CHAPTER 18

Performance Evaluation and Active Portfolio Management

18.1 RISK-ADJUSTED RETURNS

Introduction

- Complicated subject
- Theoretically correct measures are difficult to construct
- Different statistics or measures are appropriate for different types of investment decisions or portfolios
- Many industry and academic measures are different
- The nature of active managements leads to measurement problems

Abnormal Performance

- What is abnormal
- Abnormal performance is measured:
  - Comparison groups
  - Market adjusted
  - Market model / index model adjusted
  - Reward to risk measures such as the Sharpe Measure:

$$E(r_p - r_f) / \sigma_p$$

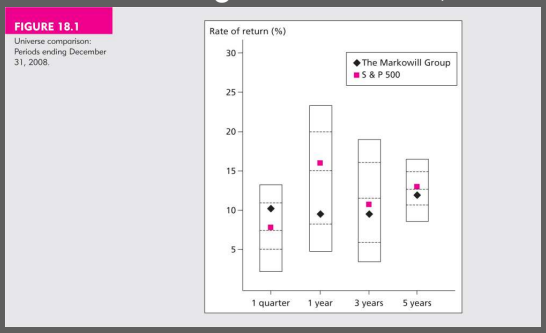
Factors That Lead to Abnormal Performance

- Market timing
- Superior selection
  - Sectors or industries
  - Individual companies

Comparison Groups

- Simplest method
- Most popular
- Compare returns to other funds with similar investment objectives

Figure 18.1 Universe Comparison Periods Ending December 31, 2008



Risk Adjusted Performance: Sharpe

1) Sharpe Index

$$\frac{\bar{r}_p - \bar{r}_f}{\sigma_p}$$

$\bar{r}_p$ = Average return on the portfolio

$\bar{r}_f$ = Average risk free rate

σ_p = Standard deviation of portfolio return

Risk Adjusted Performance: Treynor

2) Treynor Measure $\dfrac{\bar{r}_p - \bar{r}_f}{ß_p}$

$\bar{r}_p$ = Average return on the portfolio

$\bar{r}_f$ = Average risk free rate

$ß_p$ = Weighted average β for portfolio

Risk Adjusted Performance: Jensen

3) Jensen's Measure

$$\alpha_p = \bar{r}_p - [\, \bar{r}_f + ß_p (\bar{r}_m - \bar{r}_f) \,]$$

α_p = Alpha for the portfolio

$\bar{r}_p$ = Average return on the portfolio

$ß_p$ = Weighted average Beta

$\bar{r}_f$ = Average risk free rate

$\bar{r}_m$ = Avg. return on market index port.

M^2 Measure

- Developed by Modigliani and Modigliani
- Equates the volatility of the managed portfolio with the market by creating a hypothetical portfolio made up of T-bills and the managed portfolio
- If the risk is lower than the market, leverage is used and the hypothetical portfolio is compared to the market

M^2 Measure: Example

	Managed Portfolio	Market	T-bill
Return	35%	28%	6%
Stan. Dev	42%	30%	0%

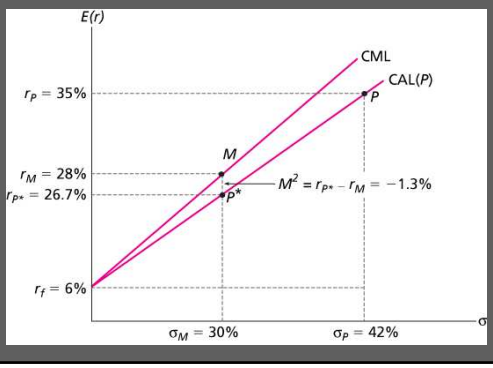
Hypothetical Portfolio: Same Risk as Market

30/42 = .714 in P (1-.714) or .286 in T-bills

(.714) (.35) + (.286) (.06) = 26.7%

Since this return is less than the market, the managed portfolio underperformed

Figure 18.2 The M^2 of Portfolio P



T^2 (Treynor Square) Measure

- Used to convert the Treynor Measure into percentage return basis
- Makes it easier to interpret and compare
- Equates the beta of the managed portfolio with the market's beta of 1 by creating a hypothetical portfolio made up of T-bills and the managed portfolio
- If the beta is lower than one, leverage is used and the hypothetical portfolio is compared to the market

T^2 Example

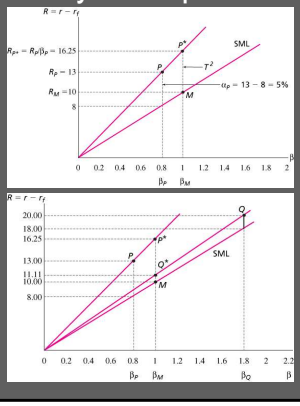
	Port. P.	Market
Risk Prem. ($r-r_f$)	13.00%	10.00%
Beta	0.80	1.0
Alpha	5.00%	0.00%
Treynor Measure	16.25	10.00

Weight to match Market $w = \beta_M/\beta_P = 1.0 / 0.8$

Adjusted Return $R_P^* = w\,(R_P) = 16.25\%$

$T^2_P = R_P^* - R_M = 16.25\% - 10\% = 6.25\%$

Figure 18.3 Treynor Square Measure



Which Measure is Appropriate

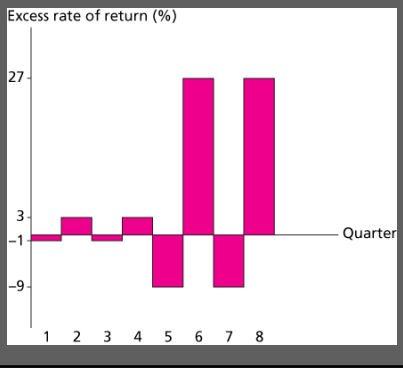
- <u>It depends on investment assumptions</u>

1) If the portfolio represents the entire investment for an individual, Sharpe Index compared to the Sharpe Index for the market.
2) If many alternatives are possible, use the Jensen α or the Treynor measure
   The Treynor measure is more complete because it adjusts for risk

Limitations

- Assumptions underlying measures limit their usefulness
- When the portfolio is being actively managed, basic stability requirements are not met
- Practitioners often use benchmark portfolio comparisons to measure performance

Figure 18.4 Portfolio Returns



18.2 STYLE ANALYSIS

Style Analysis

- Introduced by Bill Sharpe
- Explaining percentage returns by allocation to style
- Style Analysis has become popular with the industry

Figure 18.5 Fidelity Magellan Fund Difference: Fund versus Style Benchmark

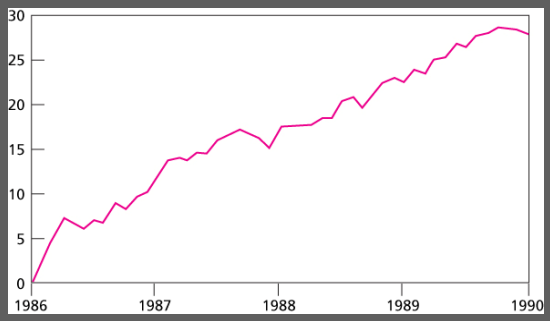
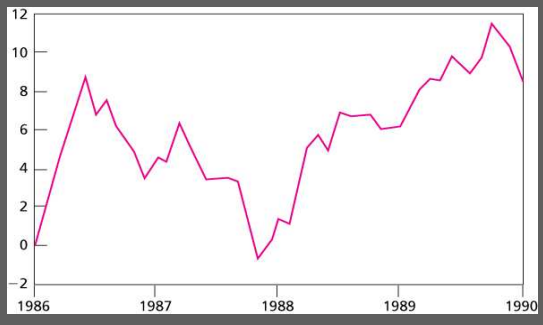


Figure 18.6 Fidelity Magellan Fund Difference: Fund versus S&P 500

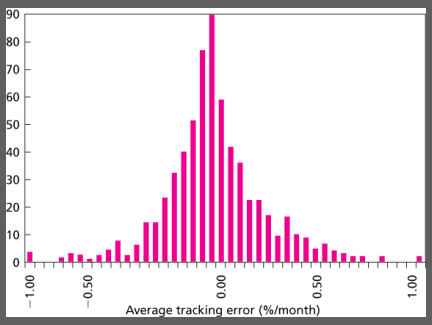


18.3 MORNINGSTAR'S RISK-ADJUSTED RATING

Morningstar

- Premier source of information on mutual funds
- Risk Adjusted Rating (RAR) among most widely used performance measures

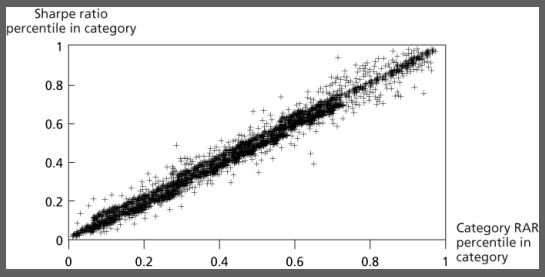
Figure 18.7 Average Tracking Error of 636 Mutual Funds, 1985 - 1989



Morning Star's Risk Adjusted Rating

- Similar to mean Standard Deviation rankings
- Companies are put into peer groups
- Stars are assigned
  - 1-lowest
  - 5-highest
- Highly correlated to Sharpe measures

Figure 18.8 Rankings Based on Morningstar's RARs and Excess Return Sharpe Ratios



18.4 PERFORMANCE ATTRIBUTION PROCEDURES

Performance Attribution

- Decomposing overall performance into components
- Components are related to specific elements of performance
- Example components
  - Broad Allocation
  - Industry
  - Security Choice
  - Up and Down Markets

Process of Attributing Performance to Components

- Set up a 'Benchmark' or 'Bogey' portfolio
  - Use indexes for each component
  - Use target weight structure

Process of Attributing Performance to Components

- Calculate the return on the 'Bogey' and on the managed portfolio
- Explain the difference in return based on component weights or selection
- Summarize the performance differences into appropriate categories

Table 18.5 Performance Attribution

TABLE 18.5
Performance attribution

A. Contribution of Asset Allocation to Performance

Market	(1) Actual Weight in Market	(2) Benchmark Weight in Market	(3) Excess Weight	(4) Index Return (%)	(5) = (3) × (4) Contribution to Performance (%)
Equity	0.70	0.60	0.10	5.81	.5810
Fixed-income	0.07	0.30	−0.23	1.45	−.3335
Cash	0.23	0.10	0.13	0.48	.0624
Contribution of asset allocation					0.3099

B. Contribution of Selection to Total Performance

Market	(1) Portfolio Performance (%)	(2) Index Performance (%)	(3) Excess Performance (%)	(4) Portfolio Weight	(5) = (3) × (4) Contribution (%)
Equity	7.28	5.81	1.47	0.70	1.03
Fixed-income	1.89	1.45	0.44	0.07	0.03
Contribution of selection within markets					1.06

Table 18.6 Sector Allocation Within the Equity Market

TABLE 18.6
Sector allocation within the equity market

Sector	(1) Beginning of Month Weights: Portfolio	(2) Beginning of Month Weights: S&P 500	(3) Difference in Weights	(4) Sector Return (%)	(5) = (3) × (4) Contribution of Sector Allocation (%)
Basic materials	0.0196	0.083	−0.0634	6.9	−0.437
Business services	0.0784	0.041	0.0374	7.0	0.262
Capital goods	0.0187	0.078	−0.0593	4.1	−0.243
Consumer cyclical	0.0847	0.125	−0.0403	8.8	−0.355
Consumer noncyclical	0.4037	0.204	0.1997	10.0	1.997
Credit sensitive	0.2401	0.218	0.0221	5.0	0.111
Energy	0.1353	0.142	−0.0067	2.6	−0.017
Technology	0.0195	0.109	−0.0895	0.3	−0.027
Total	1.0000	1.000	0.0000		1.290

Table 18.7 Portfolio Attribution Summary

TABLE 18.7
Portfolio attribution: summary

		Contribution (basis points)
1. Asset allocation		31.0
2. Selection		
a. Equity excess return		
i. Sector allocation	129	
ii. Security selection	18	
	147 × 0.70 (portfolio weight) =	102.9
b. Fixed-income excess return	44 × 0.07 (portfolio weight) =	3.1
Total excess return of portfolio		137.0

18.5 THE LURE OF ACTIVE MANAGEMENT

Lure of Active Management

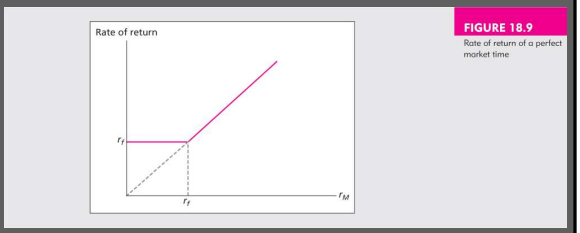
- Are markets totally efficient?
  - Some managers outperform the market for extended periods
  - While the abnormal performance may not be too large, it is too large to be attributed solely to noise
  - Evidence of anomalies such as the turn of the year exist
- The evidence suggests that there is some role for active management

18. MARKET TIMING

Market Timing

- Adjust the portfolio for movements in the market
- Shift between stocks and money market instruments or bonds
- With perfect ability to forecast behaves like an option
- Little evidence of market timing ability

Figure 18.9 Rate of Return of a Perfect Market Timer



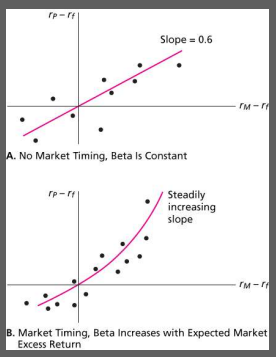
With Imperfect Ability to Forecast

- Long horizon to judge the ability
- Judge proportions of correct calls
- Bull markets and bear market calls

Market Timing & Performance Measurement

- Adjusting portfolio for up and down movements in the market
  - Low Market Return - low ßeta
  - High Market Return - high ßeta

Figure 18.10 Characteristic Lines



18.7 SECURITY SELECTION: THE TREYNOR-BLACK MODEL

Superior Selection Ability

- Concentrate funds in undervalued stocks or undervalued sectors or industries
- Balance funds in an active portfolio and in a passive portfolio
- Active selection will mean some nonsystematic risk

Treynor-Black Model

- Security analysts can analyze in depth only a small number of stocks
- Market index portfolio is the baseline portfolio
- Macro forecasting unit provides forecasts of expected rate of return

Treynor-Black Model: Characteristics

- Objective of security analysis is to form an active portfolio
  - Estimate the SCL
  - Determine the expected return
  - Use estimates for alpha, beta, and residual risk to determine optimal weight of each security
- Macroeconomic forecasts for passive index portfolio and composite forecast for the active portfolio are used to determine the optimal risky portfolio

Treynor-Black Model: Characteristics

- Analysis performed using the model can add value
- The model is easy to implement
- Lends itself to use with decentralized decision making

Portfolio Construction

- Rate of return on security *i*, where e_i is the firm specific component

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

Portfolio Construction

- Subset of available securities are researched and that portfolio will be mixed with the index portfolio to improve diversification
- For each security *k*, where α represents abnormal expected return

$$r_k = r_f + \beta_k(r_M - r_f) + e_k + \alpha_k$$

Estimating Parameters

- For each security analyzed, the following parameters would be estimated:

$$\alpha_k, \beta_k, \sigma^2(e_k)$$

- Active portfolio would have the following parameters:

$$\alpha_A, \beta_A, \sigma^2(e_A)$$

- Total variance would be:

$$\beta_A^2\sigma_M^2 + \sigma^2(e_A)$$

Sharpe Measurement

- Sharpe measurement of the risky portfolio is:

$$S(P) = \left[\frac{S^2(M) + \alpha_A^2}{\alpha^2(e_A)}\right]^{\frac{1}{2}}$$

- Position in active portfolio relative to the market portfolio depends on the ratio of the active portfolio's abnormal return relative to its weakness: appraisal ratio

Sharpe Measurement

Appraisal Ratio

$$\frac{\alpha_A}{\alpha(e_A)}$$

α_A = Alpha for the active portfolio

$\sigma_{(e_A)}$ = Nonsystematic risk

Summary Points: Treynor-Black Model

- Sharpe Measure will increase with added ability to pick stocks
- Slope of CAL>CML

  $(r_p - r_f)/\sigma_p > (r_m - r_f)/\sigma_p$
- P is the portfolio that combines the passively managed portfolio with the actively managed portfolio
- The combined efficient frontier has a higher return for the same level of risk

Figure 18.11 The Optimization Process with Active and Passive Portfolios