Portfolio Choice

2009/2010

Session 6

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Part 6. Portfolio Performance

6.1 Overview of Performance Measures

6.2 Main Performance Measures

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6.5 Performance Measures with Market Timing

6.6 Security selection: Treynor-Black Model

6.7 Style Analysis

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6.1 Overview of Performance Measurement

Overview of Performance Measurement

- The portfolio management process can be viewed in three steps:
  - Analysis of Capital Market and Investor-Specific Conditions
    - Strategic Asset Allocation Decision
  - Formation of Asset Class-Specific Portfolios
    - Security Selection Decision
  - Analysis of Investment Performance
    - Performance Measurement Analytics

Overview of Performance Measurement

- The first two of these steps are ex ante; the third is ex post.
- Thus, performance measurement can be viewed as the “end game” for the portfolio management process,
- The information generated in this evaluation will be used to alter decisions made about the portfolio’s design (i.e., portfolio management is a *dynamic process*.)
- There are two goals that an investment manager should strive to achieve:
  - Generate superior risk-adjusted returns for a given style class
  - Diversify the portfolio relative to the relevant benchmark

Comparisons

- Benchmark (fund objective)
- Median/Average of the universe (category)
- Median/Average of the peer group (sub-category)
- Buy-and-hold portfolio
- Direct challengers

Simple Performance Measurement: Peer Group Comparisons

- *Peer group comparison*. This is accomplished by calculating a portfolio's relative return ranking compared to a collection of similar funds:

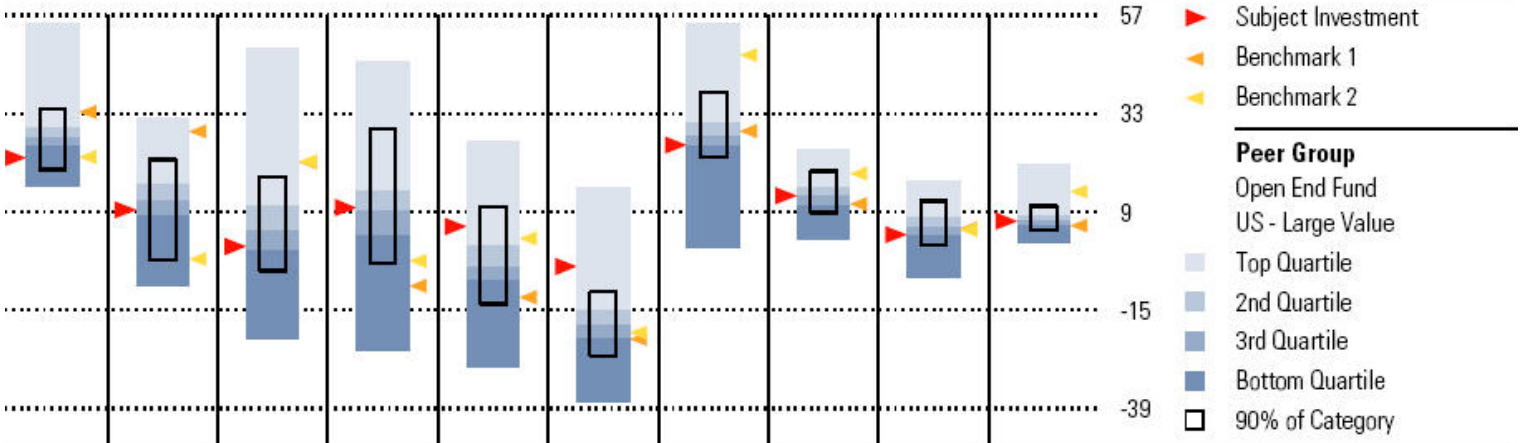
  % Ranking = [1 – (Fund's Absolute Ranking/Ttl Peer Funds)] x 100

- Relatively simple to produce. The goal is to compare the return generated by a given fund relative to other portfolios that follow the same investment mandate.

- This comparison can be captured visually by a *boxplot graph*.

Example of Peer Group Comparisons (Morningstar type)

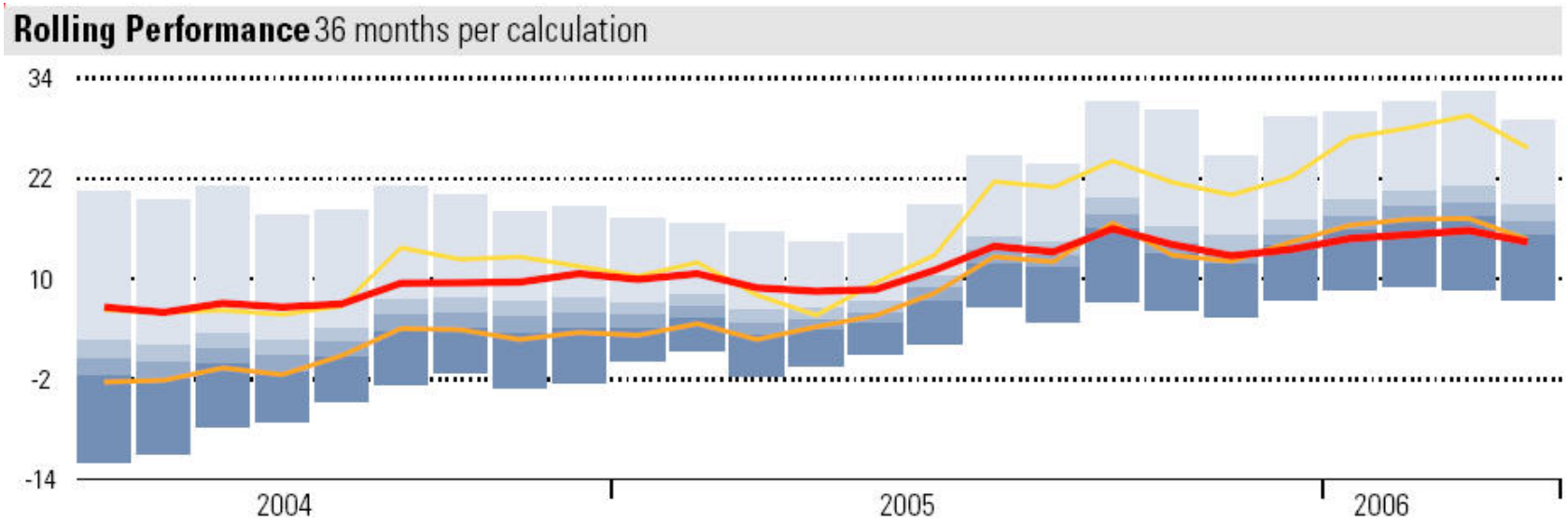
Return vs. Peer Group



1997	1998	1999	2000	2001	2002	2003	2004	2005	2006-04	History
22.16	9.47	0.52	9.98	5.41	-4.37	25.27	12.92	3.41	6.72	Subject Investment
33.35	28.58	21.04	-9.10	-11.88	-22.09	28.67	10.87	4.91	5.60	Benchmark 1
22.36	-2.55	21.26	-3.02	2.49	-20.48	47.25	18.33	4.55	13.92	Benchmark 2
27.47	11.38	5.87	9.81	-3.20	-18.18	28.66	13.22	5.89	7.26	Peer Group Avg
55.02	31.98	48.83	45.53	26.06	14.99	55.06	24.16	16.46	20.66	Best
29.82	16.09	10.91	14.40	1.14	-14.85	31.25	15.08	8.15	8.36	25th Percentile
27.53	11.96	4.91	9.44	-4.06	-18.22	27.92	13.07	5.53	7.20	50th Percentile
25.16	8.54	0.02	3.60	-7.62	-21.67	25.57	10.76	3.62	6.05	75th Percentile
15.29	-8.91	-22.02	-24.88	-28.82	-37.27	0.34	2.34	-7.04	1.52	Worst

Source: Morningstar

Example of Peer Group Comparisons (Morningstar type)



Name	Total # of Calculations	% in Top Quartile	% in 2nd Quartile	% in 3rd Quartile	% in Btm Quartile	% Above Bmark 1	% Above Bmark 2
Subject Investment	25	60.000	8.000	8.000	24.000	76.000	28.000
Benchmark 1	25	0.000	0.000	48.000	52.000	—	—
Benchmark 2	25	96.000	4.000	0.000	0.000	—	—

Source: Morningstar

Simple Performance Measurement: Peer Group Comparisons

- Drawbacks of the the peer group comparison method:
  - It requires the designation of a peer group, which may be difficult depending on the degree of specialization for the fund in question
  - Self declared peer-group $\neq$ peer-group followed (check)
  - It *does not make an explicit adjustment for risk differences* between portfolios in the peer group. Risk adjustment is *implicit* assuming that funds with the same objective should have the same level of risk.

Abnormal Performance

- What is abnormal
  - Equilibrium returns model

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

Factors That Lead to Abnormal Performance

- Market timing
  - Manage exposures (sectors, themes, geographic areas, risk)

- Superior selection
  - Sectors or industries
  - Stock picking

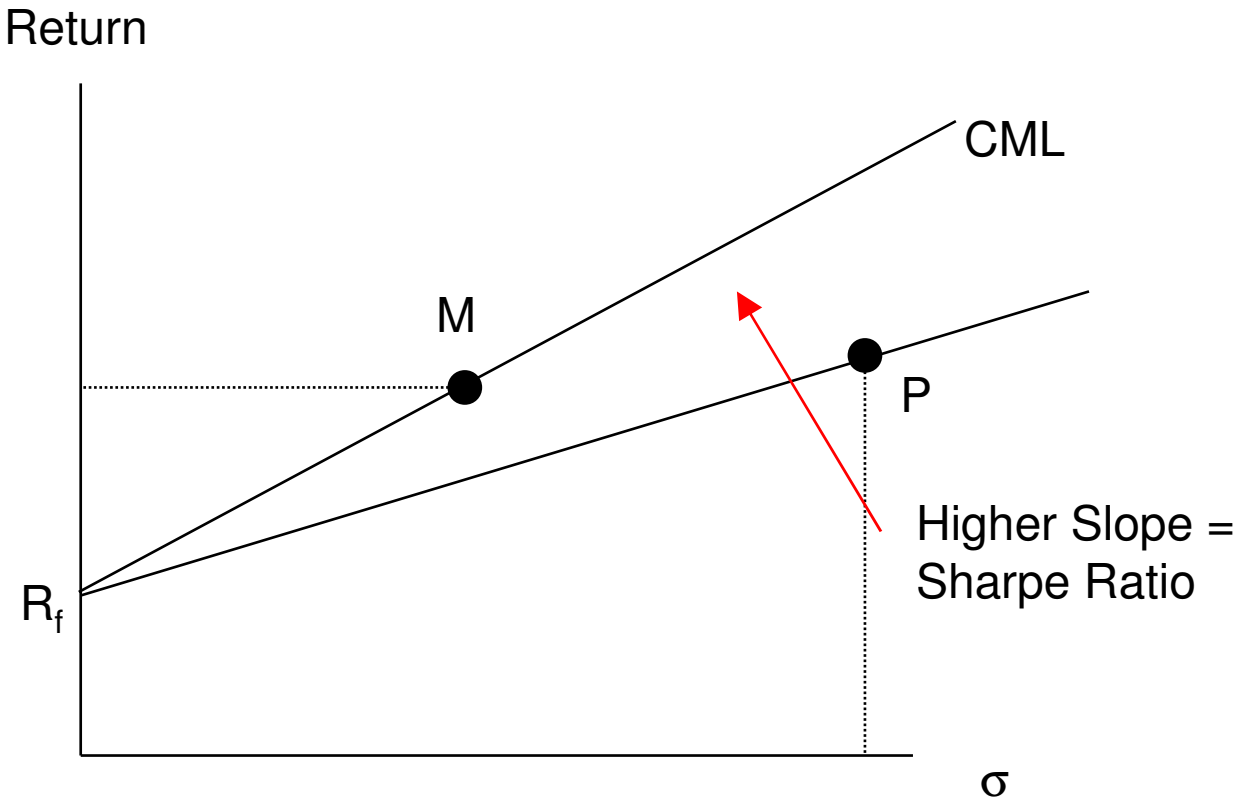
6.2 Main Performance Measures

Sharpe Ratio

$$S = \frac{R_p - R_F}{\sigma_p}$$

Measures the Slope of the CML

Sharpe Ratio



Sharpe Ratio

	Fund	Market	T-Bill
Return	15%	14%	5%
Standard Deviation	16%	12%	
Beta	1.3	1.0	

$$S_p = \frac{R_p - R_F}{\sigma_p} = \frac{15-5}{16} = 0.625$$

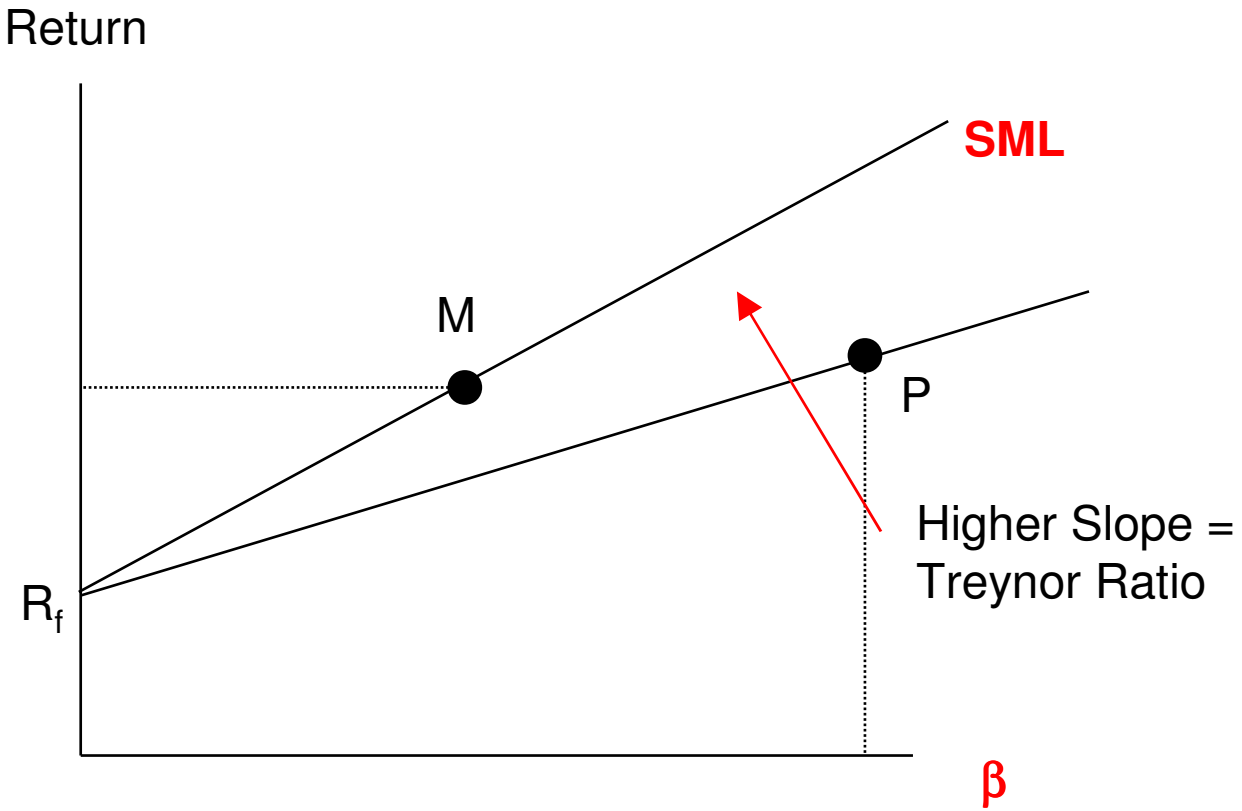
$$S_M = \frac{R_M - R_F}{\sigma_M} = \frac{14-5}{12} = 0.750$$

Treynor Ratio

$$T = \frac{R_p - R_F}{\beta_p}$$

Measures the Slope of the SML

Treynor Ratio



Treynor Ratio

	Fund	Market	T-Bill
Return	15%	14%	5%
Standard Deviation	16%	12%	
Beta	1.3	1.0	

$$T_p = \frac{R_p - R_F}{\beta_p} = \frac{15-5}{1.3} = 7.7$$

$$T_M = \frac{R_p - R_F}{\beta_M} = \frac{14-5}{1.0} = 9.0$$

Jensen Measure

- The Jensen measure stems directly from the CAPM:

$$R_{it} - R_{ft} = \alpha + \left[\beta_i \left(R_{mt} - R_{ft} \right) \right]$$

Jensen's Alpha

$$\alpha = \left(R_{it} - R_{ft} \right) - \beta_i \left(R_{mt} - R_{ft} \right)$$

Alpha measures "excess return" (i.e. greater/less than the market, after adjusting for systematic risk)

Jensen's Alpha

Alpha	Interpretation
Positive	Fund manager outperformed the market on a (systematic) risk-adjusted basis
Zero	Fund manager matched the market after adjusting for the risk level of the fund's portfolio
Negative	Fund manager underperformed against the market after adjusting for the level of systematic risk in the fund.

Jensen Measure

	Fund	Market	T-Bill
Return	15%	14%	5%
Standard Deviation	16%	12%	
Beta	1.3	1.0	

$$\alpha = R_p - R_F + \beta\left(R_M - R_F\right)$$

$$= 15 - 5 + 1.3\left(14 - 9\right)$$

$$= 15 - 16.7$$

$$= -1.7\%$$

Industry version of Alpha

$$\alpha = R_{it} - R_{mt}$$

Alpha measures “excess return” (i.e. greater/less than the market, after adjusting for systematic risk)

M^2

- Developed by Modigliani and Modigliani (1997)
- Adjust the risk of the fund to match that of the market
  - Mixture of fund + Rf security
  - (σ_M / σ_P) weight to fund, remaining weight to R_f
  - Gives r_P^*
- Then determine the return that would have been earned

M^2

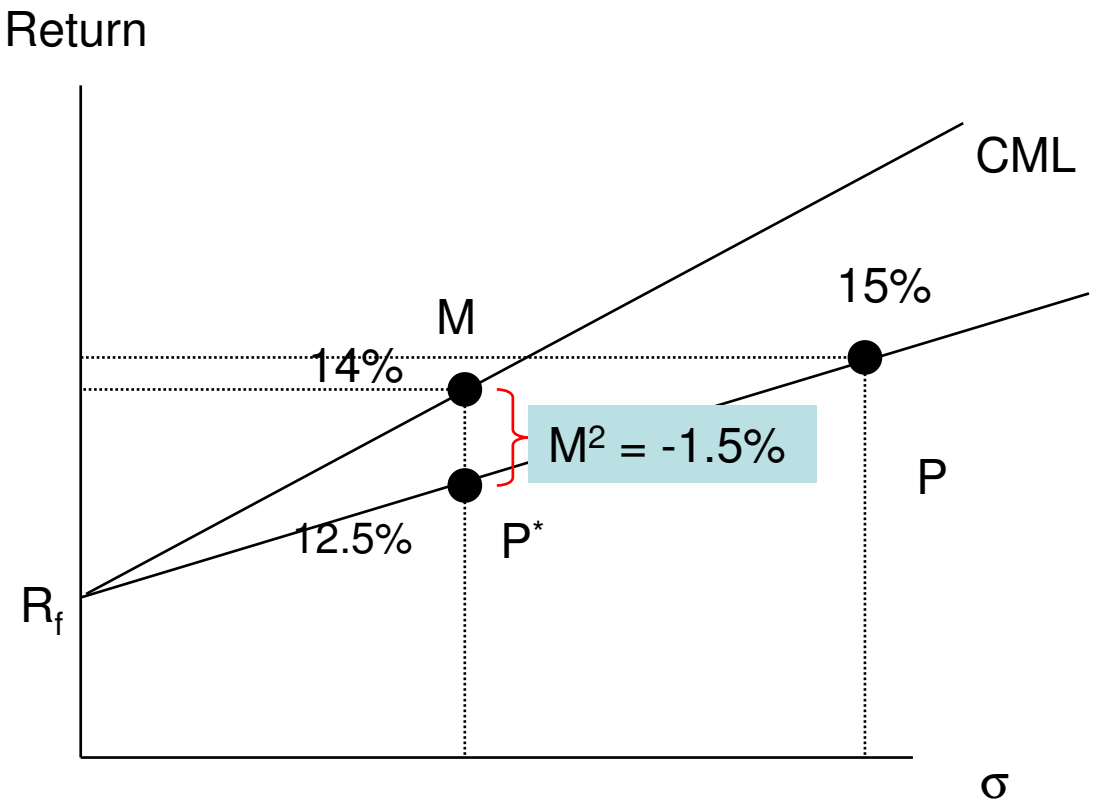
	Fund	Market	T-Bill
Return	15%	14%	5%
Standard Deviation	16%	12%	
Beta	1.3	1.0	

$$\sigma_P^* = \left(\sigma_M / \sigma_P\right)\sigma_p + \left(1 - \frac{\sigma_M}{\sigma_p}\right)\sigma_F = \left(\frac{12}{16}\right)16\% + \left(1 - \frac{12}{16}\right)0\% = 12\%$$

$$r_P^* = \left(\sigma_M / \sigma_P\right)R_p + \left(1 - \frac{\sigma_M}{\sigma_p}\right)R_F = \left(\frac{12}{16}\right)15\% + \left(1 - \frac{12}{16}\right)5\% = 12.5\%$$

$$M^2 = r_p^* - r_M = 12.5\% - 14\% = -1.50\%$$

M2



T^2

- 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

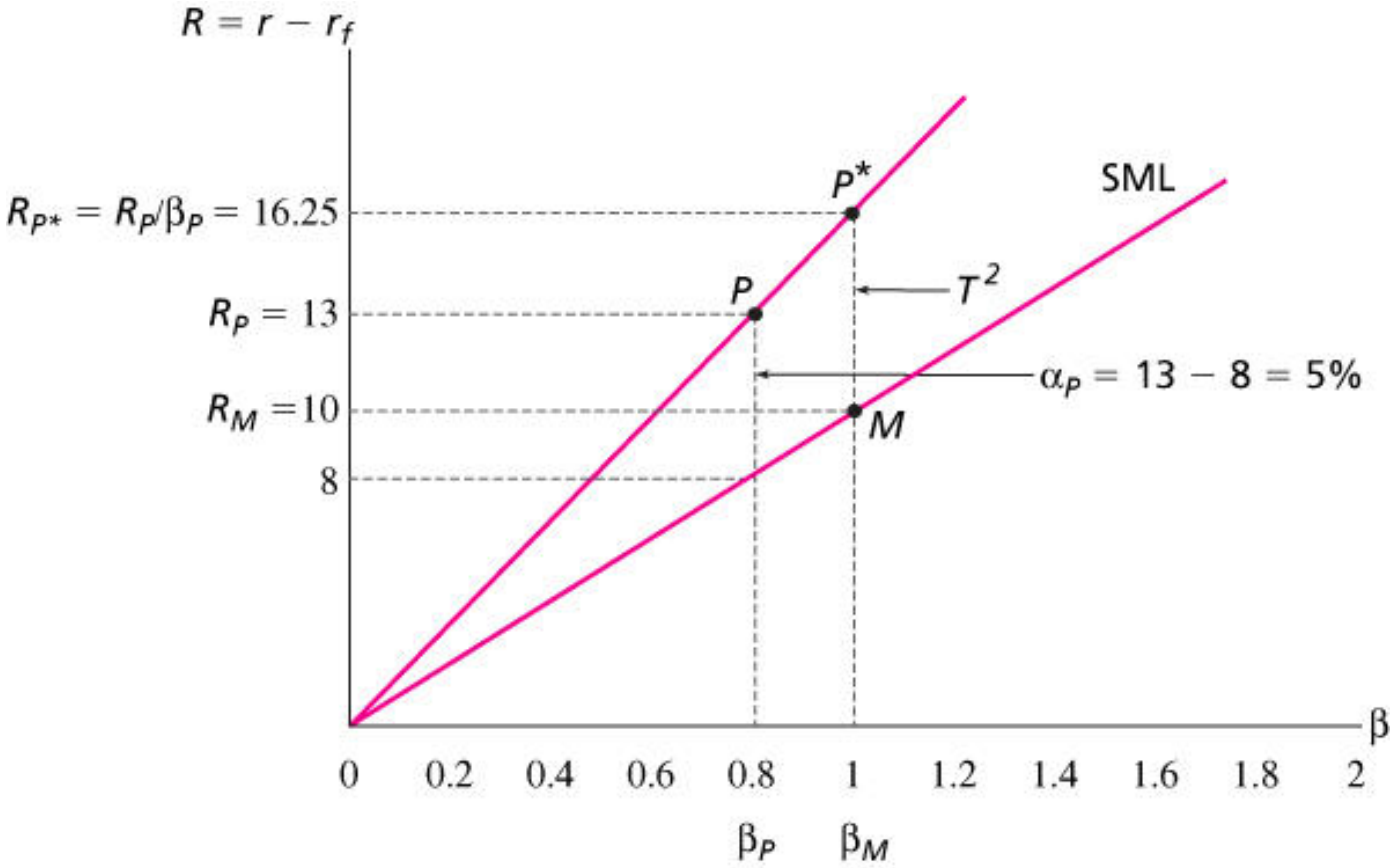
	Port. P.	Market
Risk Prem. $(r-r_f)$	13.00%	10.00%
Beta	0.80	1.0
Alpha	5.00%	0.00%
Treynor Measure	16.25	10.00

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

Adjusted Return $R_P^* = w \times R_P = 16.25\%$

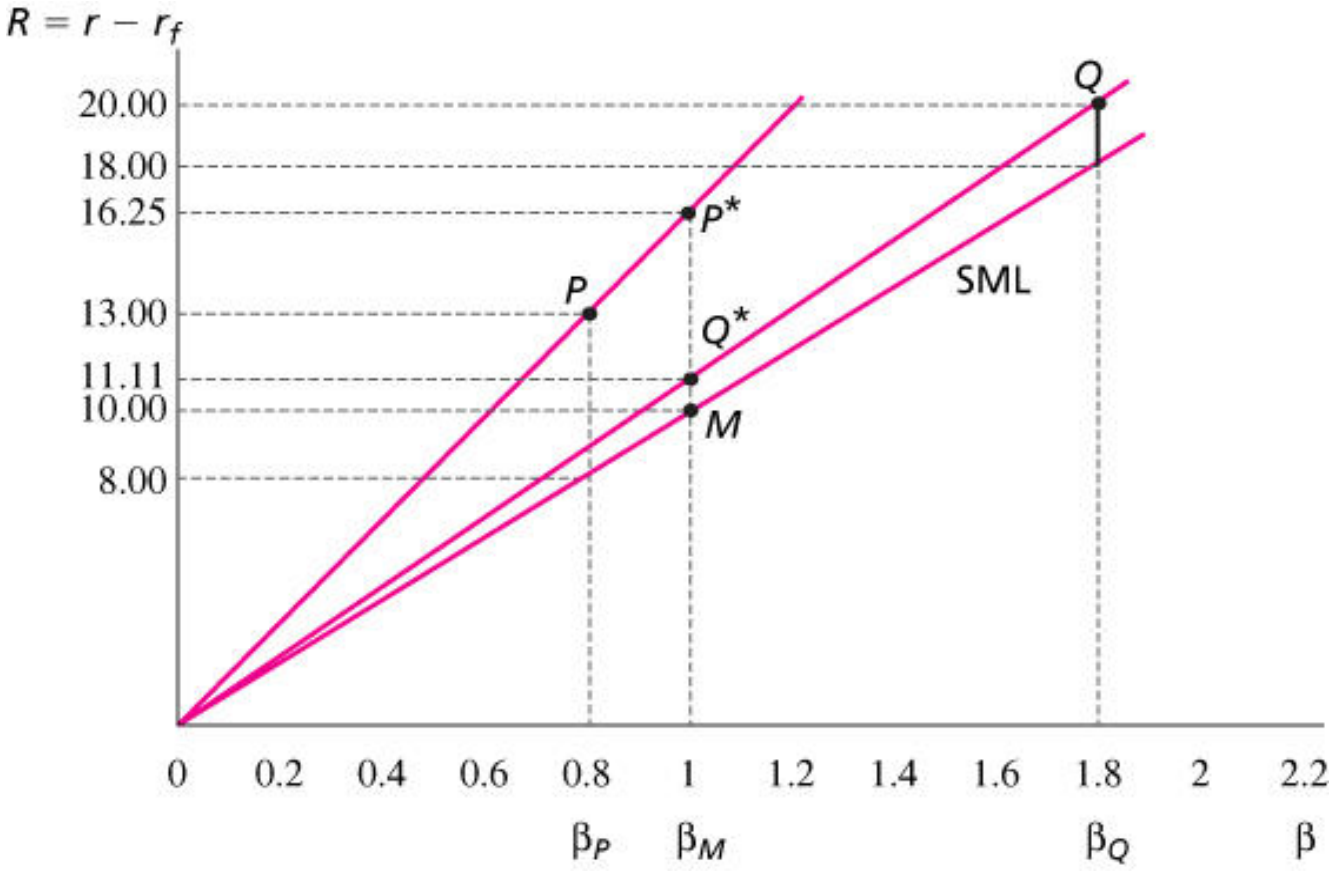
$T^2_P = R_P^* - R_M = 16.25\% - 10\% = 6.25\%$

T^2 Measure



Source: BKM (2007)

T² Measure



Source: BKM (2007)

Information Ratio (Appraisal ratio)

$$I_p = \frac{\alpha_p}{\sigma(\varepsilon_p)}$$

- Information Ratio divides the alpha of the portfolio by the nonsystematic risk
- Abnormal return per unit of risk
- From regression analysis, obtain alpha, beta and ε_p simultaneously
- Then calculate the standard deviation of ε_p
- Nonsystematic risk could, in theory, be eliminated by diversification

Performance Statistics

	Portfolio *P*	Portfolio *Q*	Portfolio *M*
Sharpe's measure	0.45	0.51	0.19
M^2	2.19	2.69	0.00
SCL regression statistics			
Alpha	1.63	5.28	0.00
Beta	0.69	1.40	1.00
Treynor	4.00	5.40	1.63
T^2	2.37	3.77	0.00
$\sigma(e)$	1.95	8.98	0.00
Information ratio	0.84	0.59	0.00
R-SQR	0.91	0.64	1.00

Source: BKM (2007)

Which Measure Should We Use?

To decide on compensation:

• Use the Jensen measure, which should provide you the amount you are willing to pay the manager (…in fact numerous managers should pay me)

To decide on optimal portfolio choices:

• Use Sharpe ratio if portfolio represents entire investment;

• Use Treynor's measure for a fund that is just one sub-portfolio out of a large set of passively-managed portfolios;

• Use Appraisal ratio for an actively-managed portfolio that is mixed with a passively-managed portfolio.

Main Drawbacks of Traditional Risk-adjusted Returns

- Unable to statistically distinguish luck from skill
- Many observations are needed for significant results
- When the portfolio is being actively managed, basic stability requirements are not met
- They rely on the validity of CAPM
- Valid with normal returns

(Hedge funds can “manipulate” volatility using derivatives: DSR)

Sharpe Ratio in Bear Markets

Which of them do you prefer?

	Fund A	Fund B	T-bill
Return	-5%	-5%	3%
SE	16%	20%	

$$S_A = \frac{R_A - R_F}{\sigma_A} = \frac{-5-3}{16} = -0.5$$

$$S_B = \frac{R_B - R_F}{\sigma_B} = \frac{-5-3}{20} = -0.4$$

Sharpe ratio and stability of returns

Source: BKM (2007)

Alpha with multi-factor models

Three-Factor Model:

$$R_{jt} - Rf_t = \alpha_j + \{[b_{j1}(R_{mt} - Rf_t) + b_{j2}SMB_t + b_{j3}HML_t]\} + e_{jt}$$

Four-Factor Model:

$$R_{jt} - Rf_t = \alpha_j + \{[b_{j1}(Rm_t - Rf_t) + b_{j2}SMB_t + b_{j3}HML_t] + b_{j4}MOM_t\} + e_{jt}$$

Morningstar

The Morningstar Risk-Adjusted Return (MRAR) measure has the following characteristics:

- No particular distribution of excess returns is assumed
- Risk is penalized
- The theoretical foundation is acceptable to sophisticated investors and investment analysts (increasing and concave utility function).

MRAR

$$MRAR(\gamma) = \left[\frac{1}{T} \sum_{t=1}^{T} (1 + r_{Gt})^{-\gamma} \right]^{-\frac{12}{\gamma}} - 1$$

r_{Gt}	=	the geometric excess return in month t $= \frac{1+TR_t}{1+R_{bt}} - 1$
R_{bt}	=	return on risk-free asset in month t

Source: Morningstar

- Risk aversion $\Leftrightarrow \gamma > 0$
- MRAR: $\gamma = 2$

Morningstars' rating and categories

Age of fund	Overall rating
At least three years, but less than five	100% three-year rating
At least five years, but less than 10	60% five-year rating 40% three-year rating
At least 10 years	50% 10-year rating 30% five-year rating 20% three-year rating

Current Morningstar Categories

Large Value
Large Blend
Large Growth
Mid Value
Mid Blend
Mid Growth
Small Value
Small Blend
Small Growth
Specialty Communications
Specialty Financial
Specialty Health
Specialty Natural Resources
Specialty Real Estate
Specialty Technology
Specialty Utilities
U.S. Hybrid
Convertibles

Europe
Latin America
Diversified Emerging Markets
Pacific/Asia
Pacific/Asia (ex Japan)
Japan
Diversified Foreign
Diversified World
International Hybrid
Specialty Precious Metals

Government Long-Term
Government Intermediate-Term
Government Short-Term
General Long-Term
General Intermediate-Term
General Short-Term
General Ultrashort-Term
Specialty International Bond
Specialty High-Yield
Specialty Multisector
Specialty Emerging Markets Bond

Muni National Long-Term
Muni National Intermediate-Term
Muni Single State Long-Term
Muni Single State Intermediate-Term
Muni Short-Term

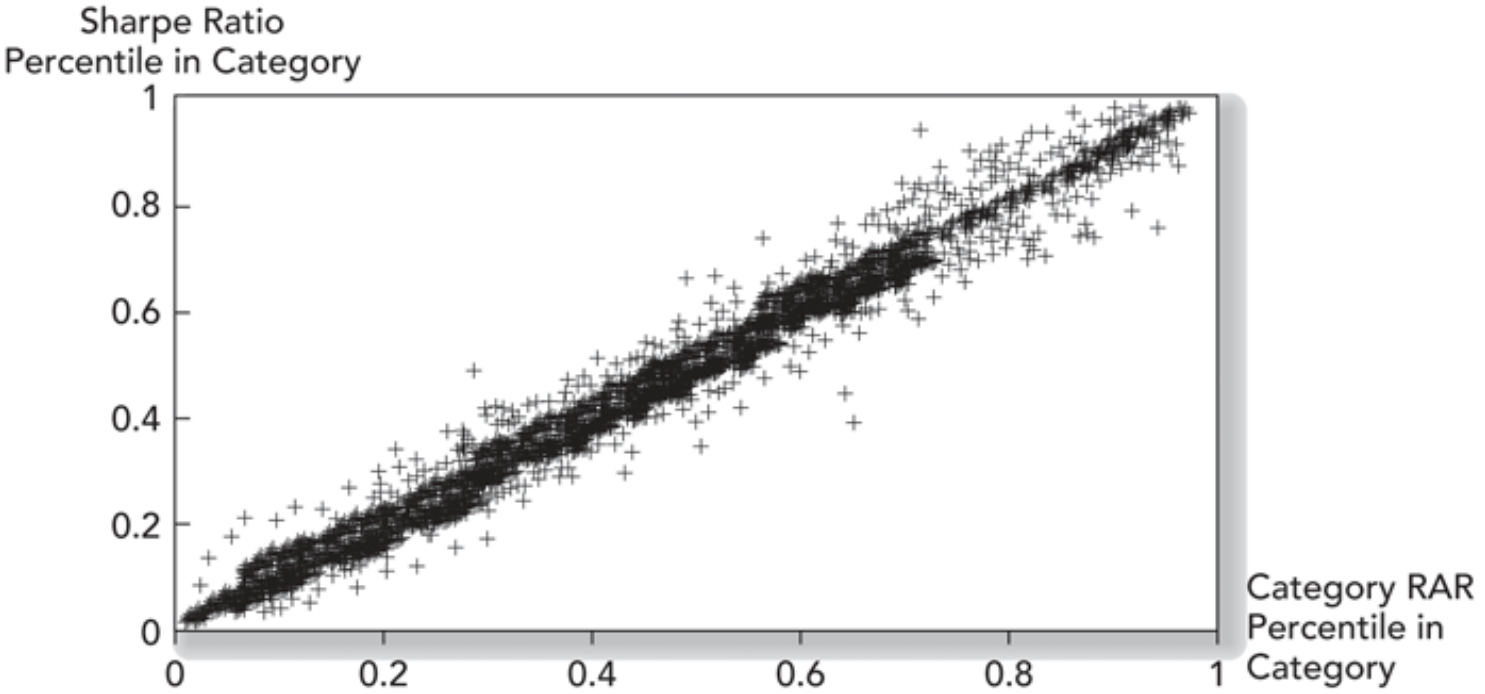
Muni California Long-Term
Muni California Intermediate-Term
Muni New York Long-Term
Muni New York Intermediate-Term

[1] While the 10-year formula seems to give the most weight to the 10-year period, the most recent three-year period actually counts the most because it is included in all three rating periods.

When a fund changes investment categories, its historical information is given less weight, depending on the magnitude of the change.

Source: Morningstar

Rankings Based on MRAR and Sharpe Ratios



Source: BKM (2007)

6.3 Alternative Performance Measures

Alternative Risk/Return Measures

- Downside risk can go undetected if conventional measures (TE, Sharpe, or Std Dev) are used
- Essentially for Hedge Fund (non-normally returns)
- Increasing for traditional investments (recurrent turbulences)

Traditional and Alternative Risk/Return Measures

Sortino Ratio

Sortino ratio is similar to Sharpe ratio except that it uses downside risk (downside deviation) in the denominator.

Because upside variability is not necessary a bad thing, the Sortino ratio is sometimes preferable to the Sharpe ratio. It measures the annualized rate of return for a given level of downside risk.

Calmar Ratio

Calmar ratio often applied to hedge funds and used to determine return relative to downside risk. A higher Calmar ratio reflects better historical risk-adjusted performance.

Traditional and Alternative Risk/Return Measures

- Sharpe Ratio (Ann Ret-Rf) / Stdev(Ret)
- Sortino Ratio (Ann Ret-Rf)/(Downside Dev)
- Calmar Ratio (Ann Ret-Rf)/Max DD)
- Sterling Ratio (Ann Ret-Rf)/(Average(Max DD)-10%))
- Stutzer Ratio, Omega and Sharpe Omega, Kappa, Burke Ratio, etc…

Complementary Alternative Risk/Return Measures

Best/Worst Month
Actual highest/lowest monthly return that occurred during the time period.

% of Up/Down Month
The percentage of months with positive/negative returns.

Average Monthly Gain/Loss
A geometric average of the monthly return periods with a positive/ negative return.

Gain/Loss Standard Deviation
The standard deviation of positive/negative monthly returns.

Longest Up/Down Streak (Mo)
The number of months representing the longest period of consecutive positive/negative returns.

Traditional and Alternative Risk/Return Measures

Di Pierro and Mosevich (2005) proved that for Normally distributed returns:

Sharpe, Sortino, Kappa, Omega and **Stutzer** imply the same ranking and therefore they are all Equivalent.

Ranking using various Measures

- For non-Normal distributions the implied rankings are different
- Which is better?
- No explicit answer but by examining stability for various schemes and thresholds we have an idea of the confidence of the rankings
- If returns exhibit long term auto-correlation rankings may be suspect (Hedge Funds daily NAVs?)

6.4 Performance attribution

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

Attributing Performance to Components

Set up a ‘Benchmark’ or ‘Bogey’ portfolio

- Use indexes for each component
- Use target weight structure

Attribution Analysis

- Portfolio managers can "add value" to their investors in either of two ways:
  - (i) selecting superior securities, or
  - (ii) demonstrating superior market timing skills through their allocation of funds to different asset classes or market segments.

Attributing Performance to Components Continued

- 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

Formula for Attribution

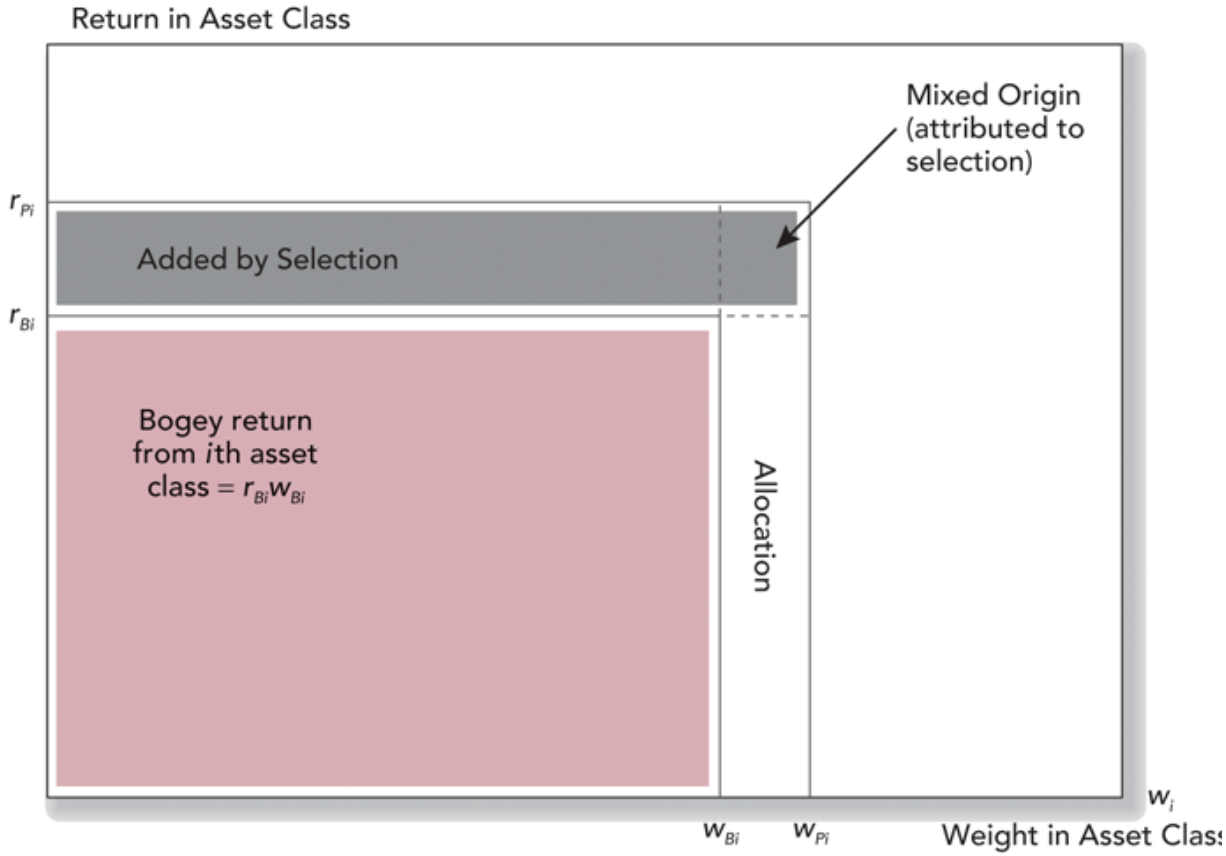
$$r_B = \sum_{i=1}^{n} w_{Bi} r_{Bi} \qquad r_p = \sum_{i=1}^{n} w_{pi} r_{pi}$$

$$r_p - r_B = \sum_{i=1}^{n} w_{pi} r_{pi} - \sum_{i=1}^{n} w_{Bi} r_{Bi} =$$

$$\sum_{i=1}^{n} (w_{pi} r_{pi} - w_{Bi} r_{Bi})$$

Where B is the bogey portfolio and p is the managed portfolio

Performance Attribution of *i*th Asset Class



Source: BKM

Performance of the Managed Portfolio

Component	Bogey Performance and Excess Return Benchmark Weight	 Return of Index during Month (%)
Equity (S&P 500)	.60	5.81
Bonds (Lehman Brothers Index)	.30	1.45
Cash (money market)	.10	0.48
Bogey = (.60 × 5.81) + (.30 × 1.45) + (.10 × 0.48) = 3.97%		
Return of managed portfolio	5.34%	
– Return of bogey portfolio	3.97	
Excess return of managed portfolio	1.37%	

Source: BKM

Performance Attribution

A. Contribution of asset allocation to performance

Market	(1) Actual Weight in Market	(2) Benchmark Weight in Market	(3) Active or Excess Weight	(4) Market Return (%)	(5) = (3) × (4) Contribution to Performance (%)
Equity	.70	.60	.10	5.81	.5810
Fixed-income	.07	.30	−.23	1.45	−.3335
Cash	.23	.10	.13	.48	.0624
Contribution of asset allocation					.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	.70	1.03
Fixed-income	1.89	1.45	0.44	.07	0.03
Contribution of selection within markets					1.06

Source: BKM

Sector Selection within the Equity Market

Sector	(1) Beginning of Month Weights (%) Portfolio	(2) Beginning of Month Weights (%) S&P 500	(3) Active Weights (%)	(4) Sector Return (%)	(5) = (3) × (4) Sector Allocation Contribution
Basic materials	1.96	8.3	−6.34	6.9	−0.4375
Business services	7.84	4.1	3.74	7.0	0.2618
Capital goods	1.87	7.8	−5.93	4.1	−0.2431
Consumer cyclical	8.47	12.5	−4.03	8.8	0.3546
Consumer noncyclical	40.37	20.4	19.97	10.0	1.9970
Credit sensitive	24.01	21.8	2.21	5.0	0.1105
Energy	13.53	14.2	−0.67	2.6	−0.0174
Technology	1.95	10.9	−8.95	0.3	−0.0269
TOTAL					1.2898

Source: BKM

Portfolio Attribution: Summary

			Contribution (basis points)
1. Asset allocation			31
2. Selection			
a. Equity excess return (basis points)			
i. Sector allocation	129		
ii. Security selection	18		
	147	× .70 (portfolio weight) =	102.9
b. Fixed-income excess return	44	× .07 (portfolio weight) =	3.1
Total excess return of portfolio			137.0

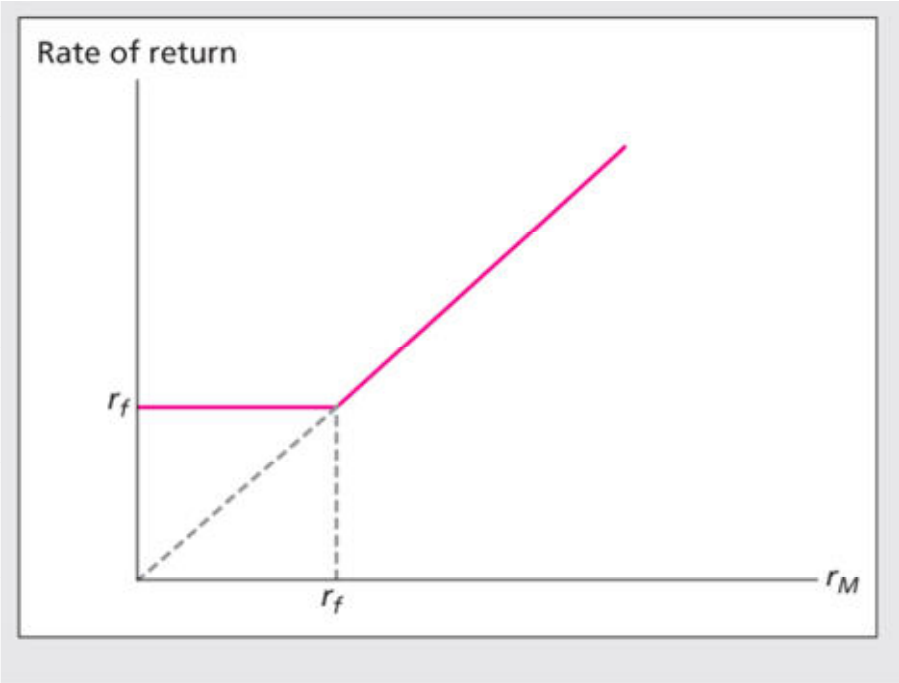
Source: BKM

6.5 Performance measures with 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

Rate of Return of a Perfect Market Timer



Source: BKM

Performance of Bills, Equities and (Annual) Timers – Perfect and Imperfect

Strategy	Bills	Equities	Perfect Timer	Imperfect Timer*
Terminal value	18.35	2,318.04	172,732.75	3,494.91
Arithmetic average (%)	3.75	12.15	17.04	54.81
Standard deviation (%)	3.15	20.26	13.82	15.77
Geometric average (%)	3.70	10.17	16.27	10.74
LPSD (relative to bills)	0	10.63	0	5.75
Minimum (%)	−.06**	−45.56	−.06	−25.90
Maximum (%)	14.86	54.56	54.56	54.56
Skew	1.03	−.36	.66	.53
Kurtosis	1.10	−.07	−.37	.31
One-period call value ($)	0	0	.1605	.0642
Terminal value of call ($)	0	0	225,330.92	174.19

Performance of bills, equities, and (annual) timers—perfect and imperfect

*The imperfect timer has $P_1 = .7$ and $P_2 = .7$. $P_1 + P_2 - 1 = .4$.

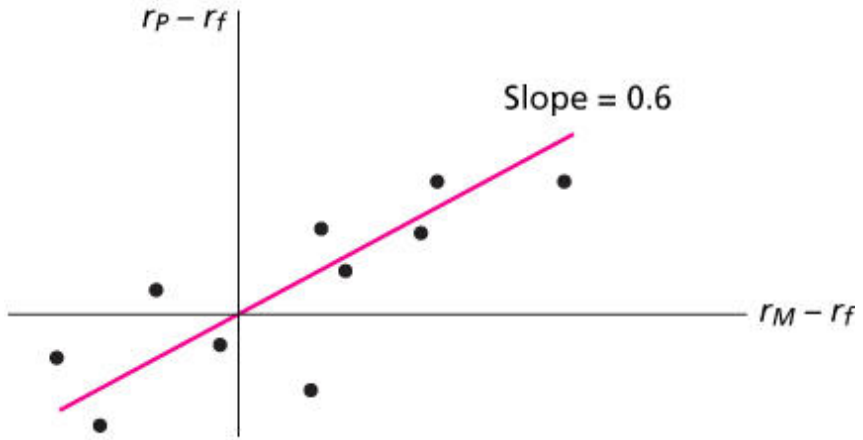
**A negative rate on "bills" of –.06% was observed in 1940. The Treasury security used in the data series for this year actually was not a T-bill, but a T-bond with a short remaining maturity.

Source: BKM

Market Timing & Performance Measurement

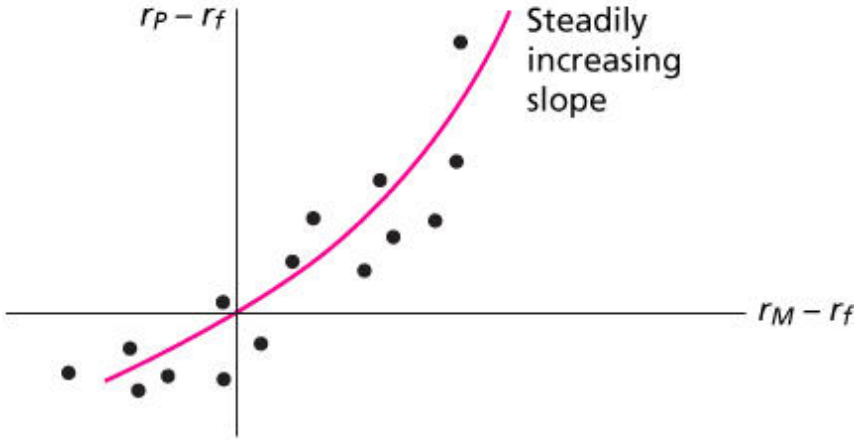
- Adjusting portfolio for up and down movements in the market
  - Low Market Return - low ßeta
  - High Market Return - high ßeta

Characteristic Lines



A. No Market Timing, Beta Is Constant

Source: BKM



B. Market Timing, Beta Increases with Expected Market Excess Return

Source: BKM

Market Timing ability

- In its pure form, market timing involves shifting funds between a market-index portfolio and a safe asset

- Treynor and Mazuy:

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

- Henriksson and Merton:

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

6.6 Security selection: 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: Assumptions

- Analysts will have a limited ability to find a select number of undervalued securities
- Portfolio managers can estimate the expected return and risk, and the abnormal performance for the actively-managed portfolio
- Portfolio managers can estimate the expected risk and return parameters for a broad market (passively managed) portfolio

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

Treynor-Black Model

- Model used to combine actively managed stocks with a passively managed portfolio
- Using a reward-to-risk measure that is similar to the the Sharpe Measure, the optimal combination of active and passive portfolios can be determined

Sharpe Measurement

- Sharpe measurement of the risky portfolio is:

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

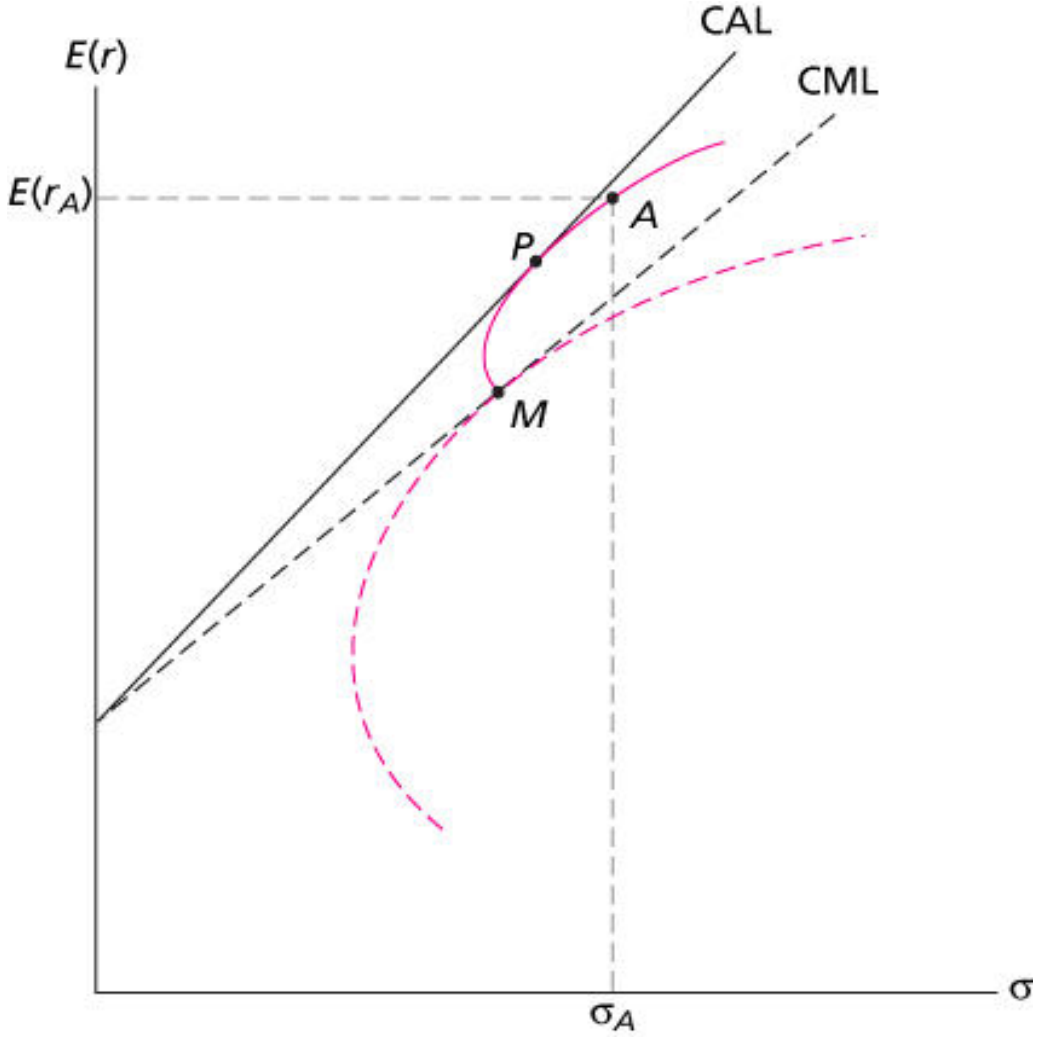
- Treynor-Black model says weight of each security should be based on ratio of its mispricing to its nonsystematic risk

$$\frac{\alpha_i}{\sigma^2(e_i)_i}$$

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

The Optimization Process with Active and Passive Portfolios



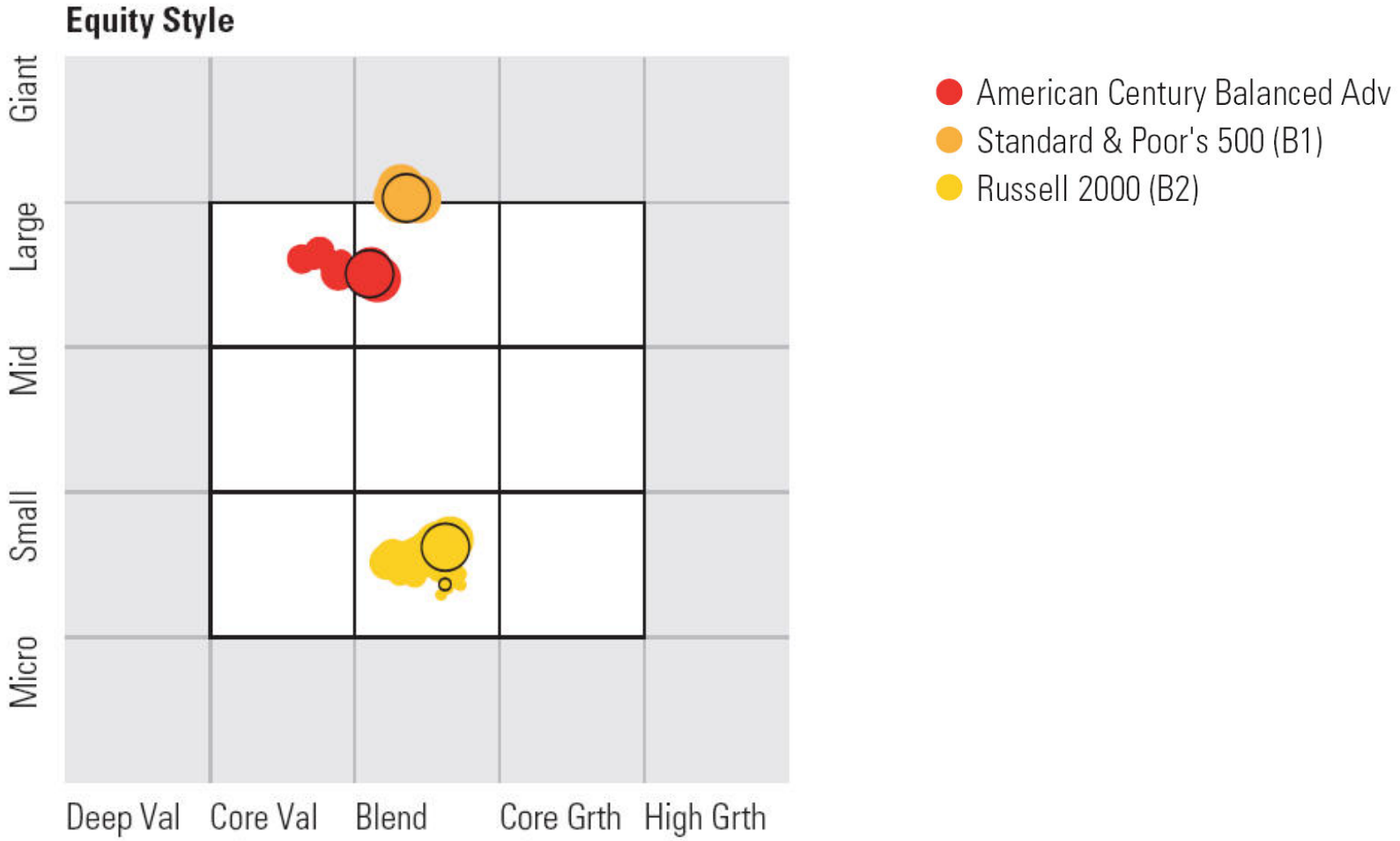
Source: BKM

6.7 Style analysis

Style analysis

- Check the self-declared style of manager
- Measure the “style drift”
- Holding-based style analysis (necessity of information!)
- Return-based style analysis (statistical biases!)
  - The weights are the rolling regression coefficients from a multivariate regression

Example of holding-based style analysis (Morningstar)

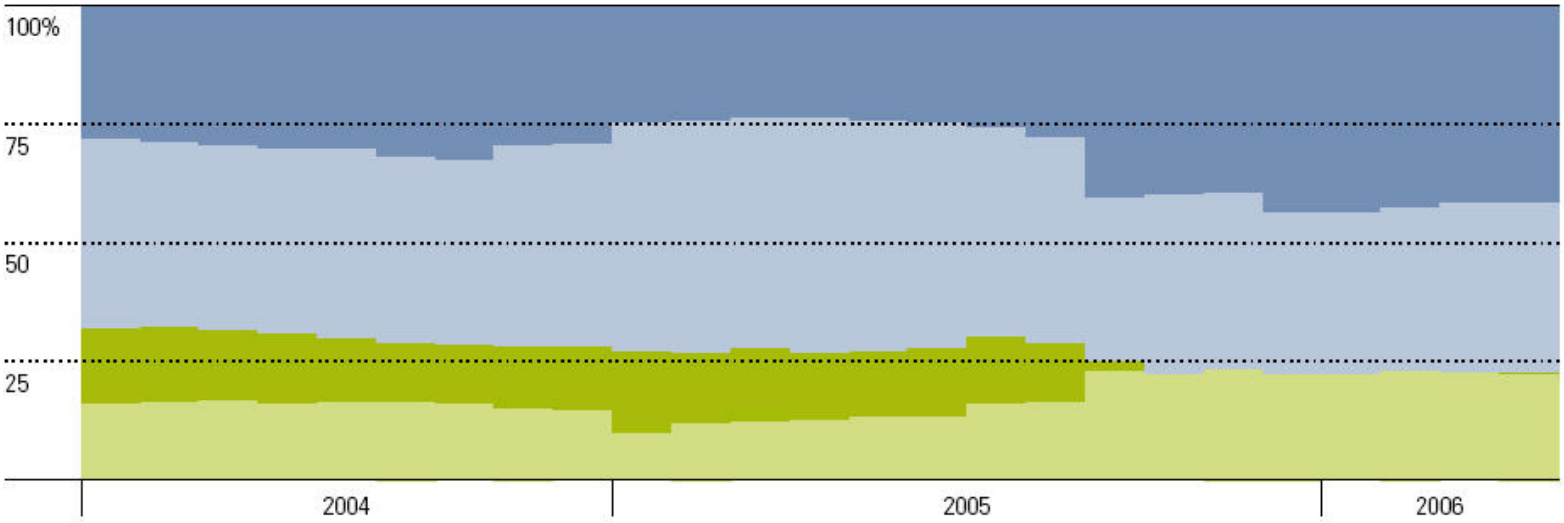


Source: Morningstar

Example of return-based style analysis (Morningstar)

Historical Asset Class/Style Exposures: 36 Month Rolling Window

Historical Style Exposure



Summary of Historical Exposures	Most Recent	Average	Std Dev	Min	Max
Morningstar Large Value TR	41.86	32.16	7.20	23.64	43.74
Morningstar Large Growth TR	35.74	40.89	5.24	33.91	49.64
Morningstar Small Value TR	0.00	9.80	6.77	0.00	17.31
Morningstar Small Growth TR	22.41	17.15	4.13	9.71	23.08

Source: Morningstar

Return-based Style Analysis

- Advantages:
  - Characterizes entire portfolio
  - Facilitate comparison across portfolios
  - Aggregates the effect of investment process
  - Clear theoretical basis and limited minimal inputs
  - Quick and cost effective

- Disadvantages:
  - Maybe ineffective in characterizing current style
  - Sensitive to definition of style indexes
  - Biases with multicollinearity of style indices

Holding-based Style Analysis

- Advantages:
  - Characterizes each position
  - Facilitate comparison of individual positions
  - Captures changes in the current style quickly

- Disadvantages:
  - Sensitive to classification attributes for styles
  - More data insensitive than return-base analysis

Examples of style index performance

Style Data as of 10/31/2008	1-Month	3-Month	YTD	1-Year	3-Year	5-Year	10-Year
Broad Market Index							
US Market Index	-17.53	-24.16	-32.96	-36.31	-5.07	0.86	0.97
Cap Indexes							
Large Cap Index	-16.05	-22.43	-32.08	-35.26	-4.58	0.48	-0.36
Mid Cap Index	-21.79	-30.10	-36.86	-40.35	-6.89	1.68	4.13
Small Cap Index	-21.15	-25.23	-31.19	-36.05	-5.70	1.58	5.93
Composite Style Indexes							
US Value Index	-15.79	-19.48	-32.34	-36.31	-5.20	2.45	2.97
US Core Index	-17.63	-22.82	-29.95	-32.91	-3.33	2.11	2.67
US Growth Index	-19.11	-29.78	-36.96	-40.10	-7.19	-2.38	-3.58
Style Indexes							
Large Value Index	-13.99	-18.41	-32.68	-36.48	-4.59	2.35	2.01
Mid Value Index	-20.66	-23.73	-33.19	-37.53	-7.71	2.34	4.96
Small Value Index	-19.58	-18.34	-26.04	-30.81	-5.33	2.86	7.40
Large Core Index	-16.05	-20.27	-28.43	-30.68	-2.26	2.31	1.58
Mid Core Index	-22.62	-31.12	-35.90	-40.39	-6.99	0.91	4.81
Small Core Index	-22.15	-28.07	-30.86	-37.16	-5.94	2.13	8.79
Large Growth Index	-18.03	-28.49	-35.83	-39.27	-7.64	-3.82	-5.68
Mid Growth Index	-22.04	-34.71	-41.19	-43.18	-6.28	1.46	1.95
Small Growth Index	-21.70	-28.54	-36.11	-39.81	-6.28	-0.59	1.84

6.8 Performance Persistence

Performance persistence

Table VII

Subsequent 1980 to 1990 Performance of Top Twenty Mutual Funds From the 1970 to 1980 Period

This table shows the returns earned during the 1980s on the 20 mutual funds with the best returns during the 1970s.

	1970–1980		1980–1990	
	Rank	Average Annual Return (%)	Rank	Average Annual Return (%)
1. Twentieth Century Growth	1	27.12	151	11.24
2. Templeton Growth	2	22.34	101	12.68
3. Quasar Associates	3	20.56	161	10.99
4. 44 Wall Street	4	20.13	260	−16.83
5. Pioneer II	5	20.12	112	12.49
6. Twentieth Century Select	6	19.95	17	15.78
7. Security Ultra	7	19.74	249	2.22
8. Mutual Shares Corp.	8	19.52	29	15.23
9. Charter Fund	9	19.50	97	12.78
10. Magellan Fund	10	18.87	1	21.27
11. Over-the-counter	11	18.13	210	9.24
12. Amer. Cap. Growth	12	18.11	243	4.90
13. Amer. Cap. Venture	13	17.97	136	11.75
14. Putnam Voyager	14	17.41	65	13.88
15. Janus Fund	15	17.29	18	15.74
16. Weingarten Equity	16	17.28	30	15.21
17. Hartwell Leverage Fund	17	16.92	222	8.44
18. Pace Fund	18	16.82	50	14.53
19. Acorn Fund	19	16.50	147	11.36
20. Stein Roe Special Fund	20	15.75	48	14.54
Average of 20 funds		19.01		10.87
Overall fund average		9.74		11.56
S&P 500		8.45		13.87
No. of funds with 10-year record		211		260

Source: Carhart (1997)

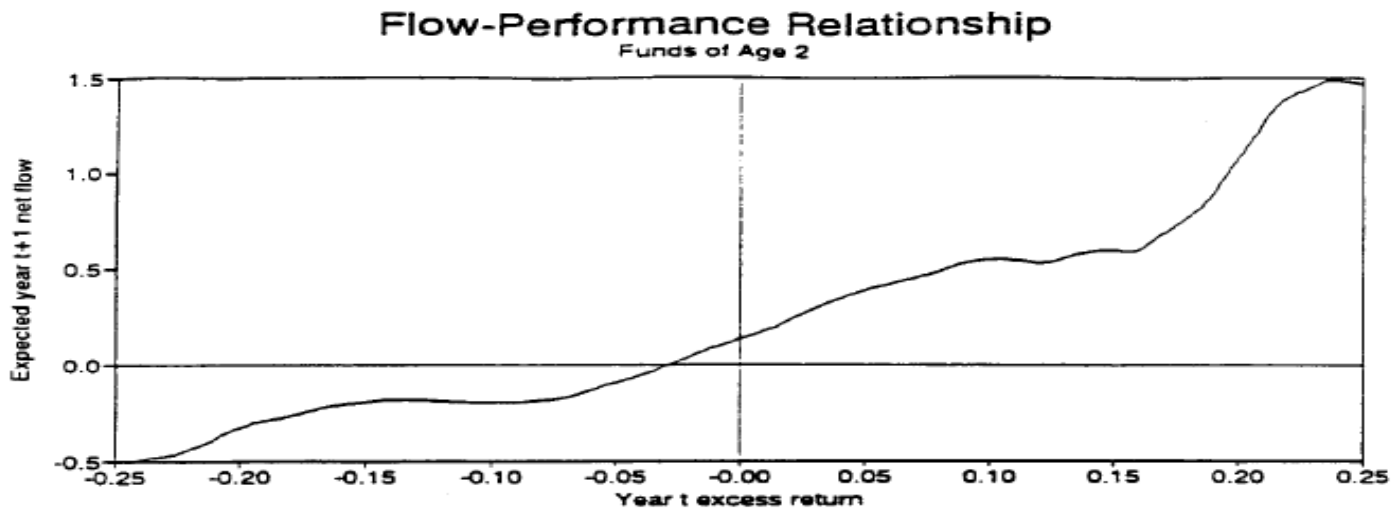
Persistence – Carhart (1997)

Portfolio	Monthly Excess Return	Std Dev	CAPM Alpha	CAPM VWRF	CAPM Adj R-sq	4-Factor Model Alpha	RMRF	SMB	HML	PR1YR	Adj R-Sq
1 (high)	0.68%	5.04%	0.22%	1.03	0.834	−0.12%	0.88	0.62	−0.05	0.29	0.933
			(2.10)	(43.11)		(−1.60)	(50.54)	(23.67)	(−1.86)	(13.88)	
2	0.59%	4.72%	0.14%	1.01	0.897	−0.10%	0.89	0.46	−0.05	0.20	0.955
			(1.75)	(57.00)		(−1.78)	(66.47)	(22.95)	(−2.25)	(12.43)	
3	0.43%	4.56%	−0.01%	0.99	0.931	−0.18%	0.90	0.34	−0.07	0.16	0.963
			(−0.08)	(70.96)		(−3.65)	(76.80)	(18.99)	(−3.69)	(11.52)	
4	0.45%	4.41%	0.02%	0.97	0.952	−0.12%	0.90	0.27	−0.05	0.11	0.971
			(0.33)	(85.70)		(−2.81)	(90.03)	(18.18)	(−3.12)	(9.40)	
5	0.38%	4.35%	−0.05%	0.96	0.960	−0.14%	0.90	0.22	−0.05	0.07	0.970
			(−1.10)	(93.93)		(−3.31)	(89.65)	(14.42)	(−3.27)	(6.18)	
6	0.40%	4.36%	−0.02%	0.96	0.958	−0.12%	0.90	0.22	−0.04	0.08	0.968
			(−0.46)	(91.94)		(−2.82)	(86.16)	(14.02)	(−2.37)	(6.01)	
7	0.36%	4.30%	−0.06%	0.95	0.959	−0.14%	0.90	0.21	−0.03	0.04	0.967
			(−1.39)	(92.90)		(−3.09)	(85.73)	(13.17)	(−1.62)	(2.89)	
8	0.34%	4.48%	−0.10%	0.98	0.951	−0.13%	0.93	0.20	−0.06	0.01	0.958
			(−1.86)	(85.14)		(−2.52)	(75.44)	(10.74)	(−3.16)	(0.84)	
9	0.23%	4.60%	−0.21%	1.00	0.926	−0.20%	0.93	0.22	−0.10	−0.02	0.938
			(−3.24)	(67.91)		(−3.11)	(60.44)	(9.69)	(−3.80)	(−1.17)	
10 (low)	0.01%	4.90%	−0.45%	1.02	0.851	−0.40%	0.93	0.32	−0.08	−0.09	0.887
			(−4.58)	(46.09)		(−4.33)	(42.23)	(9.69)	(−2.23)	(−3.50)	

Source: Carhart (1997)

Performance and flows

- People act as if there were much more persistency in performance

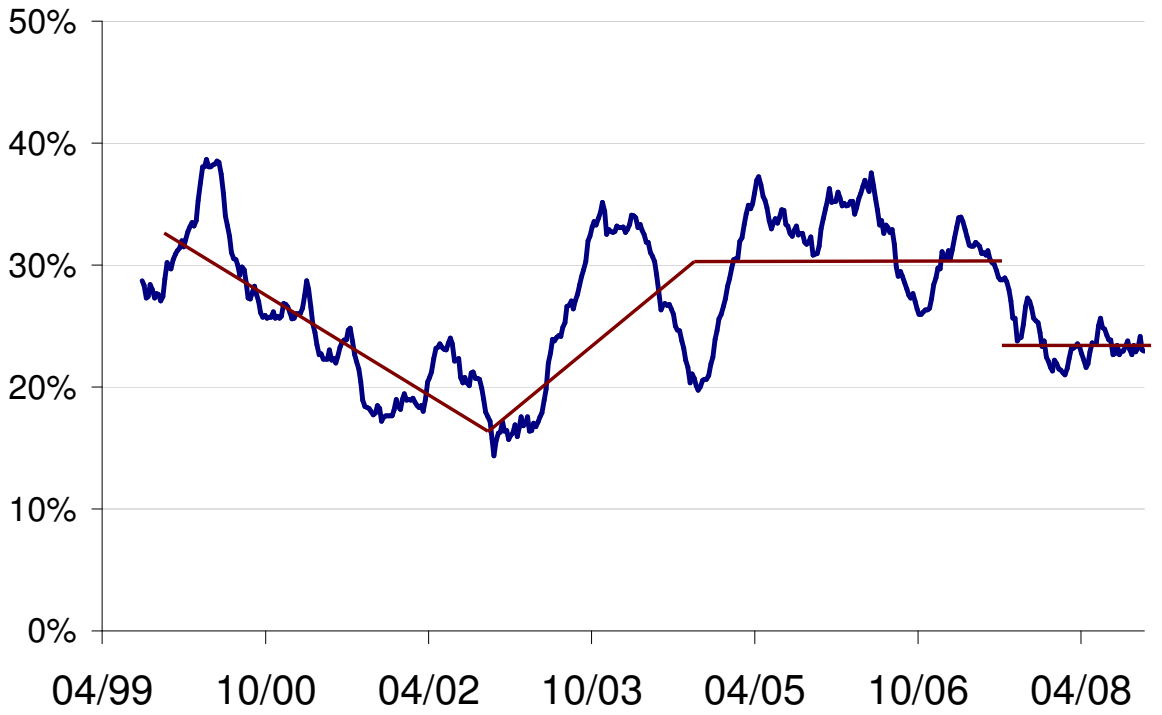


Performance and flows (contd..)

- Is Money Smart?
  - Most (but not all) is pretty dumb!
- Investors chases past winners, chase funds with cosmetic name changes, respond strongly to fund advertising, and do not chase funds with high loadings on momentum factor
  - not smart
- Absence of large cash outflows from poorly performing funds inhibits the competitive process
  - really dumb

Ranking stability

Conditional probability to stay in the first quartile (return) two weeks consecutively



Source : Datastream, authors' calculations.

Where are the past best performers?

	07/2005-07/2008	random	Persistent world	Anti-persistent world	08/2008-11/2008
Top25 %	100%	25%	100%	0%	20%
		25%	0%	0%	35%
		25%	0%	0%	20%
Bottom 25%		25%	0%	100%	25%

Source : Datastream, authors' calculations.

Thank you for your attention…

See you next week