

Stock Market

-Trading and market participants

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Overview

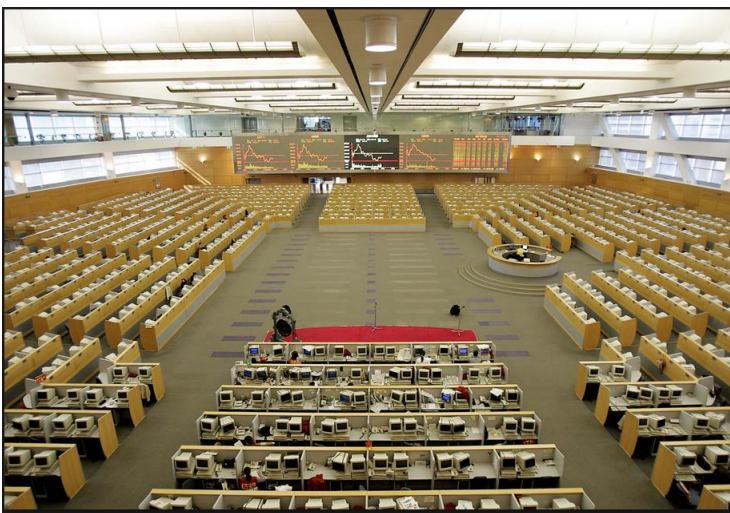
- Trading Stock
 - Understand trading order
 - Trading cost
 - Margin trading
 - Short-selling
- Market participants
 - Mutual funds, hedge funds

Sources: SC Chap. 8 Stock Markets; Chap.17 Mutual Funds and Hedge Funds

Trading Stock

Types of stock markets

- Conventional stock exchanges
 - Specialist system in NYSE
 - Broker system in most other exchanges
- Nasdaq and OTC markets
 - In Nasdaq, dealers are market makers who stand ready to buy and sell particular securities
 - OTC bulletin boards and pink sheets: These trade very small stocks. (e.g. delisted Lehman Brothers stock).
- ECNs (Electronic Communications Network)
 - Computerized systems that match buyers and sellers without going through an exchange.



Trading Stocks

- Liquid stock markets
 - Stock markets are extremely liquid. Stock holders trade shares with one another on stock exchanges. Liquidity is the ability to buy or sell shares without much cost, time, difficulty, or price concession.
- Most investors hold a stock for less than one year.
 - Short-term investing
 - Hedge fund trading and program trading accounts for about one third of NYSE volume.
- Why do investors trade?
 - Liquidity reasons (they need funds for consumption)
 - Differences of opinion about fundamentals
 - Investment
 - Speculation

Trading Orders

- Limit orders
 - Transact at the limit price or better. Non urgent execution. Queuing for a better price. E.g. Buy at a price lower than the market price.
- Market order
 - Immediate execution. Executing a trade at the prevailing market price or whatever price available.
- Stop loss order
 - To protect against losses from existing positions. When the market price reaches the stop loss price, the stop order becomes a market order.
- See BATS (an ECN) example.

- Limit buy: _____
- Limit sell: _____
- Market buy will transact at: _____
- Market sell will transact at: _____
- Stop loss buy at: _____
- Stop loss sell at: _____

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BATS BAC Go

BANK OF AMERICA CORPORATION COM

Orders Accepted			Total Volume		
	11,740			2,133,162	
TOP OF BOOK			LAST 10 TRADES		
	SHARES	PRICE	TIME	PRICE	SHARES
ASKS	4,400	11.80	09:17:16	11.76	100
	5,400	11.79	09:17:16	11.76	900
	2,800	11.79	09:17:16	11.76	200
	1,300	11.77	09:17:12	11.75	500
	900	11.76	09:17:12	11.75	500
BIDS	3,000	11.75	09:17:12	11.75	800
	2,300	11.74	09:17:12	11.75	100
	4,400	11.73	09:17:12	11.75	900
	4,100	11.72	09:17:12	11.75	600
	2,800	11.71	09:17:12	11.74	1,000

Last updated 09:17:44

Buying on Margin

- Borrow funds from broker to buy a security
 - To leverage a bet that a security price will **rise**
- *Margin*: % funded by investor (rest loaned by broker)

$$\text{Percentage Margin} = \frac{\text{Equity in Account}}{\text{Total Value of Stock}}$$

- *Initial margin*: Investor funding needed at beginning
- *Maintenance Margin*: Minimum margin thereafter
- *Margin call*: When Maintenance Margin is not met;
Fund the account or broker sells margined security

Margin trading: Graphic e.g.



Buying on Margin Example

\$70 Initial Stock Price for SIN Corp
1000 Number of Shares Bought (N)
50% Initial Margin
40% Maintenance Margin (M)

Initial Position

Stock \$70,000	Loan	\$35,000
	Equity	\$35,000

Price drop to \$60

Maintenance Margin

\$60 New Stock Price for SIN Corp
% Margin = Equity ÷ Market Value
 = (Market Value – Loan) ÷ Market Value
 = (\$60,000 – \$35,000) ÷ \$60,000
 ≈ 41.67% > 40% → **No Margin Call**

New Position

Stock \$60,000	Loan	\$35,000
	Equity	\$25,000

Exercise

- Suppose that Froogle Inc. is selling at \$50 per share. You buy 100 shares using \$3,000 of your own money, borrowing the remainder of the purchase price from your broker. The interest rate on the margin loan is 10%.
 - What's the initial margin?
 - What is the percentage increase in the net worth of your brokerage account if the price of Froogle is selling at \$45 after one year?
 - The maintenance margin is 30%. Suppose a year has passed. How low can Froogle's price fall before you get a margin call?
 - What is your answer for part (a) if Froogle pays a dividend of 5\$ per share during the year and the ex-dividend price is still \$45 after one year? Ignore the dividend reinvestment income.

Equity	=	3000
Loan	=	2000
Initial Margin	=	$3000/5000$
	=	60%

start equity = \$3000 loan = \$2000 interest rate = \$200

end equity = $\$45 * 100 - \$2000 - \$200 = \2300

ROE = $(\$2300 - \$3000) / \$3000 = -23.3\%$

suppose the price one year later is $\$x$

$$(\$100x - \$2000 - \$200) / \$100x = 30\%$$

$$\therefore x = 31.43$$

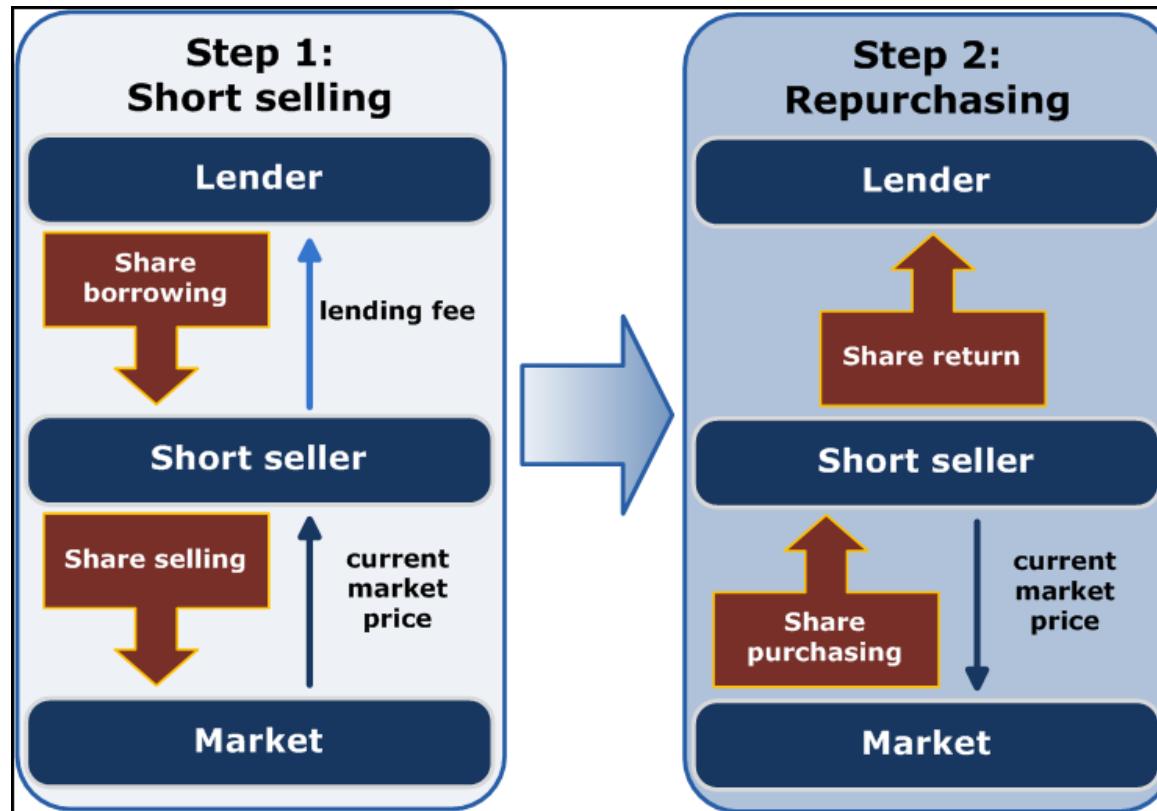
So, the price can fall to \$31.43 before you get a margin call.

start equity = \$3000

end equity = $\$2300 + \$500 = \$2800$

ROE = $(\$2800 - \$3000) / \$3000 = -6.67\%$

Short Selling



Short Selling

- Adds to market efficiency, so that investors can profit from price declines.
- Assets that cannot be shorted are usually inefficiently priced, larger bid-ask spreads. Eg. no short selling in real estate, most Chinese stocks.
- Short-selling is sometimes banned during financial crises to prevent further price declines.

But it's not clear that short selling exacerbates price declines. In fact, short sales can lead to price increases due to short covering.

Market participants

- Mutual funds
- ETFs
- Hedge funds

Mutual Funds, ETFs, Hedge Funds

- Mutual funds
 - Economic Motivation for funds
 - Structure of MF industry
 - ETFs
- Hedge funds
- Evaluating funds
 - Performance measures
 - Costs measures

Mutual Funds

- MFs are financial institutions that pool the financial resources of individuals and companies and invest those resources in portfolios of assets. They can have short-term or long term investment horizons.
- Fund is “mutually” owned by the asset management firm and the investors. An appointed “trustee” represents the “investors” to safeguard their interests. (Board of Trustees or Trustee Company)
- The barriers to entry in the mutual fund industry are low. The largest MF sponsors have not increased their market share recently the largest 25 MF companies managed 76% (71%) of industry assets in 1990 (2007). 7 of the largest 25 firms in 2007 were not among the top 25 in 1990

Economic Motivation of Funds

- Low-cost diversification (across companies, sectors, countries). You don't need to do it yourself.
- Better liquidity
 - You buy/sell one fund instead of hundreds of individual securities.
- Professional management
 - You don't have to do research on which securities to buy.
- Variety, Choice
 - Choosing asset classes instead of choosing individual securities.

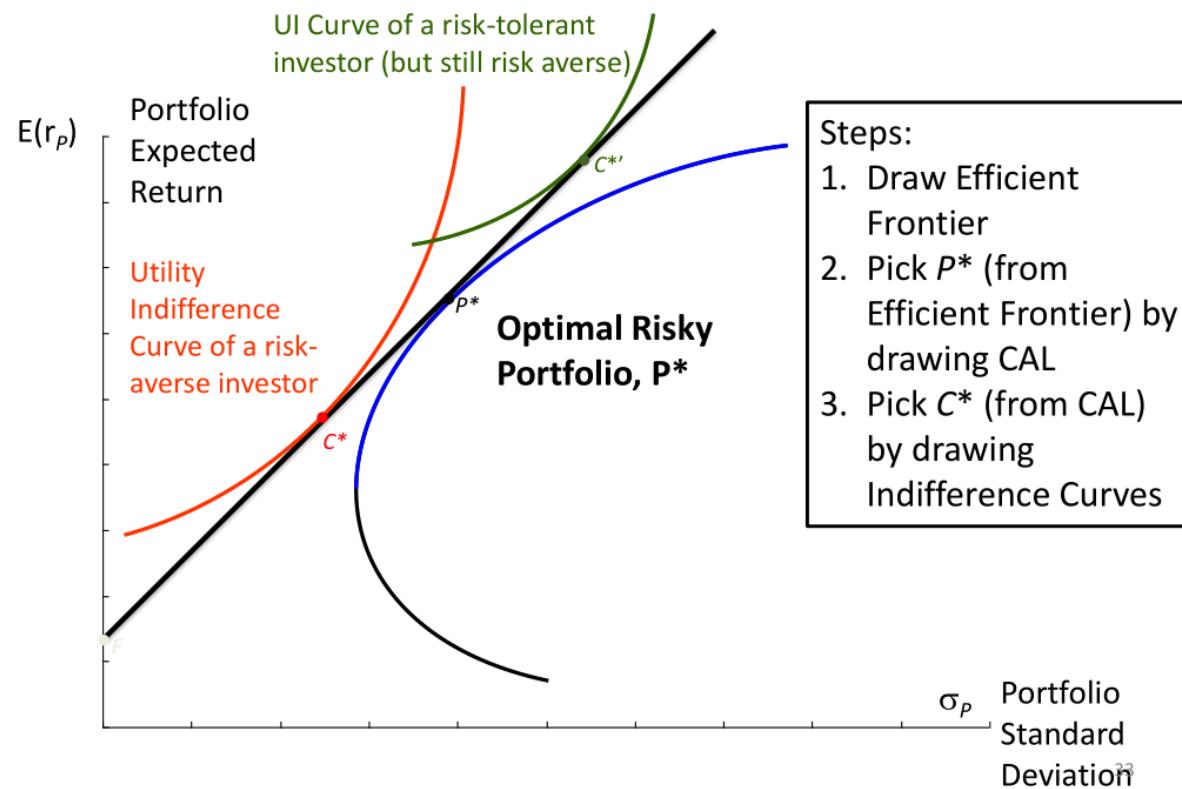
RETAIL, TECH, INDUSTRIALS,
TRANSPORTATION, AND UTILITY
STOCKS ARE ALL DOWN.
PAIN KILLERS ARE UP.



Diversification

- Diversification reduces risk
 - Expected portfolio return is the weighted average of the two expected returns
 - Portfolio standard deviation is smaller than the weighted average of the two standard deviations
- Question: When will portfolio standard deviation equal the weighted average of the two standard deviations?
 - As long as asset returns do not always move in the same direction (< 1), we have room for lowering risk by diversification
 - Not all risks are systematic risks
 - Firms respond to systematic risk in different ways

Allocation with A Risk-free Asset



To Diversify Or Not To Diversify?

- While diversification reduces risk (in theory), some professional asset managers have different views:
- Warren Buffet:
 - From 1976-2006, the top 5 holdings of Berkshire on average accounted for 73% of the portfolio
 - The average annual return of Berkshire's stock portfolio outperformed the S&P500 by 11%
 - “Wide diversification is only required when investors do not understand what they are doing”
- Mutual fund managers that concentrate their portfolios in a few industries perform better than those who widely diversify across industries (Kacperczyk, Sialm, and Zheng, 2005 JF)
- How do you reconcile the two views?

Passive versus Active funds

- Approximately 25% of long-term funds are passive funds
- Passive funds are index funds which managers buy securities in proportions similar to those included in a specified major index.
- Index funds involve little research or management, which results in lower management fees and higher net returns than actively-managed funds.
- Active funds are funds whose objective is to “beat the market”, i.e. perform better than a passive benchmark.
- Active funds have much higher fees than comparable passive funds.
- Paradox: But they rarely beat the market! (see articles)
 - 86% of investment managers failed to beat the market in 2014
 - <http://money.cnn.com/2015/03/12/investing/investing-active-versus-passive-funds/>

STUDIES HAVE SHOWN
THAT MONKEYS CAN PICK
STOCKS BETTER THAN
MOST PROFESSIONALS.



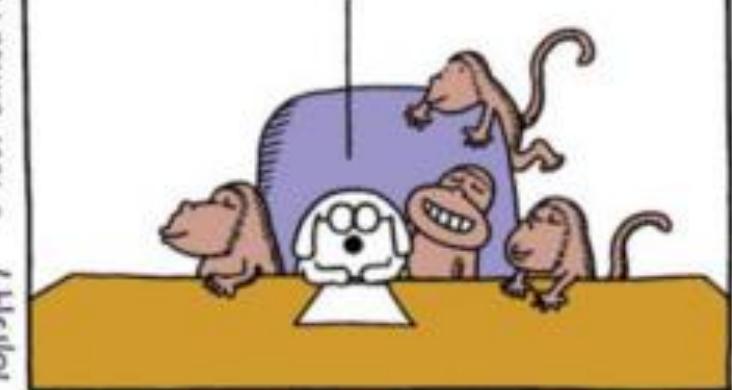
S. Adams www.unitedmedia.com

THAT'S WHY THE
DOGBERT MUTUAL FUND
EMPLOYS ONLY MONKEYS.



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YES, OUR FEES ARE
HIGH, BUT I DON'T
APOLOGIZE FOR HIRING
THE BEST.



Open versus Closed end fund

- Open-end
 - Redeem or issue shares at NAV
 - Investors sell shares back to the fund to “cash out”
 - Shares outstanding change when new shares are sold or old shares are redeemed
- Closed-end
 - Shares are traded in secondary markets (like common stocks)
 - No change in shares outstanding: If investors want to sell, they must sell to other investors
 - Share prices can differ from NAV
 - Premium/discount = $(\text{Price} - \text{NAV}) / \text{NAV}$

Mutual Fund Expenses

- Front-end Load: a commission or sales charge paid when purchasing the shares
 - Typically less than 6%; Reduce the amount of money invested
- Back-end Load: a redemption, or “exit,” fee incurred when selling the shares
 - Typically starts at 5~6%; Becomes smaller with longer investment periods
- Operating Expenses: costs incurred in operating the portfolio
 - Including administrative expenses and advisory fees paid to the investment manager
 - Expressed as a percentage of total assets under management
 - Deducted from the assets of the fund periodically
- 12b-1 Charges: annual fees charged by a mutual fund to pay for marketing and distribution cost
 - Deducted from the assets of the fund periodically
 - Limited to 1% of average net assets per year

Returns from MF investing

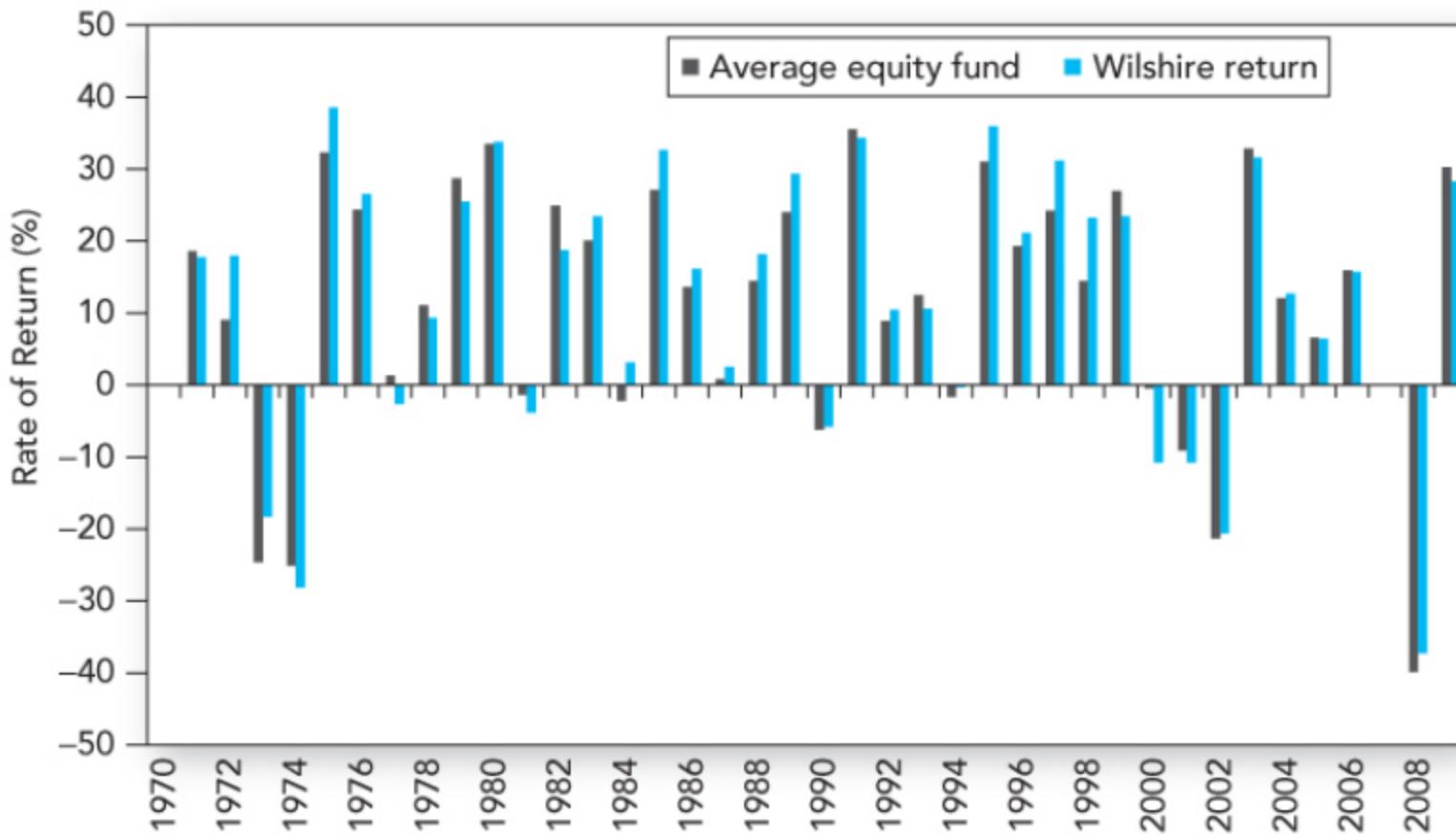
- Investor returns from MF ownership reflect three components income and dividends on portfolio assets.
- Dividends are usually reinvested in the fund's assets.
- capital gains on assets bought and sold at higher prices
- capital appreciation on assets held in the fund
- MF assets are usually marked to market daily prices are adjusted daily to reflect changes in the current market prices of the portfolio's assets Then net asset value (NAV) of a MF share is equal to the market value of the assets in the MF portfolio divided by the number of shares outstanding

Fees and Mutual Fund Returns

$$\text{Rate of Return of Fund} = \frac{\text{NAV}_1 - \text{NAV}_0 + \text{Income and capital gain distributions}}{\text{NAV}_0}$$

- Note that this measure ignores any commissions such as front-end loads and expenses
- Example:
 - You purchased 1,000 shares of the PKU Fund at a price of \$20 per share at the beginning of the year
 - The front-end fee is 4% and the expense ratio is 1.2%
 - The securities in which the fund invests increase in value by 12% during the year
 - What is your rate of return on the fund if you sell your shares at the end of the year?

Mutual Fund Performance



- Diversified equity mutual funds versus Wilshire 5000 index, 1971-2009
- The average return on diversified equity funds underperform the index in 23 of the 39 years

Exchange Traded Funds (ETFs)

- Mutual funds that are traded on an exchange.
- “Closed”-end funds, but float can be increased/decreased.
- Usually passively-managed, tracking an index. But some ETFs are derivative based and very risky. (e.g. short 2x financials)
- Lower fees (only pay brokerage commissions for transaction, and yearly expense ratios typically <0.5%)
- Able to be traded intra-day, unlike open-ended mutual funds
- Explosive growth in the US in recent years (QQQs, SPDRs, DIAMONDs, iShares). E.g., SPDRs is the most liquid stock in the US.

Hedge funds

- Hedge funds (HFs) are investment pools that solicit funds from wealthy individuals and other investors (e.g., commercial banks) and invest these funds on their behalf
- Similar to MFs, but not required to register with the SEC
- Subject to virtually no regulatory oversight and thus generally can (and do) take significant risk
- Do not have to disclose their activities to third parties and thus offer a high degree of privacy
- HFs use more aggressive trading strategies than MFs such as short selling, leverage, program trading, arbitrage, and the use of derivatives
- Diversification, providing alternate “beta”
- Allow investors to have an alternative source of returns that is not highly correlated with regular risky assets.
- There are no specific rules on valuation or pricing for hedge funds and new investors typically must pledge to keep their money in a hedge fund for at least 1 year (lock-up period)

What Do Hedge Funds Do?

- A long-short equity hedge fund takes both long and short positions in stocks
- Event-driven hedge fund strategies attempt to take advantage of opportunities created by significant transactional events, such as mergers and acquisitions, reorganizations, bankruptcies, and other extraordinary corporate transactions
- Macro hedge fund strategies attempt to identify mispriced valuations in stock markets, interest rates, foreign exchange rates, and physical commodities and make leveraged bets on the anticipated price movements in these markets
- Fixed-income arbitrage hedge funds attempt to find arbitrage opportunities in the fixed-income markets

Hedge fund fees

- Management fees on HFs are computed as a percent of assets under management, usually 2% p.a.
- Performance fees give fund managers a share of any positive returns earned.
- the average is 20%, but performance fees vary substantially depending on the HF
- a hurdle rate is a benchmark that must be realized before a performance fee can be assessed.
- a high-water mark is when a manager does not receive a performance fee unless the value of the fund exceeds the highest NAV it has previously achieved (for that particular investor).

High-Water Mark

- Some managers offer a high-water mark in calculating their performance fees
- Performance fees is triggered only when the investor has profits exceeding the level of profits that existed the last time a performance fee was charged
- Example: Suppose PKU fund uses a high-water mark. The fund is up 25% gross in year 1, down 20% gross in year 2, up 30% gross in year 3
 - What is the performance fee in each year?

Evaluating Funds

- Historical performance
- Arithmetic mean, Geometric mean
- Risk-adjusted return
 - Sharpe ratio
 - Treynor ratio
 - Jenson's alpha
 - Information ratio
 - Against appropriate benchmark
- Evaluating fees, Refer to handout on fund fees
- Sales charges (front-end, back-end)
- Management fee, trustee fee, good performance fee, switching fee



$$\text{Sharpe Measure: } S_p = \frac{(\bar{r}_P - \bar{r}_f)}{\sigma_P}$$

Reward-to-Variability

\bar{r}_P \equiv Average portfolio return for the period

\bar{r}_f \equiv Average riskfree return for the period

σ_P \equiv Standard deviation of returns for the period

- Measures the reward (excess return) for bearing the **total risk** of the portfolio
- Appropriate for the evaluation of **diversified** portfolios



Treynor Measure:

$$T_P = \frac{(\bar{r}_P - \bar{r}_f)}{\beta_P}$$

Reward-to-Systemic Risk

\bar{r}_P ≡ Average portfolio return for the period

\bar{r}_f ≡ Average riskfree return for the period

β_P ≡ Portfolio's market sensitivity for the period

- Measures the reward (excess return) for bearing the **systemic** risk of the portfolio
- Appropriate for the evaluation of securities or portfolios for possible inclusion into a broader, diversified portfolio



Jensen Measure:

Portfolio alpha: $\alpha_P = \bar{r}_P - [\bar{r}_f + \beta_P(\bar{r}_M - \bar{r}_f)]$

CAPM-predicted return

\bar{r}_P \equiv Average portfolio return for the period

\bar{r}_f \equiv Average riskfree return for the period

β_P \equiv Portfolio's market sensitivity for the period

\bar{r}_M \equiv Average market portfolio return for the period

- Measures the excess return above or below the SML
- Can be used to evaluate portfolios or securities



Information Ratio: $I_p = \frac{\alpha_p}{\sigma(e_p)}$

Appraisal Ratio

α_p \equiv Jensen measure (alpha) for the period

$\sigma(e_p)$ \equiv Non-systemic risk (tracking error)

- Measures the expected return of the manager's active portfolio divided by the amount of idiosyncratic risk that the manager takes
- Can be used to gauge the skill of fund managers



M^2 Measure: $M_P^2 = \bar{r}_{P^*} - \bar{r}_M$

$$\bar{r}_{P^*} = \frac{\sigma_M}{\sigma_P} \bar{r}_P + \left(1 - \frac{\sigma_M}{\sigma_P}\right) \bar{r}_f$$

σ_P \equiv Total risk (st dev) of the evaluated portfolio

σ_M \equiv Total risk (st dev) of the market portfolio

- Mixes P and F to create a portfolio that has the same **total risk** as the market portfolio
- A more easily interpretable version of the Sharpe Measure
 - Same rankings as S_P

Luck or Skill?

- Suppose we regress monthly excess returns of a fund manager's portfolio on the excess return of the market index and find: $\text{alpha} = 0.2\%$ and $\text{std}(e) = 2\%$
- How many months must we observe this manager before we can be 95% sure that his alpha is truly different than zero ($\text{alpha} > 0$)?

Luck or Skill?

- The standard error of the alpha estimate is approximately:

$$\sigma(\alpha) = \frac{\sigma(e)}{\sqrt{N}}$$

where $\sigma(e)$ is the estimate of non-systemic risk and N is the number of months in the sample

- The t -statistic is $t(\alpha) = \frac{\alpha}{\sigma(\alpha)} = \frac{\alpha\sqrt{N}}{\sigma(e)}$
- To be 95% sure, $t(\alpha)$ must be at least 1.96

$$1.96 = \frac{0.2\sqrt{N}}{2} \rightarrow N = 384 \text{ months or 32 years!}$$

- We need a very long observation period to measure performance with any precision, even if the return distribution is stable with a constant mean and variance

Market Timing

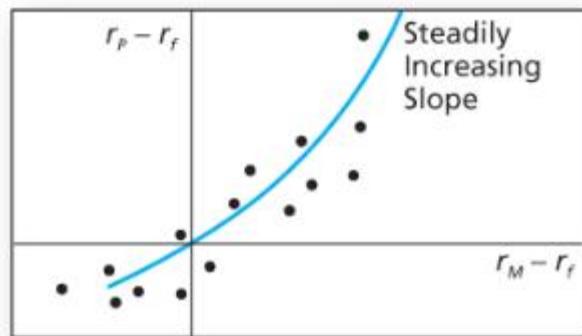
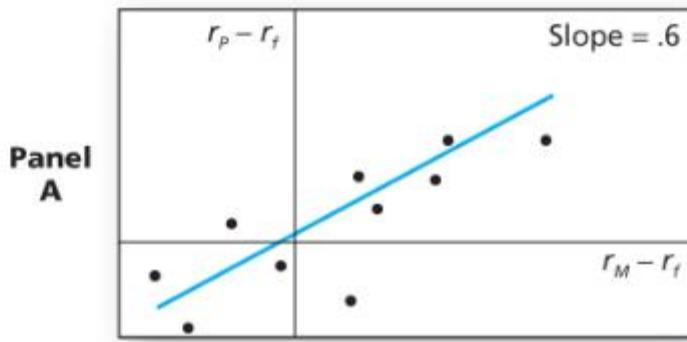
- Risk adjustment techniques assume that portfolio risk is *constant* over the relevant time period
- If the portfolio manager can time the market, she would shift funds from the safe asset to the market portfolio (*from cash to stocks or bonds*) just before the market upturn
- Treynor and Mazuy:

$$r_P - r_f = a + b(r_M - r_f) + c(r_M - r_f)^2 + e_P$$

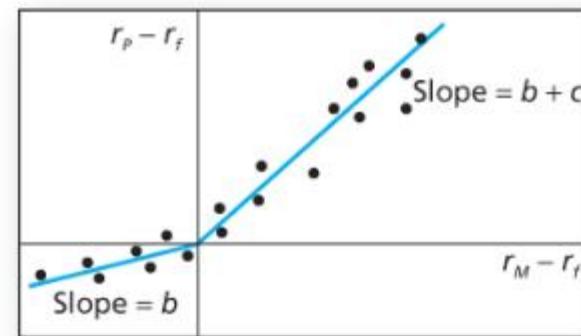
- Henriksson and Merton:

$$r_P - r_f = a + b(r_M - r_f) + c(r_M - r_f)D + e_P$$

where D is an indicator variable that equals 1 if $r_M - r_f > 0$ and 0 otherwise



**Panel
B**



**Panel
C**

Figure 24.5 Characteristic lines. **Panel A:** No market timing, beta is constant.
Panel B: Market timing, beta increases with expected market excess return.
Panel C: Market timing with only two values of beta.

Empirical Evidence of Mutual Fund Performance

- Most academic research shows that mutual funds on average underperform the market after correcting for costs
 - Before costs, some studies show that mutual fund managers have some stock picking skills, but this is not enough to offset the expenses charged by the funds
- Mutual fund managers are on average not able to time the market
- Turnover, fund flows, expenses, and management fees have a negative impact on the performance of mutual funds
 - There is some evidence that the funds with high turnover earn higher net returns than funds with low turnover
 - There is little persistence in performance of funds from year to year
 - Nevertheless, some short-term persistence is found among the best-performing funds and the worst-performing funds