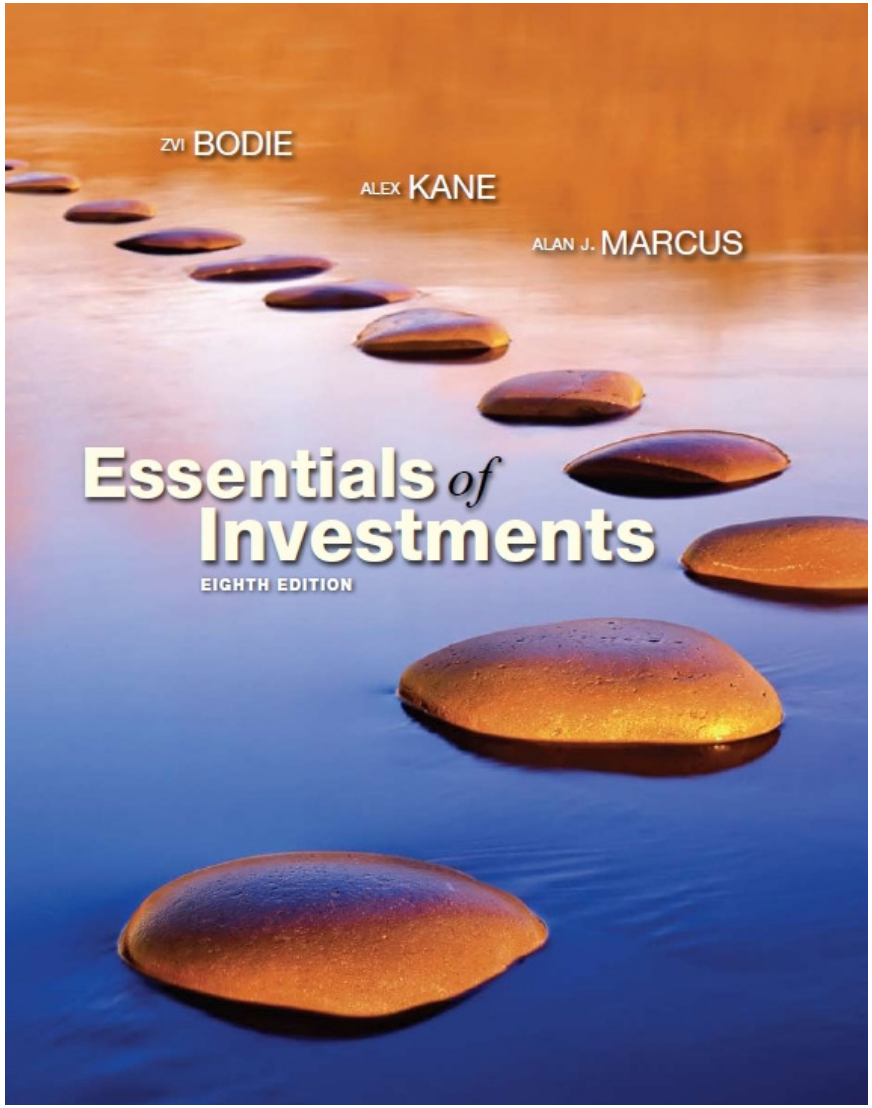
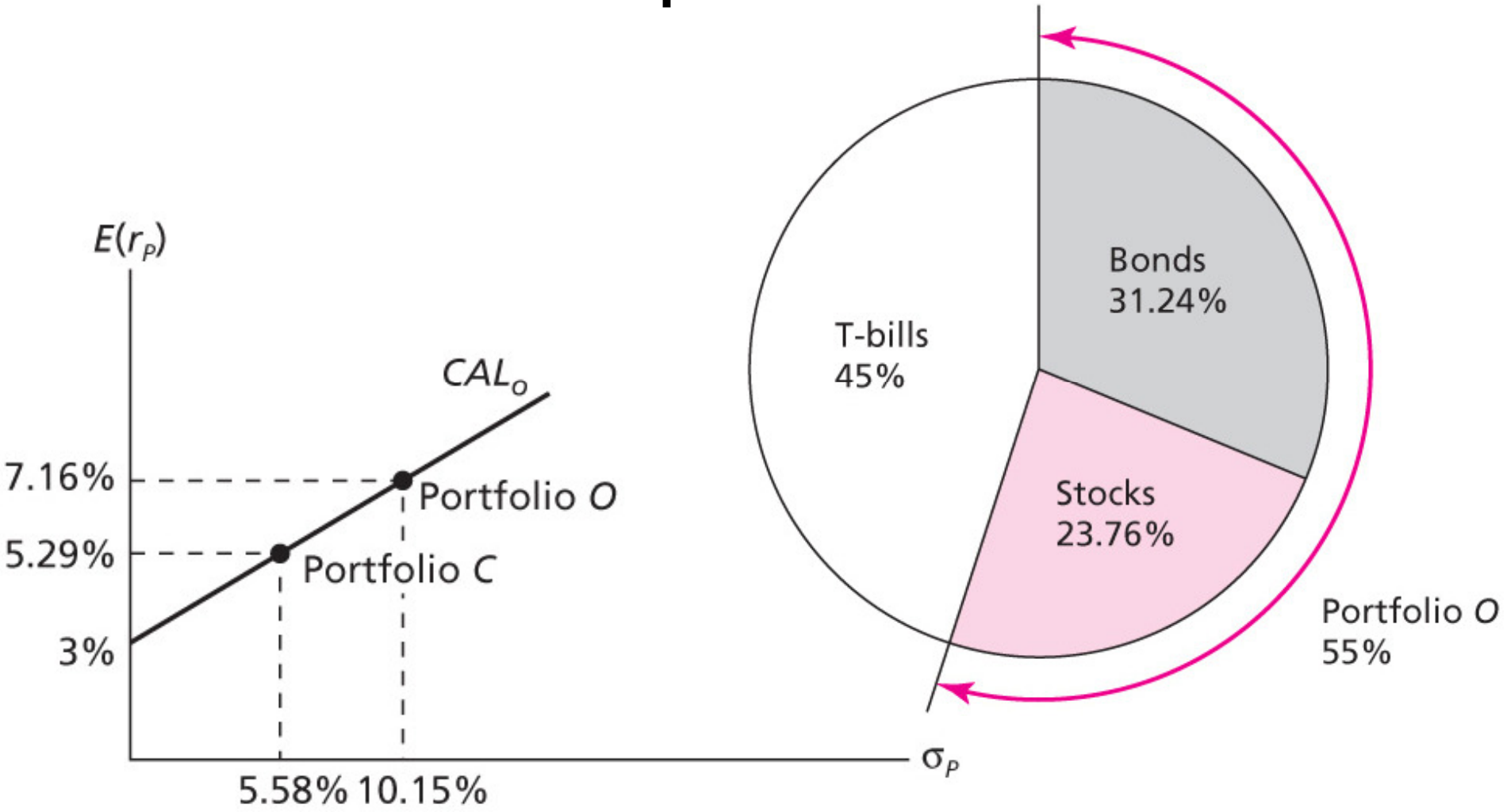
Chapter 5 (Cont'd)

Single Factor Model



The Complete Portfolio



Practical Implications

- **The analyst or planner should identify what they believe will be the best performing well diversified portfolio, call it P.**

  P may include funds, stocks, bonds, international and other alternative investments.

- **This portfolio will serve as the starting point for all their clients.**

- **The planner will then change the asset allocation between the risky portfolio and "near cash" investments according to risk tolerance of client.**

- **The risky portfolio P may have to be adjusted for individual clients for tax and liquidity concerns if relevant and for the client's opinions.**

Individual securities

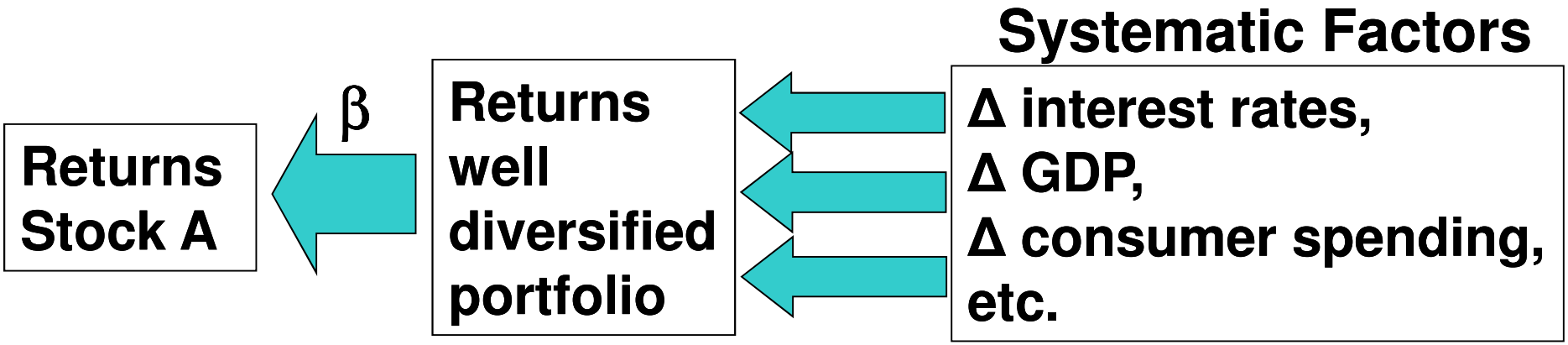
- **We have learned that investors should diversify.**
- **Individual securities will be held in a portfolio. Consequently, the relevant risk of an individual security is the risk that remains when the security is placed in a portfolio.**
- **What do we call the risk that cannot be diversified away, i.e., the risk that remains when the stock is put into a portfolio?** **Systematic risk**
- **How do we measure a stock's systematic risk?**

Systematic risk

- Systematic risk arises from events that effect the entire economy such as a change in interest rates or GDP or a financial crisis such as occurred in 2007and 2008.
- If a well diversified portfolio has no unsystematic risk then any risk that remains must be systematic.
- That is, the variation in returns of a well diversified portfolio must be due to changes in systematic factors.

Individual securities

How do we measure a stock's systematic risk?



Single Index Model Parameter Estimation

$$(r_i - r_f) = \alpha_i + \beta_i (r_m - r_f) + e_i$$

Risk Prem

Market Risk Prem or Index Risk Prem

α_i = the stock's expected excess return if the market's excess return is zero, i.e., $(r_m - r_f) = 0$

$\beta_i(r_m - r_f)$ = the component of excess return due to movements in the market index

e_i = firm specific component of excess return that is not due to market movements

Single Factor Model

$R_i = E(R_i) + \beta_i M + e_i$

R_i = Actual excess return = $r_i - r_f$

$E(R_i)$ = expected excess return

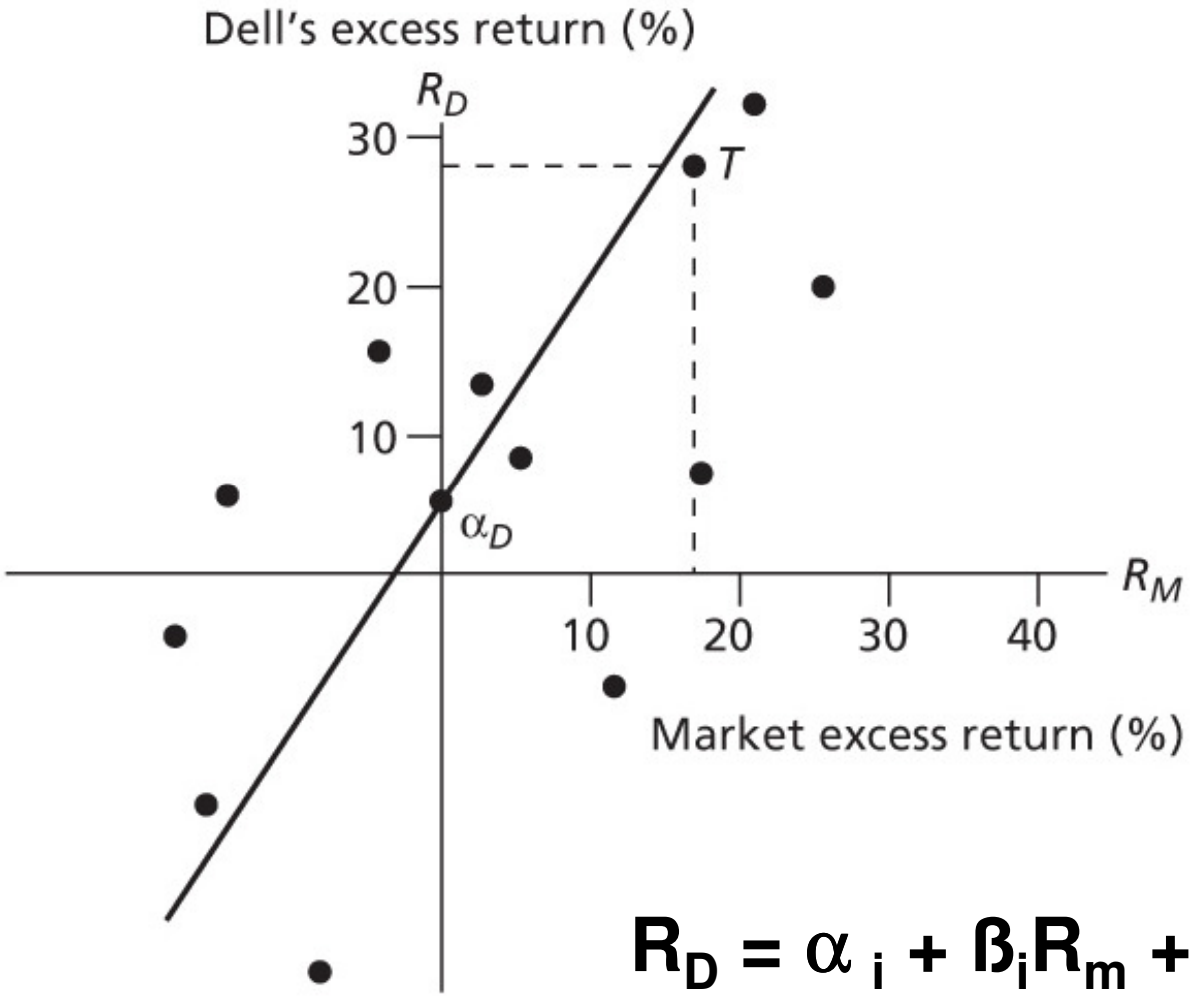
Two sources of Uncertainty

M = **some systematic factor or proxy; in this case M is unanticipated movement in a well diversified broad market index like the S&P500**

β_i = **sensitivity of a securities' particular return to the factor**

e_i = **unanticipated firm specific events**

Estimating the Index Model



$$R_D = \alpha_i + \beta_i R_m + e_i$$

Slope of SCL = beta

y-intercept = alpha

Components of Risk

	Symbol
1. The component of return due to movements in the overall market (as represented by the index R_M); β_i is the security's responsiveness to the market.	$\beta_i R_M$
2. The component attributable to unexpected events that are relevant only to this security (firm-specific).	e_i
3. The stock's expected excess return if the market factor is neutral, that is, if the market's excess return is zero.	α_i

Measuring Components of Risk

$$\sigma_i^2 = \beta_i^2 \sigma_m^2 + \sigma^2(e_i)$$

where;

σ_i^2 = **total variance**

$\beta_i^2 \sigma_m^2$ = **systematic variance**

$\sigma^2(e_i)$ = **unsystematic variance**

Examining Percentage of Variance

Total Risk = **Systematic Risk + Unsystematic Risk**

Systematic Risk / Total Risk = ρ^2

$$\beta_i^2 \sigma_m^2 / \sigma_i^2 = \rho^2$$

$$\beta_i^2 \sigma_m^2 / (\beta_i^2 \sigma_m^2 + \sigma^2(e_i)) = \rho^2$$

Advantages of the Single Index Model

- **Reduces the number of inputs needed to account for diversification benefits**

  If you want to know the risk of a 25 stock portfolio you would have to calculate 25 variances and (25x24) = 600 covariance terms

  With the index model you need only 25 betas

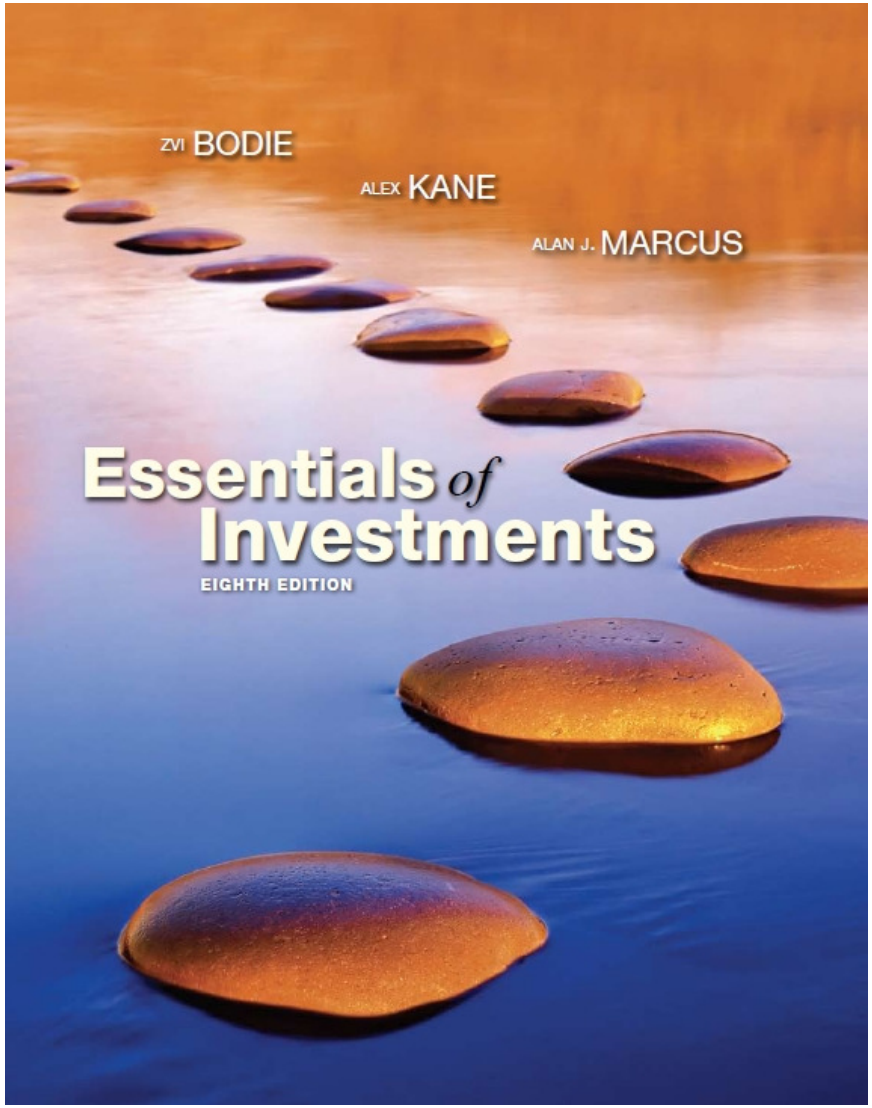
- **Easy reference point for understanding stock risk.**

  $\beta_M = 1$, so if $\beta_i > 1$ what do we know?

  If $\beta_i < 1$?

Chapter 4

Mutual Funds and Other Investment Companies



Organizational Forms

Unit Investment Trusts (UITs): *unmanaged, fixed composition portfolios*

- **Any interest and/or dividends are distributed immediately to trust certificate holders.**
- **Provide *diversification* within one sector or area and low cost entry.**
- **Often *levered*, rates of return can be *extreme*.**

Organizational Forms

Managed Investment Companies: Managed, usually changing composition portfolio.

- ***More commonly known as a 'mutual fund'***
- **The fund's board of directors typically hires an *investment advisor* to select and manage the fund assets according to some specific goal(s) set by the board and any regulatory requirements.**
- **The *investment advisor* usually creates the fund and selects the investments. Most funds are of this type.**

Organizational Forms

A managed investment company (mutual fund) may be

- ***Open end***
  - ***shares are bought from the fund and redeemed by the fund or***
- ***Closed end***
  - ***shares are bought and sold among investors in the marketplace (NASDAQ or an exchange) and the fund itself is not involved.***

Table 4.1 U.S. Mutual Funds by Investment Classification, 2008

	Assets ($ billion)	Percent of Total Assets	Number of Funds
Equity funds			
Capital appreciation focus	$ 2,911.8	24.2%	3,037
World/international	1,659.5	13.8	968
Total return focus	1,950.2	16.2	762
Total equity funds	$ 6,521.4	54.3%	4,767
Bond funds			
Corporate	$ 301.1	2.5%	293
High yield	156.7	1.3	206
World	84.0	0.7	122
Government	203.2	1.7	301
Strategic income	560.3	4.7	370
Single-state municipal	155.8	1.3	451
National municipal	218.0	1.8	224
Total bond funds	$ 1,679.0	14.0%	1,967
Hybrid (bond/stock) funds	$ 713.4	5.9%	488
Money market funds			
Taxable	$ 2,642.1	22.0%	548
Tax-exempt	465.1	3.9	259
Total money market fund	$ 3,107.2	25.8%	807
Total	$12,021.0	100.0%	8,029

Note: Column sums subject to rounding error.

Source: Investment Company Institute, *2008 Investment Company Fact Book*. Copyright © 2008 by the Investment Company Institute.

Costs of Investing in Mutual Funds

Fee Structure

- Front-end load
- Back-end load (contingent), (redemption fee)

Operating expenses

- Buying and selling commissions, administrative expenses and advisory fees for the managers

12 b-1 charges

- Marketing costs paid by the fundholders
- Alternative to a load, but assessed annually
- Maximum is 1% of assets

Implications of Fund Turnover

- **The fund itself pays *commission costs* on purchases and sales of portfolio holdings, which are charged against NAV.**
  - ***Total commission expenses are higher if the portfolio has higher turnover.***
  - ***Tax liability is higher if the portfolio has higher turnover***

- **The *turnover rate* is measured as the *total asset value bought or sold* in a year divided by the *average total asset value*.**

Other Investment Organizations

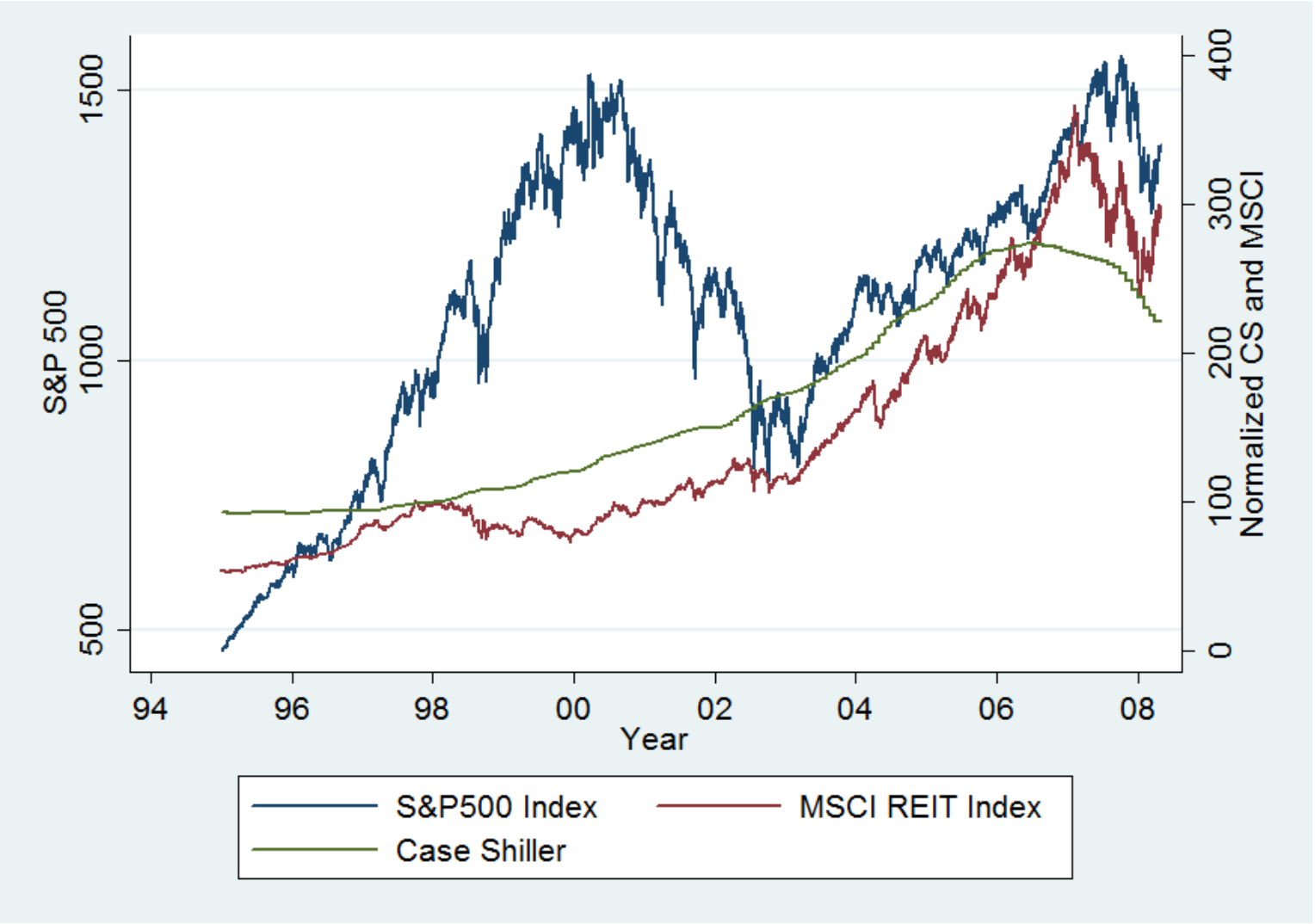
- **Commingled funds**
  - **Partnerships of investors that pool their funds. Designed for trusts or larger retirement accounts to get professional management for a fee. Operates similar to a mutual fund.**

- **REITs**
  - **Similar to closed end fund. Invest in real estate and real estate loans.**

    Equity trusts purchase real estate.

    Mortgage trusts invest in mortgage and construction loans.

REITs


S&P 500
1500
1000
500
Normalized CS and MSCI
400
300
200
100
0
94
96
98
00
02
04
06
08
Year
S&P500 Index
MSCI REIT Index
Case Shiller

First Look at Mutual Fund Performance

Initial Period Performance	Successive Period Performance: Top Half	Successive Period Performance: Bottom Half
A. Malkiel study, 1970s		
Top half	65.1%	34.9%
Bottom half	35.5	64.5
B. Malkiel study, 1980s		
Top half	51.7	48.3
Bottom half	47.5	52.5

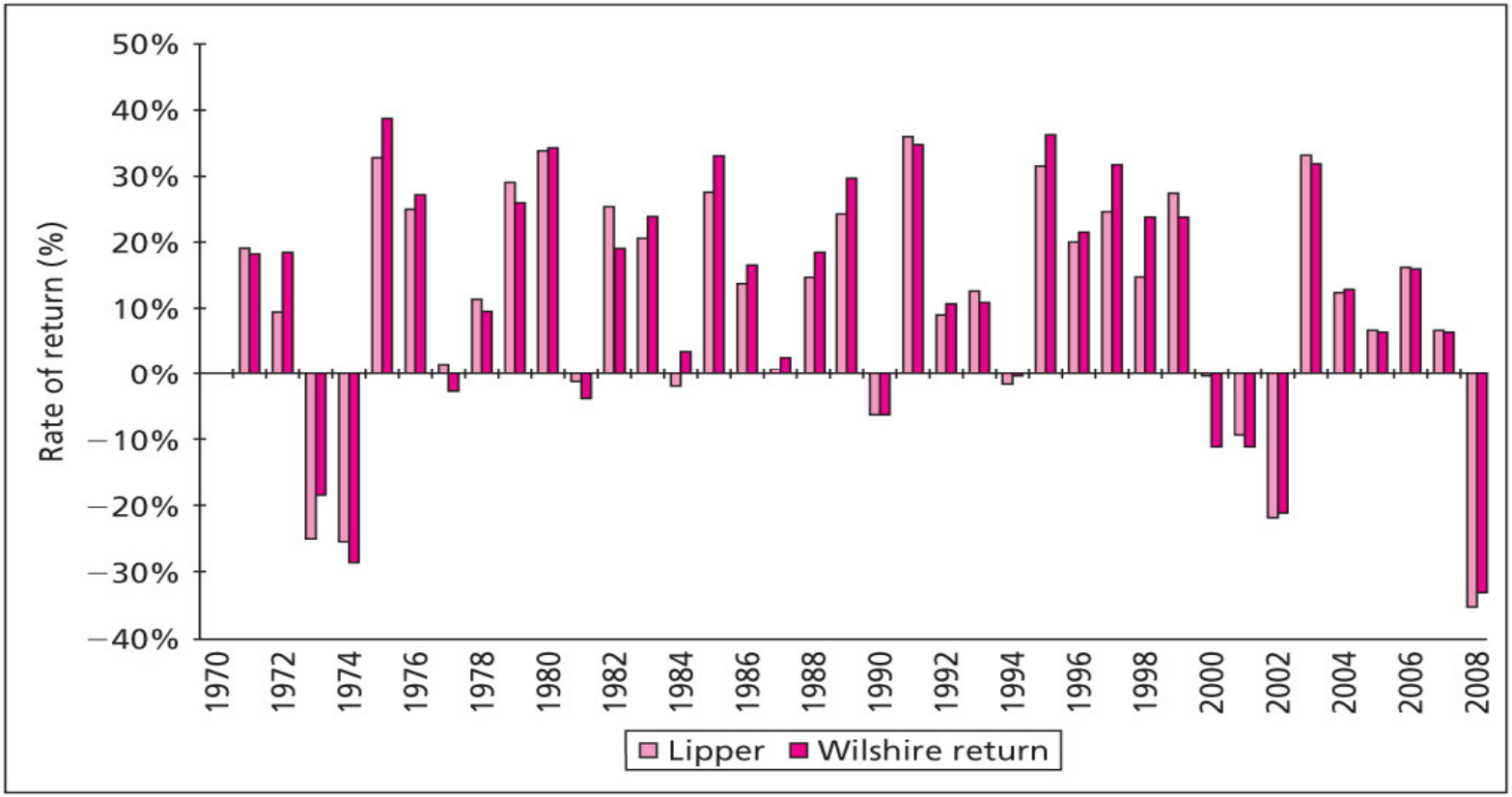
TABLE 4.4

Consistency of investment results

Source: Burton G. Malkiel, "Returns from Investing in Equity Mutual Funds 1971–1991," *Journal of Finance* 50 (June 1995), pp. 549–72. Reprinted by permission of the publisher, Blackwell Publishing, Inc.

Conclusion?

Figure 4.3 Diversified Equity Funds versus Wilshire 5000 Index



Lipper: Fund average; Wilshire is unmanaged index return

Other Investment Organizations Cont.

– **Hedge Funds**

- **Similar to mutual funds, but *not registered and not subject to SEC regulations*.**
- ***Available to institutional and high net worth investors***
- **Can pursue investment strategies that are not allowed for mutual funds.**

Grew from about $50 billion in 1990 to about $2 trillion in 2008.

Exchange Traded Funds

ETFs allow investors to trade index portfolios like shares of stock

Examples: **SPDRs and Diamonds, Cubes, WEBS**

Potential advantages

- **Trade continuously throughout the day**
- **Can be sold short or purchased on margin**
- **Potentially lower taxes**
  - **No fund redemptions**
  - **Large investors can exchange their ETF shares for shares in the underlying portfolio**
- **Lower costs (No marketing; lower fund expenses)**