therefore trade at a price consistent with the local shares.
- What makes them different and potentially riskier than the stocks with dual listings is that ADRs are not always directly comparable to the common shares traded locally – one ADR on Telmex, the Mexican telecommunications company, is convertible into 20 Telmex shares.
- In addition, converting an ADR into local shares can be both costly and time consuming. In some cases, there can be differences in voting rights as well.
- In spite of these constraints, you would expect the price of an ADR to closely track the price of the shares in the local market, albeit with a currency overlay, since ADRs are denominated in dollars.

Evidence on Pricing

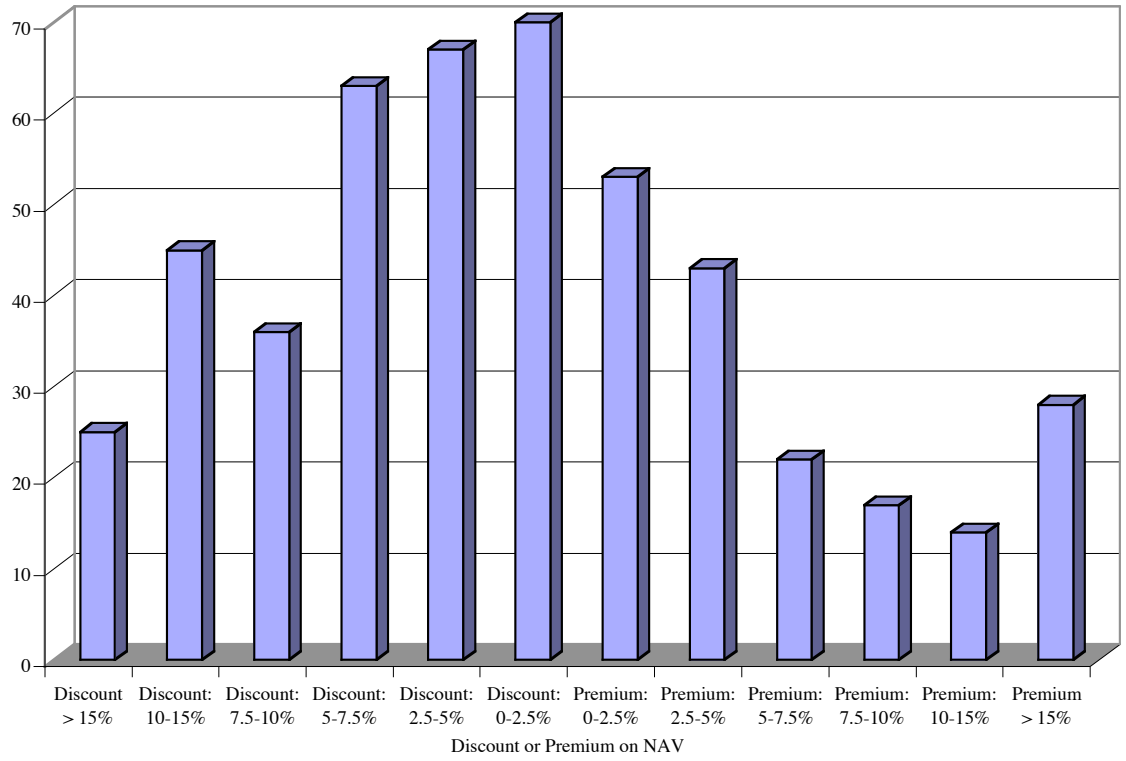
- In a study conducted in 2000 that looks at the link between ADRs and local shares, Kin, Szakmary and Mathur conclude that about 60 to 70% of the variation in ADR prices can be attributed to movements in the underlying share prices and that ADRs overreact to the U.S, market and under react to exchange rates and the underlying stock.
- They also conclude that investors cannot take advantage of the pricing errors in ADRs because convergence does not occur quickly or in predictable ways.
- With a longer time horizon and/or the capacity to convert ADRs into local shares, though, you should be able to take advantage of significant pricing differences.

2. Closed End Funds

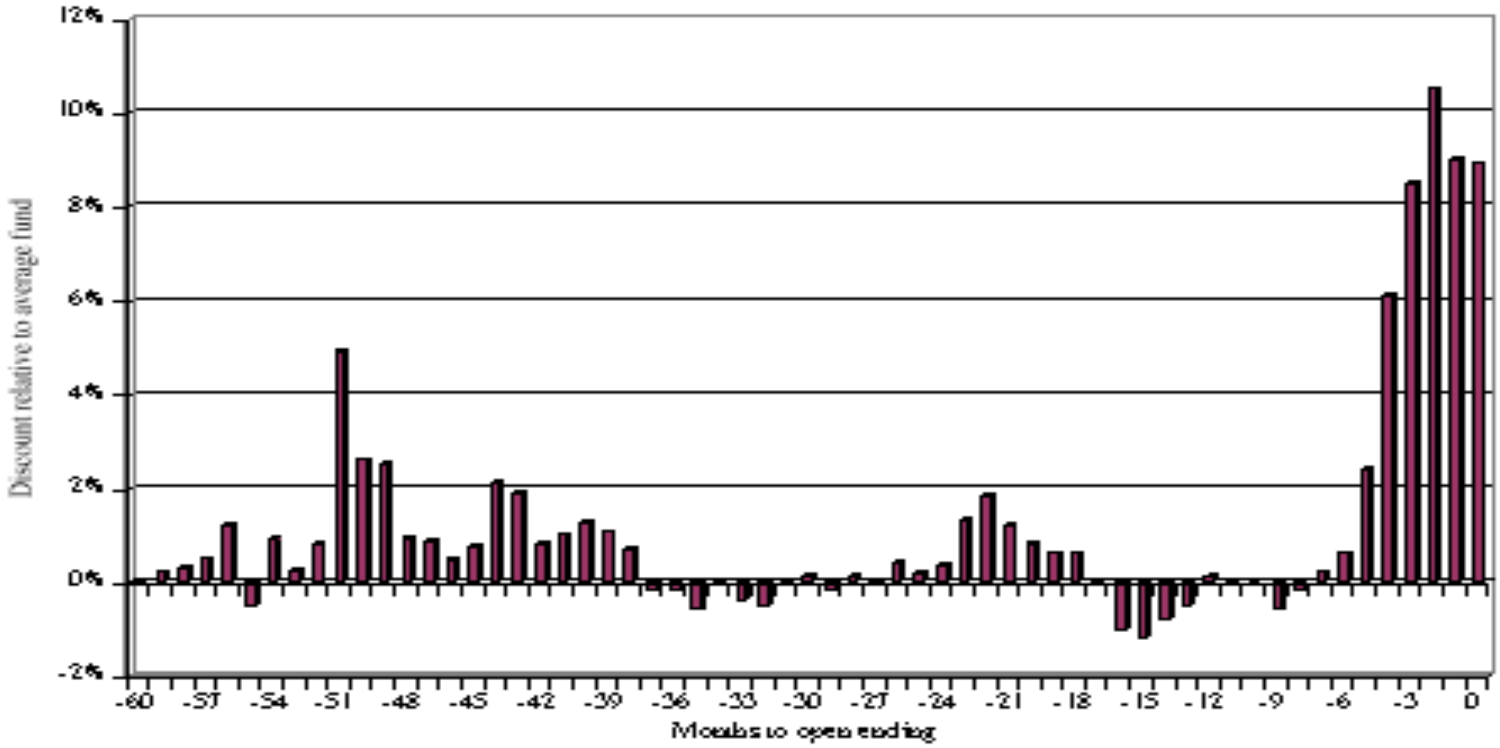
- Closed end mutual funds differ from other mutual funds in one very important respect. They have a fixed number of shares that trade in the market like other publicly traded companies, and the market price can be different from the net asset value.
- If they trade at a price that is lower than the net asset value of the securities that they own, there should be potential for arbitrage.

Discounts and Premiums on Closed End Funds

Figure 11.7: Discounts/Premiums on Closed End Funds- June 2002



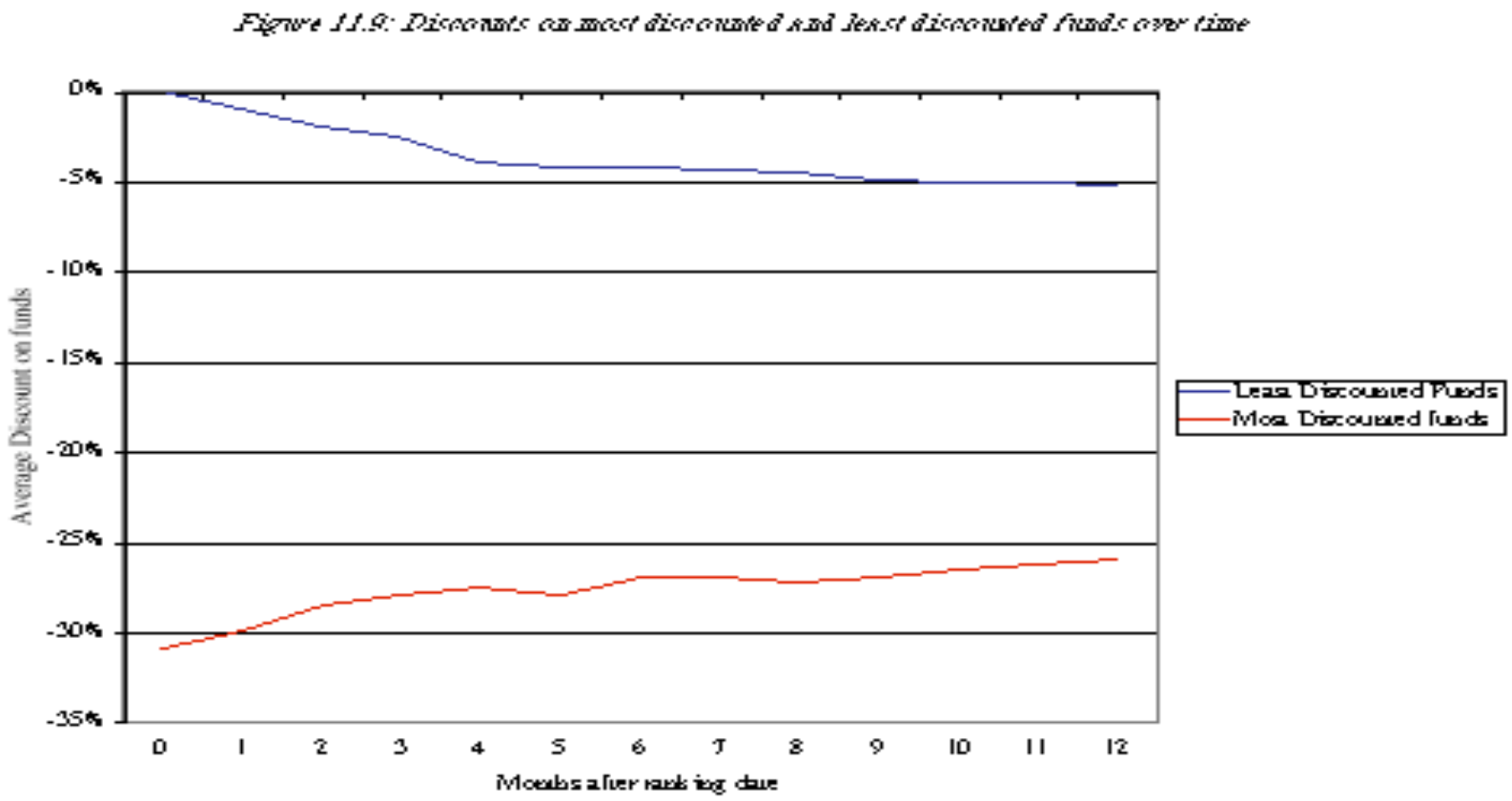
Closed end funds that open end…



What is the catch?

- In practice, taking over a closed-end fund while paying less than net asset value for its shares seems to be very difficult to do for several reasons- some related to corporate governance and some related to market liquidity.
- The potential profit is also narrowed by the mispricing of illiquid assets in closed end fund portfolios (leading to an overstatement of the NAV) and tax liabilities from liquidating securities. There have been a few cases of closed end funds being liquidated, but they remain the exception.

An Investment Strategy of buying discounted funds…



3. Convertible Arbitrage

- When companies have convertible bonds or convertible preferred stock outstanding in conjunction with common stock, warrants, preferred stock and conventional bonds, it is entirely possible that you could find one of these securities mispriced relative to the other, and be able to construct a near-riskless strategy by combining two or more of the securities in a portfolio.
- In practice, there are several possible impediments.
  - Many firms that issue convertible bonds do not have straight bonds outstanding, and you have to substitute in a straight bond issued by a company with similar default risk.
  - Companies can force conversion of convertible bonds, which can wreak havoc on arbitrage positions.
  - Convertible bonds have long maturities. Thus, there may be no convergence for long periods, and you have to be able to maintain the arbitrage position over these periods.
  - Transactions costs and execution problems (associated with trading the different securities) may prevent arbitrage.

Determinants of Success at Near Arbitrage

- These strategies will not work for small investors or for very large investors. Small investors will be stymied both by transactions costs and execution problems. Very large investors will quickly drive discounts to parity and eliminate excess returns.
- If you decide to adopt these strategies, you need to refine and focus your strategies on those opportunities where convergence is most likely. For instance, if you decide to try to exploit the discounts of closed-end funds, you should focus on the closed end funds that are most discounted and concentrate especially on funds where there is the potential to bring pressure on management to open end the funds.

Pseudo or Speculative Arbitrage

- There are a large number of strategies that are characterized as arbitrage, but actually expose investors to significant risk.
- We will categorize these as pseudo or speculative arbitrage.

1. Paired Arbitrage

- In paired arbitrage, you buy one stock (say GM) and sell another stock that you view as very similar (say Ford), and argue that you are not that exposed to risk. Clearly, this strategy is not riskless since no two equities are exactly identical, and even if they were very similar, there may be no convergence in prices.
- The conventional practice among those who have used this strategy on Wall Street has been to look for two stocks whose prices have historically moved together – i.e., have high correlation over time.

Evidence on Paired Trading

- Screening first for only stocks that traded every day, the authors found a matching partner for each stock by looking for the stock with the minimum squared deviation in normalized price series. Once they had paired all the stocks, they studied the pairs with the smallest squared deviation separating them.
  - If you use absolute prices, a stock with a higher price will always look more volatile. You can normalize the prices around 1 and use these series.
  - With each pair, they tracked the normalized prices of each stock and took a position on the pair, if the difference exceeded the historical range by two standard deviations, buying the cheaper stock and selling the more expensive one.
- Over the 15 year period, the pairs trading strategy did significantly better than a buy-and-hold strategy. Strategies of investing in the top 20 pairs earned an excess return of about 6% over a 6-month period, and while the returns drop off for the pairs below the top 20, you continue to earn excess returns. When the pairs are constructed by industry group (rather than just based upon historical prices), the excess returns persist but they are smaller. Controlling for the bid-ask spread in the strategy reduces the excess returns by about a fifth, but the returns are still significant.

Two Caveats on Paired Arbitrage

- The study quoted found that the pairs trading strategy created negative returns in about one out of every six periods, and that the difference between pairs often widened before it narrowed. In other words, it is a risky investment strategy that also requires the capacity to trade instantaneously and at low cost.
- By the late 1990s, the pickings for quantitative strategies (like pairs trading) had become slim because so many investment banks were adopting the strategies. As the novelty has worn off, it seems unlikely that the pairs trading will generate the kinds of profits it generated during the 1980s.

2. Merger Arbitrage

- The stock price of a target company jumps on the announcement of a takeover. However, it trades at a discount usually to the price offered by the acquiring company.
- The difference between the post-announcement price and the offer price is called the arbitrage spread, and there are investors who try to profit off this spread in a strategy called merger or risk arbitrage. If the merger succeeds, the arbitrageur captures the arbitrage spreads, but if it fails, he or she could make a substantial loss.
- In a more sophisticated variant in stock mergers (where shares of the acquiring company are exchanged for shares in the target company), the arbitrageur will sell the acquiring firm's stock in addition to buying the target firm's stock.

Evidence from merger arbitrage

- Mitchell and Pulvino (2000) use a sample of 4750 mergers and acquisitions to examine this question. They conclude that there are excess returns associated with buying target companies after acquisition announcements of about 9.25% annually, but that you lost about two thirds of these excess returns if you factor in transactions costs and the price impact that you have when you trade (especially on the less liquid companies).
- The strategy earns moderate positive returns much of the time, but earns large negative returns when it fails. The strategy has payoffs that resemble those you would observe if you sell puts – when the market goes up, you keep the put premium but when it goes down, you lost much more.

Determinants of Success at Speculative Arbitrage

- The use of financial leverage has to be scaled to reflect the riskiness of the strategy. With pure arbitrage, you can borrow 100% of what you need to put the strategy into play. In futures arbitrage, for instance, you borrow 100% of the spot price and borrow the commodity. Since there is no risk, the leverage does not create any damage. As you move to near and speculative arbitrage, this leverage has to be reduced. How much it has to be reduced will depend upon both the degree of risk in the strategy and the speed with which you think prices will converge. The more risky a strategy and the less certain you are about convergence, the less debt you should take on.
- These strategies work best if you can operate without a market impact. As you get more funds to invest and your strategy becomes more visible to others, you run the risk of driving out the very mispricing that attracted you to the market in the first place.

Long Short Strategies: Hedge Funds

- While hedge funds come in all varieties, they generally share a common characteristic. They can go both buy and sell short assets.
- You can have value and growth investing hedge funds, hedge funds that specialize in market timing, hedge funds that invest on information and hedge funds that do convertible arbitrage.

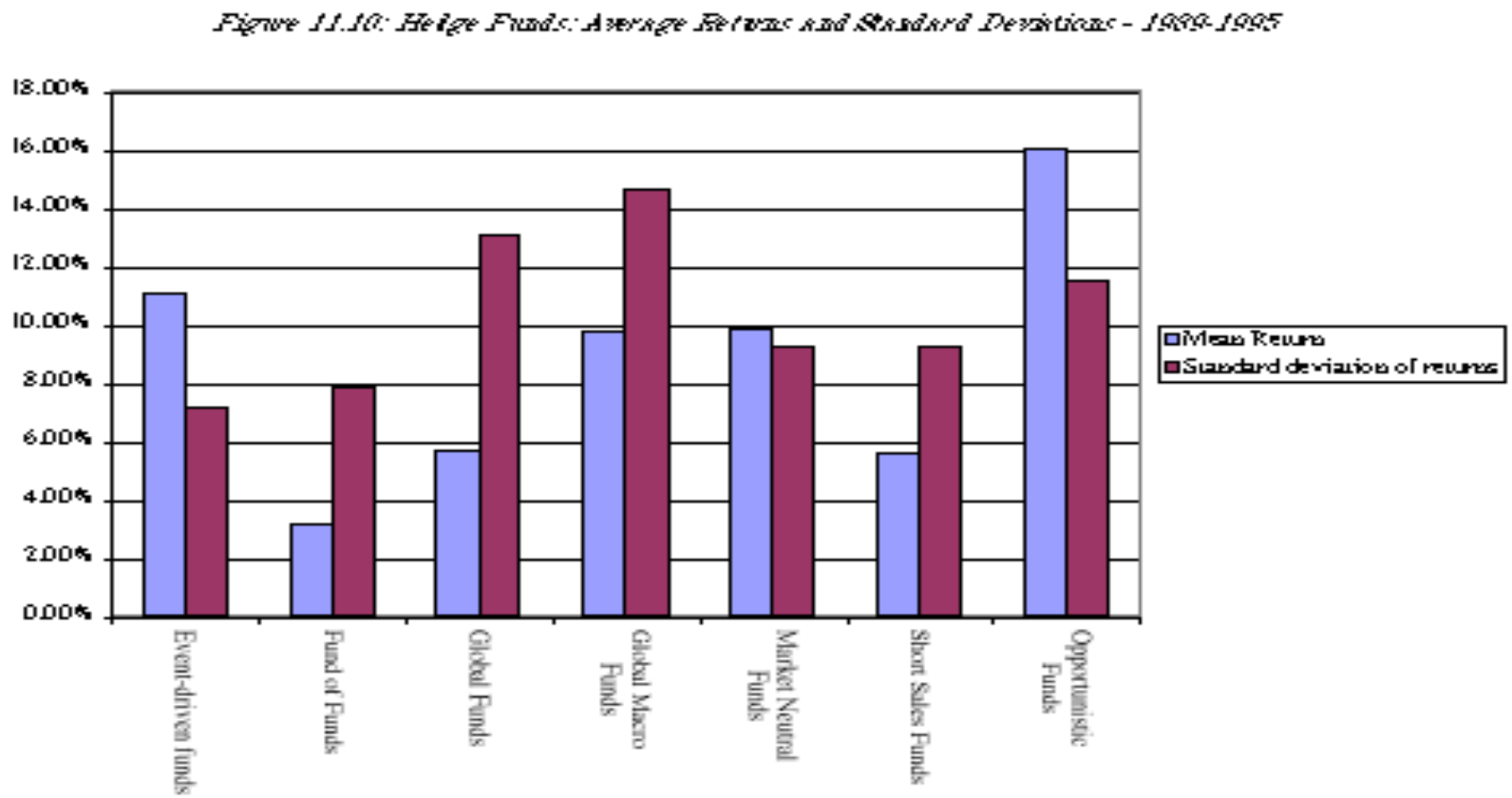
The Performance of Hedge Funds

Year	*No of funds in sample*	*Arithmetic Average Return*	*Median Return*	*Return on S&P 500*	*Average Annual Fee (as % of money under management)*	*Average Incentive Fee (as % of excess returns)*
1988-89	78	18.08%	20.30%		1.74%	19.76%
1989-90	108	4.36%	3.80%		1.65%	19.52%
1990-91	142	17.13%	15.90%		1.79%	19.55%
1991-92	176	11.98%	10.70%		1.81%	19.34%
1992-93	265	24.59%	22.15%		1.62%	19.10%
1993-94	313	-1.60%	-2.00%		1.64%	18.75%
1994-95	399	18.32%	14.70%		1.55%	18.50%
Entire Period		13.26%		16.47%%		

Looking a little closer at the numbers…

- The average hedge fund earned a lower return (13.26%) over the period than the S&P 500 (16.47%), but it also had a lower standard deviation in returns (9.07%) than the S & P 500 (16.32%). Thus, it seems to offer a better payoff to risk, if you divide the average return by the standard deviation – this is the commonly used Sharpe ratio for evaluating money managers.
- These funds are much more expensive than traditional mutual funds, with much higher annual fess and annual incentive fees that take away one out of every five dollars of excess returns.

Returns by sub-category



There is substantial survival risk..

- Liang examined 2016 hedge funds from 1990 to 1999. While his overall conclusions matched those of Brown et al., i.e. that these hedge funds earned a lower return than the S&P 500 (14.2% versus 18.8%), they were less risky and had higher Sharpe ratios (0.41 for the hedge funds versus 0.27 for the S&P 500), he also noted that there a large number of hedge funds die each year. Of the 2016 funds over the period for instance, only 1407 remained live at the end of the period.

In closing…

- In pure arbitrage, two exactly identical assets trade at different prices and price convergence is guaranteed at a point in time in the future. Pure arbitrage yields riskless profits but is difficult to find in markets and if found, difficult to sustatin.
- Near arbitrage is more common but there is risk, either arising from the fact that assets are not identical or because there is no guaranteed convergence.
- Pseudo arbitrage is really not arbitrage. Similar assets are mispriced, either relative to their fundamentals or relative to their historical pricing. You buy the cheaper asset and sell the more expensive one and hope to make money on convergence.