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2025 Level 3 - Performance Measurement

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Portfolio Performance Evaluation

a. explain the following components of portfolio evaluation and their interrelationships: performance measurement, performance attribution, and performance appraisal

b. describe attributes of an effective attribution process

c. contrast return attribution and risk attribution; contrast macro and micro return attribution

d. describe returns-based, holdings-based, and transactions-based performance attribution, including advantages and disadvantages of each

e. interpret the sources of portfolio returns using a specified attribution approach

f. interpret the output from fixed-income attribution analyses

g. discuss considerations in selecting a risk attribution approach

h. identify and interpret investment results attributable to the asset owner versus those attributable to the investment manager

i. discuss uses of liability-based benchmarks

j. describe types of asset-based benchmarks

k. discuss tests of benchmark quality

l. describe problems that arise in benchmarking alternative investments

m. describe the impact of benchmark misspecification on attribution and appraisal analysis

n. calculate and interpret the Sortino ratio, the appraisal ratio, upside/downside capture ratios, maximum drawdown, and drawdown duration

o. describe limitations of appraisal measures and related metrics

p. evaluate the skill of an investment manager

Portfolio Performance Evaluation

Page 1
LOS a
- explain

⇒ Performance

a) measurement (typically relative to a benchmark)

- absolute return → what the portfolio achieved over a specific period
- excess return → portfolio return - benchmark return
- also involves measuring the risk incurred to achieve that return

b) attribution - how that performance was achieved or how the risk was incurred

- explain absolute or relative return
- what portion was driven by active mgr. decisions
- decompose excess return into component sources
- decompose risk

c) evaluation - draw conclusions regarding the quality of performance
- distinguish manager luck from skill

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LOS b
- describe

- an effective process must
  1) account for all the portfolio's return or risk exposure
  2) reflect the investment decision-making process
  3) quantify the active decisions of the PM
  4) provide a complete understanding of the excess return/risk of the portfolio

LOS c
- distinguish

- Return attribution - analyzes the impact of active investment decisions on returns
- Risk attribution - analyzes the risk consequences of those (absolute or benchmark relative terms) decisions
- Micro attribution - understanding the drivers of a manager's returns and whether those drivers are consistent with the stated investment process

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- distinguish

- Macro attribution - measures the effect of the asset owner's (sponsor's) choice to deviate from the SAA
  - also measures the effect of the manager selection and timing decisions

LOS d
- describe

- Returns-based attribution
  - uses only total portfolio return
  - most appropriate when underlying portfolio information is not available at the requires frequency or detail
  - easiest to implement
  - least accurate
  - vulnerable to data manipulation

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- describe

- Holdings-based attribution
  - use actual holdings (beginning of period)
  - all transactions are assumed to occur at end of day
  - accuracy improves when data has shorter time intervals
  - most appropriate for investment strategies with little turnover
- transactions-based attribution
  - uses both the holdings and the transactions during the evaluation period
  - most accurate, but most difficult and time consuming to implement

- choice of approach depends on the availability and quality of the underlying data

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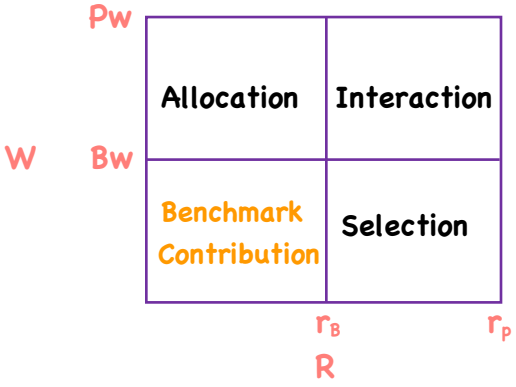
- interpret

→ Approaches/ - specific approaches have been designed to evaluate specific types of assets

• Equity attribution/

1/ Brinson-Hood-Beebower (BHB) — Brinson-Fachler (BF)



Allocation = $(Pw - Bw) \times r_B$ — only this → Allocation = $(Pw - Bw)(r_B - R_B)$

Selection = $(r_P - r_B) \times Bw$

Interaction = $(Pw - Bw)(r_P - r_B)$

} = $(r_P - r_B) \times Pw$

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• Equity attribution/

1/ Brinson-Hood-Beebower — Brinson-Fachler

Rewards: overw. when $r_s > 0$, underw. when $r_s < 0$ — Rewards: overw. when $r_s > R_B$, underw. when $r_s < R_B$

e.g./ $w_P = 8\%$ $w_B = 4\%$ $r_B = -3\%$ $R_B = -9\%$

Allocation = $(W_P - W_B) \times r_B$
= $(.08 - .04) \times -.03$
= $-.0012$
(penalizes)

Allocation = $(.08 - .04)(-.03 - (-.09))$
= $.04 \times .06$
= $.0024$
(rewards)

BHB views allocation from an absolute positive or negative perspective

BF views allocation from a relative perspective versus total benchmark return

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• Equity attribution/

1/ Brinson-Hood-Beebower — Brinson-Fachler

Sector	Portfolio Weight	Benchmark Weight	Portfolio Return	Benchmark Return
Energy	50%	50%	18%	10%
Health care	30%	20%	−3%	−2%
Financials	20%	30%	10%	12%
Total	**100%**	**100%**	**10.1%**	**8.2%**

$R_A = 1.9\%$

Allocation: $(P_w - B_w) \times r_B$ = $(P_w - B_w)(r_B - R_B)$

Energy: $(.5 - .5) \times .10 = 0\%$ — $(.5 - .5)(.10 - .082) = 0\%$

HC: $(.3 - .2) \times -.02 = -.2\%$ — $(.3 - .2)(-.02 - .082) = -.0102$

Fin: $(.2 - .3) \times .12 = -1.2\%$ — $(.2 - .3)(.12 - .082) = -.0038$

-1.4% — -1.4%

Security: $(r_p - r_B) \times B_w$

Energy: $(.18 - .10) \times .5 = 4\%$

HC: $(-.03 - (-.02)) \times .2 = -.2\%$

Fin: $(.1 - .12) \times .3 = -.6\%$

3.2%

Interaction: $(r_p - r_B)(w_p - w_B)$

$(.18 - .10)(.5 - .5) = 0\%$

$(-.03 - (-.02))(.3 - .2) = -.1\%$

$(.1 - .12)(.2 - .3) = .2\%$

$.1\%$

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• Equity attribution/

2/ Factor-based - fundamental factor models

- decompose contributions to excess returns from factors

$$R_p - R_f = \alpha + b_1 RMRF + b_2 SMB + b_3 HML + b_4 WML + \varepsilon_p$$

(Carhart 4-factor model)

market | size | value | momentum

(< 0 = Lg. Cap.) (> 0 = value)

e.g./

	Factor Sensitivity				Contribution to Active Return	
	Portfolio	Benchmark	Difference	Factor Return	Absolute	Proportion of Total
Factor	**(1)**	**(2)**	**(3)**	**(4)**	**(3) × (4)**	**Active**
RMRF	0.95	1.00	−0.05	5.52%	−0.28%	−13.30%
SMB	−1.05	−1.00	−0.05	−3.35%	0.17%	8.10%
HML	0.40	0.00	0.40	5.10%	2.04%	98.40%
WML	0.05	0.03	0.02	9.63%	0.19%	9.30%
				A. Factor tilts return =	2.12%	102.40%
				B. Security selection =	−0.05%	−2.40%
				C. Active return (A + B) =	2.07%	100.00%

Benchmark

RMRF = 1 = broad-based market index

SMB = -1 = large-cap. index

HML = 0 → no value/growth bias

portfolio → large-cap. value

(ex. #4)

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• Fixed Income Attribution

1/ Exposure decomposition - top-down approach

Benchmark → Duration
→ yield curve positioning
→ sectors (i.e. gov't., corporate)

vs. Portfolio
- active decisions to deviate from benchmark exposures

e.g./ active duration bets → increase duration relative to benchmark in anticipation of falling rates

yield curve positioning → barbell for a flattening curve

sectors → overweight credits in anticipation of spreads narrowing

• how well, relative to the benchmark, did these active decisions work out, what contribution to active return

- used primarily for client reports, easy to understand

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	Portfolio Weights				Portfolio Duration				Portfolio Contribution to Duration			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	10.00%	10.00%	20.00%	40.00%	4.42	7.47	10.21	8.08	0.44	0.75	2.04	3.23
Corporate	10.00%	20.00%	30.00%	60.00%	4.40	7.40	10.06	8.23	0.44	1.48	3.02	4.94
Total	20.00%	30.00%	50.00%	100.00%	4.41	7.42	10.12	8.17	0.88	2.23	5.06	8.17

	Benchmark Weights				Benchmark Duration				Benchmark Contribution to Duration			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	20.00%	20.00%	15.00%	55.00%	4.42	7.47	10.21	7.11	0.88	1.49	1.53	3.91
Corporate	15.00%	15.00%	15.00%	45.00%	4.40	7.40	10.06	7.29	0.66	1.11	1.51	3.28
Total	35.00%	35.00%	30.00%	100.00%	4.41	7.44	10.14	7.19	1.54	2.60	3.04	7.19

	Portfolio Weights				Portfolio Returns				Portfolio Contribution to Return			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	10.00%	10.00%	20.00%	40.00%	−3.48%	−5.16%	−4.38%	−4.35%	−0.35%	−0.52%	−0.88%	−1.74%
Corporate	10.00%	20.00%	30.00%	60.00%	−4.33%	−6.14%	−5.42%	−5.48%	−0.43%	−1.23%	−1.63%	−3.29%
Total	20.00%	30.00%	50.00%	100.00%	−3.91%	−5.81%	−5.00%	−5.03%	−0.78%	−1.74%	−2.50%	−5.03%

	Benchmark Weights				Benchmark Returns				Benchmark Contribution to Return			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	20.00%	20.00%	15.00%	55.00%	−3.48%	−5.16%	−4.38%	−4.34%	−0.70%	−1.03%	−0.66%	−2.39%
Corporate	15.00%	15.00%	15.00%	45.00%	−4.33%	−6.14%	−5.86%	−5.44%	−0.65%	−0.92%	−0.88%	−2.45%
Total	35.00%	35.00%	30.00%	100.00%	−3.84%	−5.58%	−5.12%	−4.83%	−1.35%	−1.95%	−1.54%	−4.83%

25% × 4.42
+ 25% × 7.47
+ 50% × 10.21
= 8.08

× 40% weight
= 3.23

vs.

3.91 for the benchmark

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	Portfolio Weights				Portfolio Duration				Portfolio Contribution to Duration			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	10.00%	10.00%	20.00%	40.00%	4.42	7.47	10.21	8.08	0.44	0.75	2.04	3.23
Corporate	10.00%	20.00%	30.00%	60.00%	4.40	7.40	10.06	8.23	0.44	1.48	3.02	4.94
Total	20.00%	30.00%	50.00%	100.00%	4.41	7.42	10.12	8.17	0.88	2.23	5.06	8.17

$\frac{3.48\%}{4.42} = .78$

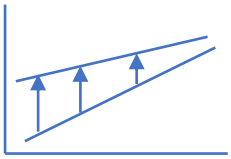
	Benchmark Weights				Benchmark Duration				Benchmark Contribution to Duration			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	20.00%	20.00%	15.00%	55.00%	4.42	7.47	10.21	7.11	0.88	1.49	1.53	3.91
Corporate	15.00%	15.00%	15.00%	45.00%	4.40	7.40	10.06	7.29	0.66	1.11	1.51	3.28
Total	35.00%	35.00%	30.00%	100.00%	4.41	7.44	10.14	7.19	1.54	2.60	3.04	7.19

$\frac{4.33\%}{4.40} = .98$

S	M	L	
78	69.5	42.9	G
98	82.9	58.2	C

	Portfolio Weights				Portfolio Returns				Portfolio Contribution to Return			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	10.00%	10.00%	20.00%	40.00%	−3.48%	−5.16%	−4.38%	−4.35%	−0.35%	−0.52%	−0.88%	−1.74%
Corporate	10.00%	20.00%	30.00%	60.00%	−4.33%	−6.14%	−5.42%	−5.48%	−0.43%	−1.23%	−1.63%	−3.29%
Total	20.00%	30.00%	50.00%	100.00%	−3.91%	−5.81%	−5.00%	−5.03%	−0.78%	−1.74%	−2.50%	−5.03%

	Benchmark Weights				Benchmark Returns				Benchmark Contribution to Return			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	20.00%	20.00%	15.00%	55.00%	−3.48%	−5.16%	−4.38%	−4.34%	−0.70%	−1.03%	−0.66%	−2.39%
Corporate	15.00%	15.00%	15.00%	45.00%	−4.33%	−6.14%	−5.86%	−5.44%	−0.65%	−0.92%	−0.88%	−2.45%
Total	35.00%	35.00%	30.00%	100.00%	−3.84%	−5.58%	−5.12%	−4.83%	−1.35%	−1.95%	−1.54%	−4.83%



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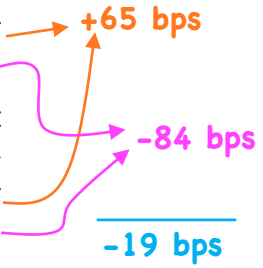
	Portfolio Weights				Portfolio Duration				Portfolio Contribution to Duration			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	10.00%	10.00%	20.00%	40.00%	4.42	7.47	10.21	8.08	0.44	0.75	2.04	3.23
Corporate	10.00%	20.00%	30.00%	60.00%	4.40	7.40	10.06	8.23	0.44	1.48	3.02	4.94
Total	20.00%	30.00%	50.00%	100.00%	4.41	7.42	10.12	8.17	0.88	2.23	5.06	8.17

	Benchmark Weights				Benchmark Duration				Benchmark Contribution to Duration			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	20.00%	20.00%	15.00%	55.00%	4.42	7.47	10.21	7.11	0.88	1.49	1.53	3.91
Corporate	15.00%	15.00%	15.00%	45.00%	4.40	7.40	10.06	7.29	0.66	1.11	1.51	3.28
Total	35.00%	35.00%	30.00%	100.00%	4.41	7.44	10.14	7.19	1.54	2.60	3.04	7.19

$R_p - R_B =$
-5.03% - (-4.83%)
= -.20%

	Portfolio Weights				Portfolio Returns				Portfolio Contribution to Return			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	10.00%	10.00%	20.00%	40.00%	−3.48%	−5.16%	−4.38%	−4.35%	−0.35%	−0.52%	−0.88%	−1.74%
Corporate	10.00%	20.00%	30.00%	60.00%	−4.33%	−6.14%	−5.42%	−5.48%	−0.43%	−1.23%	−1.63%	−3.29%
Total	20.00%	30.00%	50.00%	100.00%	−3.91%	−5.81%	−5.00%	−5.03%	−0.78%	−1.74%	−2.50%	−5.03%

	Benchmark Weights				Benchmark Returns				Benchmark Contribution to Return			
	Short	Mid	Long	Total	Short	Mid	Long	Total	Short	Mid	Long	Total
Government	20.00%	20.00%	15.00%	55.00%	−3.48%	−5.16%	−4.38%	−4.34%	−0.70%	−1.03%	−0.66%	−2.39%
Corporate	15.00%	15.00%	15.00%	45.00%	−4.33%	−6.14%	−5.86%	−5.44%	−0.65%	−0.92%	−0.88%	−2.45%
Total	35.00%	35.00%	30.00%	100.00%	−3.84%	−5.58%	−5.12%	−4.83%	−1.35%	−1.95%	−1.54%	−4.83%



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Duration Bucket	Sector	Duration Effect	Curve Effect	Total Interest Rate Allocation	Sector Allocation	Bond Selection	Total
Short	Government					0.00%	0.00%
	Corporate				0.04%	0.00%	0.04%
	Total	*0.40%*	*0.12%*	*0.52%*	*0.04%*	*0.00%*	***0.56%***
Mid	Government					0.00%	0.00%
	Corporate				−0.05%	0.00%	−0.05%
	Total	*0.23%*	*0.03%*	*0.26%*	*−0.05%*	*0.00%*	***0.21%***
Long	Government					0.00%	0.00%
	Corporate				−0.22%	0.13%	−0.09%
	Total	*−1.25%*	*0.37%*	*−0.88%*	*−0.22%*	*0.13%*	***−0.97%***
Total		**−0.62%**	**0.52%**	**−0.10%**	**−0.23%**	**0.13%**	**−0.20%**

D_P vs. D_B

where along the curve the difference in duration comes from

level
slope
curvature

B_w in Gov't./Credits vs. P_w (-/+)

total underperformance

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• Fixed Income Attribution

2/ Yield curve decomposition - duration based

- can be either top-down or bottom-up

→ estimates the returns based on duration

%total return = %Income return + %Price change

-ModDur × Δyield

- applied to both the portfolio and the benchmark
  - difference = effect of active PM decisions

- requires more data points than exposure decomp.
- typically used in reports for analysts & PMs

3/ Yield curve decomposition - full repricing - instead of using estimates

- prices out each security
- most complex attribution of the three

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Bond	Yield	Roll	Shift	Slope	Curvature	Spread	Specific	Residual	Total
Gov't. 5% 30 June 21	–0.19%	–0.04%	0.43%	0.01%	0.15%	0.00%	0.00%	–0.01%	0.35%
Gov't. 7% 30 June 26	–0.22%	–0.03%	0.71%	0.04%	0.04%	0.00%	0.00%	–0.03%	0.52%
Gov't. 6% 30 June 31	0.12%	0.01%	–0.48%	0.05%	0.09%	0.00%	0.00%	–0.01%	–0.22%
Corp. 5% 30 June 21	–0.11%	–0.02%	0.21%	0.05%	0.05%	0.04%	0.02%	–0.02%	0.22%
Corp. 7% 30 June 26	0.12%	0.01%	–0.35%	–0.02%	–0.02%	–0.07%	0.00%	0.02%	–0.31%
Corp. (B) 6% 30 June 31	–0.39%	–0.03%	1.41%	–0.26%	–0.11%	0.30%	0.00%	–0.04%	0.88%
Corp. (P) 6% 30 June 31	0.78%	0.06%	–2.82%	0.52%	0.33%	–0.60%	0.15%	–0.05%	–1.63%
Total	0.11%	–0.04%	–0.89%	0.39%	0.53%	–0.33%	0.17%	–0.14%	–0.20%
	Time:	*0.08%*	*Curve Movement:*		*0.03%*				

positive → yield, slope, curve } overweight long bonds

specific → bond selection

example #5

negative roll → overw. long bonds

shift → $D_P > D_B$

spread → overweight credits

residual → duration is only an

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- discuss

→ Risk Attribution/
- absolute mandates → identifies sources of volatility
- benchmark relative → identifies the sources of tracking risk

Investment Decision-Making Process	Relative	Absolute
Bottom up	- position's marginal contribution to tracking risk	- position's marginal contribution to total risk
Top Down	- attribute tracking risk to relative allocation and selection decision	
Factor-based	- factor's marginal contribution to tracking risk and active specific risk	- factor's marginal contribution to total risk and specific risk (example #6)

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- Macro Attribution/ sponsor level
  - decision #1 → deviations from the SAA
    - success = overweighting an asset class that outperforms its benchmark (or combined weighted benchmark)
  - decision #2 → selection of investment managers
    - success = selecting a manager that performs their benchmark

eg/

	Fund Weight	Fund Return	Benchmark Weight	Benchmark Return
Total	**100%**	**0.95**	**100%**	**−0.03**
Value Portfolio Manager	78%	0.99	75%	0.32
Small-cap value equities	20%	2.39	25%	1.52
Large-cap value equities	58%	0.51	50%	−0.28
Growth Portfolio Manager	22%	0.82	25%	−1.08
Large-cap growth equities	22%	0.82	25%	−1.08

$.99 = (^{20}/_{78})2.39 + (^{58}/_{78}).51$

.95 = .78(.99) + .22(.82)

$.32 = {}^{1}/_{3}(1.52) + {}^{2}/_{3}(-.28)$

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- distinguish

eg/

	Fund Weight	Fund Return	Benchmark Weight	Benchmark Return
Total	**100%**	**0.95**	**100%**	**−0.03**
Value Portfolio Manager	78%	0.99	75%	0.32
Small-cap value equities	20%	2.39	25%	1.52
Large-cap value equities	58%	0.51	50%	−0.28
Growth Portfolio Manager	22%	0.82	25%	−1.08
Large-cap growth equities	22%	0.82	25%	−1.08

for Value:

Allocation: $\Delta w_i \bullet (R_i - \bar{R}_B)$
(.78 - .75)(.0032 - (-.0003))
= .03 (.0035)
= .000105
or .0105%

Selection + Interaction
$B_w(R_p - R_B) + \Delta w(R_p - R_B)$
= .75(.0099 - .0032) + (.78 - .75)(.0099 - .0032)
= .005025 + .000201
= .005226 or .5226%

Note $B_w + \Delta w = P_w$
$= P_w(R_p - R_B) = .78(.0067) = .005226$

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eg/

	Fund Weight	Fund Return	Benchmark Weight	Benchmark Return
Total	**100%**	**0.95**	**100%**	**−0.03**
Value Portfolio Manager	78%	0.99	75%	0.32
Small-cap value equities	20%	2.39	25%	1.52
Large-cap value equities	58%	0.51	50%	−0.28
Growth Portfolio Manager	22%	0.82	25%	−1.08
Large-cap growth equities	22%	0.82	25%	−1.08

for Growth:

Allocation: $\Delta w_i \bullet (R_i - \overline{R}_B)$
= (.22 - .25)(-.0108 - (-.0003))
= -.03(-.0105)
= .000315
or .0315%

(neg.)

Selection + Interaction
$B_w(R_p - R_B) + \Delta w(R_p - R_B)$
= .25(.0082 - (-.0108) + (.22 - .25)(.0082 - (-.0108))
= .00475 + (-.00057)
= .00418 or .418%
Note $B_w + \Delta w = P_w$
$= P_w(R_p - R_B) = .22(.019) = .00418$

Page 18
LOS h
- distinguish

- Micro Attribution/ portfolio manager level

	Fund Weight	Fund Return	Benchmark Weight	Benchmark Return
Total	**100%**	**0.95**	**100%**	**−0.03**
Value Portfolio Manager	78%	0.99	75%	0.32
Small-cap value equities	20%	2.39	25%	1.52
Large-cap value equities	58%	0.51	50%	−0.28
Growth Portfolio Manager	22%	0.82	25%	−1.08
Large-cap growth equities	22%	0.82	25%	−1.08

- use the Brinson Model

Lg.-Cap.
Allocation
.08(-.0028 - (-.0003))
= -.0002 or .02%

SM-cap.

Allocation: $\Delta w \bullet (R_i - \overline{R}_B)$
= (.20 - .25)(.0152 - (-.0003))
= -.000775 or -.0775%

Selection + Interaction: $w_i R_A + \Delta w R_A$
.25(.0239 - .0152) + (-.05)(.0239 - .0152)
$= W_P \bullet R_A$ = .20(.0239-.0152) = .00174 or .17%

Selection + Interaction
.58(.0051 - (-.0028))
= .004582 or .4582%

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LOS h
- distinguish

Return Attribution (Plan Sponsor Level)	Selection + Interaction	Allocation	Total
Total	0.94	0.04	0.98
Value Portfolio Manager	**0.52**	**0.01**	**0.53**
Growth Portfolio Manager	**0.42**	**0.03**	**0.45**

Total	**100%**	**1.05**	**–0.07**	**0.98**
Value Portfolio Manager	78%	0.63	–0.10	0.53
Small-cap value equities	*20%*	*0.17*	*–0.08*	*0.10*
Large-cap value equities	*58%*	*0.46*	*–0.02*	*0.44*
Growth Portfolio Manager	22%	0.42	0.03	0.45
Large-cap growth equities	*22%*	*0.42*	*0.03*	*0.45*

R_B
Sm. cap. 1.52
Lg. cap. -.28

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LOS i
- discuss

→ Benchmarks/ - a collection of securities that represents the pool of assets available to the PM
- should reflect the investment process and the constraints that govern the construction of the portfolio

- market index → represents the performance of a specific security market, market segment, or asset class
- may be a benchmark

- Liability-based benchmarks - focus on the cash flows the assets must generate
- track a fund's progress towards fully funded status or track the performance of assets relative to the changes in liabilities
- Characteristics of the liabilities influence the composition of the asset portfolio

example #8

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LOS j
- discuss

→ Asset-Based Benchmarks/

- properties of a valid benchmark

- unambiguous - securities/weights clearly identified
- investable - possible to replicate and hold the benchmark to earn its return
- measurable - on a reasonably frequent and timely basis
- appropriate - consistent with the PMs style or area of expertise
- reflective of current investment opinions - manager should be familiar with constituent securities
- specified in advance - constructed prior to evaluation period
- accountable - manager should accept it.

Page 22
LOS j
- discuss

→ Asset-Based Benchmarks/
Types/

- Absolute return benchmark - a minimum target return
  - not investable, do not satisfy benchmark validity criteria
- Broad market indexes - well recognized, easy to understand, widely available
  - not appropriate if manager style deviates considerably from the style reflected in the index
- Style Indexes - often well-known, easy to understand, widely available
  (e.g. Value, growth)
- Factor-model-based benchmarks - are ambiguous, not specified in advance, may not be investable
  (e.g. many ways to get value exposure)

Page 23
LOS j
- discuss

→ Asset-Based Benchmarks/
Types/

• Returns-based $R_P = b_0 + b_1 SI_1 + b_2 SI_2 + b_3 SI_3$ etc.

style indexes, $\sum b_k = 1$

e.g. 12% lg.-cap. value, 48% mid cap. value, 40% lg. cap. growth

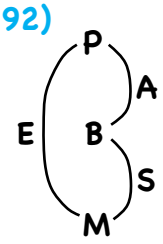
• Manager Universe (manager peer group)
- broad group of managers with similar investment disciplines
- expected to beat median manager
- fails all tests of benchmark validity

• custom-security-based - built to reflect investment discipline of a specific manager
- satisfies all benchmark validity criteria
- will reflect the investment process + all constraints

Page 24
LOS k
- discuss

→ Benchmark Quality/ (Bailey 1992)

P = B + A
↓
M + S
∴ P = M + S + A



$\rho_{AS} = 0$
$\rho_{ES} \neq 0$

example #10

- if B captures style, A should be uncorrelated with S

→ Benchmarking AI/

LOS L
- describe

- lack of investible market indexes
- frequent use of leverage
- limited liquidity
- lack of readily available market values
- use of IRR vs. twrr

} challenges in selecting a benchmark

→ Benchmarking AI/

Page 25
LOS L
- describe

- Hedge funds – encompass a broad range of possible strategies
  - may have an unlimited investment universe

  ∴ difficult to create a single standard

  - broad market indexes are unsuitable as benchmarks
  - r_f + spread is sometimes used
  - fund manager universe may be used as a benchmark

    unlikely to be representative of any single fund
    suffer from survivorship and backfill bias
    HF performance is self-report and not confirmed by the index

- Real Estate – numerous indexes available

  Limitations: based on subsets, not fully representative of the asset class

→ Benchmarking AI/

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LOS L
- describe

- Real Estate Limitations:
  - performance likely to be highly correlated with largest data contributors
  - based on self-report
  - weighting may place more emphasis on most expensive cities and asset types (if weighted by fund or asset value)
  - valuations typically appraisal-based (smoothing), are infrequent and often lag the market
  - benchmark returns may be levered
  - do not reflect high transaction costs
- Private Equity – mostly peer group benchmarks

Limitations/ – valuation methodologies may differ
- fund's IRR depends on timing of gains/losses/CFs

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LOS L
- describe

→ Benchmarking AI/

- Private Equity - PME - public market equivalents
  - based on aggregated cash flow data
- Commodity Investments
  - tend to use indexes based on performance of futures-based investments (considered investible)
  - can vary greatly in their composition and weighting
  - actual funds use varying degrees of leverage (index typically delivered)
- Managed Derivatives - benchmarks typically specific to a single investment strategy
- Distressed Securities - illiquid and non-marketable, difficult to construct an index

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LOS m
- describe

→ True active return = P - normal portfolio/benchmark
(normal portfolio/benchmark = true benchmark)

→ Misfit active return = P - investor benchmark
(investor benchmark = named in SAA)

- misspecification can lead to mismeasurement of the value added
- the normal portfolio/benchmark most closely represents the manager's typical positions in his investment universe

LOS n
- calculate
- interpret

→ Appraisal/

- was value-added a result of skill?
- assess ability of PM to add value on a risk-adjusted basis

Page 29
LOS n
- calculate
- interpret

→ Appraisal/

1/ Sharpe Ratio $SR = \frac{R_p - R_f}{\sigma_p}$ → uses total risk

→ penalizes for upside risk

2/ Treynor Ratio $TR = \frac{R_p - R_f}{\beta}$ → uses systematic risk

- for well diversified portfolios

→ requires an appropriate benchmark as a proxy for systematic risk

3/ Information Ratio $IR = \frac{R_p - R_B}{\sigma_{(R_P - R_B)}} = R_A / \sigma_{R_A}$

- active return per unit of active risk

Page 30
LOS n
- calculate
- interpret

→ Appraisal/

4/ Appraisal Ratio $AR = \frac{\alpha}{\sigma_\varepsilon}$

- alpha (b_0)

→ SEE $\left(\frac{\Sigma\varepsilon^2}{n-1}\right)$

α - can be computed from any factor model

- Jensen's alpha originally used

σ_ε - s.d. of portfolio's residual (non-systematic) risk

- note: Variances are additive (and can be subtracted)

5/ Sortino Ratio $SR_D = \frac{R_p - R_T}{\sigma_D}$

→ R_T = target return

→ semi-deviation

$$\sigma_D = \left[\frac{\Sigma \min(r_t - r_T, 0)^2}{N}\right]^{1/2}$$

→ or n - 1 for a sample

Page 31
LOS n
- calculate
- interpret

→ Appraisal/

5/ Sortino Ratio – can assess performance when return distributions are not symmetrical

∴ better for hedge funds & commodity trading funds

– when inflation is R_T, SR_D most relevant when a primary goal is capital preservation

(example #11)

6/ Capture Ratios - measures the PM's participation in up and down markets

upside capture UC – when benchmark is positive

downside capture DC – when benchmark is negative

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LOS n
- calculate
- interpret

→ Appraisal/

6/ Capture Ratios $UC = {R_{P_g}}/{R_{B_g}}$ when $R_B \geq 0$

$DC = {R_{P_g}}/{R_{B_g}}$ when $R_B < 0$

upside/downside ration = ${UC}/{DC}$ – measures the asymmetry of return

> 1 = positive asymmetry (convex return profile)

< 1 = negative asymmetry (concave return profile)

→ Appraisal/
6/ Capture Ratios

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LOS n
- calculate
- interpret

			Upside Return				Downside Return			
t	R(*m*)	R(*B*)	R(*m*)	R(*B*)	Cum R(*m*)	Cum R(*B*)	R(*m*)	R(*B*)	Cum R(*m*)	Cum R(*B*)
1	0.6%	1.0%	0.6%	1.0%	0.60%	1.00%			0.00%	0.00%
2	−0.3%	−0.5%			0.60%	1.00%	−0.3%	−0.5%	−0.30%	−0.50%
3	1.0%	1.5%	1.0%	1.5%	1.61%	2.52%			−0.30%	−0.50%
4	0.1%	0.2%	0.1%	0.2%	1.71%	2.72%			−0.30%	−0.50%
5	−1.0%	−2.0%			1.71%	2.72%	−1.0%	−2.0%	−1.30%	−2.49%
6	0.5%	0.6%	0.5%	0.6%	2.22%	3.34%			−1.30%	−2.49%
7	0.2%	0.1%	0.2%	0.1%	2.42%	3.44%			−1.30%	−2.49%
8	−0.8%	−1.0%			2.42%	3.44%	−0.8%	−1.0%	−2.09%	−3.47%
9	0.8%	1.0%	0.8%	1.0%	3.24%	4.47%			−2.09%	−3.47%
10	0.4%	0.5%	0.4%	0.5%	3.65%	5.00%			−2.09%	−3.47%
Geometric average			0.51%	0.70%			−0.70%	−1.17%		
Upside capture			0.51%/0.70% = 72.8%				Downside capture		−0.70%/−1.17% = 59.8%	
Capture ratio			72.8%/59.8% = 121.7%							

→ Appraisal/
7/ Drawdown

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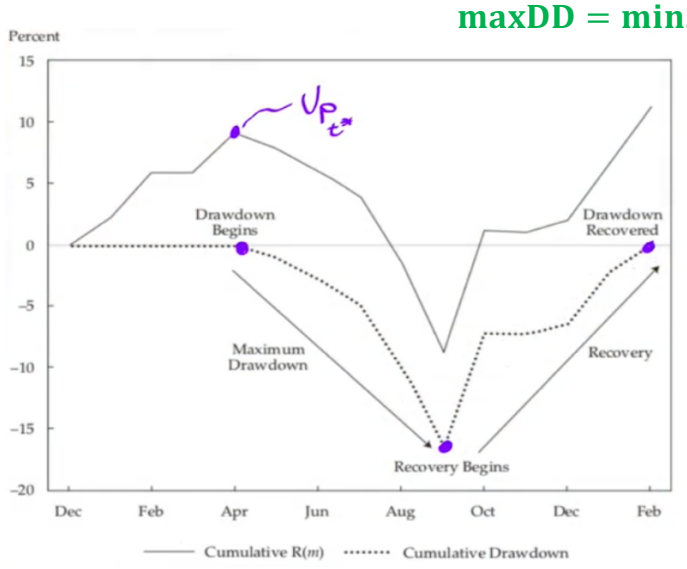
LOS n
- calculate
- interpret

$$\text{maxDD} = \min\left[\frac{V_{p_t} - V_{p_{t^*}}}{V_{p_{t^*}}}, 0\right]$$

$V_{p_{t^*}}$ → peak



maxDD = cumulative peak-to-trough loss during a continuous period

Drawdown Duration - total time from first drawdown to recovery

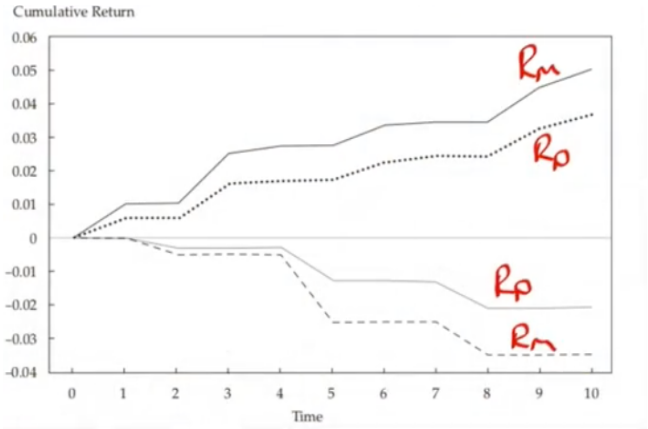
- Recovery typically longer than drawdown

Page 35
LOS n
- calculate
- interpret

→ Appraisal/

- positive asymmetry is a desirable trait (i.e. convex)
  - some strategies are convex on their own
  - other strategies rely on manager skill to create convexity
- capture ratios are useful for assessing consistency between stated investment process and reported performance

e.g. Lg.-cap, value, low β fund
→ UC < 100%
DC < 100%



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LOS n
- calculate
- interpret

→ Appraisal/

- manager response to large drawdowns
  - can provide evidence of the robustness and repeatability of the investment, portfolio construction, and risk mgmt. process
  - was any action taken (i.e. selling, hedging, buying more) part of the investment process, a misalignment of interests, or simply panic/overreaction

i.e. taking more risk to recover

Investment Manager Selection

a. describe the components of a manager selection process, including due diligence

b. contrast Type I and Type II errors in manager hiring and continuation decisions

c. describe uses of returns-based and holdings-based style analysis in investment manager selection

d. describe uses of the upside capture ratio, downside capture ratio, maximum drawdown, drawdown duration, and up/down capture in evaluating managers

e. evaluate a manager's investment philosophy and investment decision-making process

f. discuss how behavioral factors affect investment team decision making, and recommend techniques for mitigating their effects

g. evaluate the costs and benefits of pooled investment vehicles and separate accounts

h. compare types of investment manager contracts, including their major provisions and advantages and disadvantages

i. describe the three basic forms of performance-based fees

j. analyze and interpret a sample performance-based fee schedule

Investment Manager Selection

Page 1
LOS a
- describe

- Universe
  - suitability
  - style
  - active v. passive

  } what is the feasible set of managers

  - new search/new strategy → examine a broad universe
  - adding a manager within a strategy → look for a complement to current holdings
  - replacing a single manager within a strategy → look for best in that strategy universe

- Quantitative – manager's performance track record
  - attribution/appraisal
- Qualitative
  - Investment due diligence – philosophy, process, people, portfolio
  - is the manager expected to continue to generate this return distribution
  - Operational due diligence – process and procedure, investment vehicle, terms, monitoring

Page 2
LOS b
- contrast

H_0: manager skill = 0

Type I error → hiring/retaining a manager who subsequently underperforms
- rejecting the null when it is true

Type II error → 'not hiring'/firing a manager who subsequently outperforms

- general predisposition to focus on Type I errors/

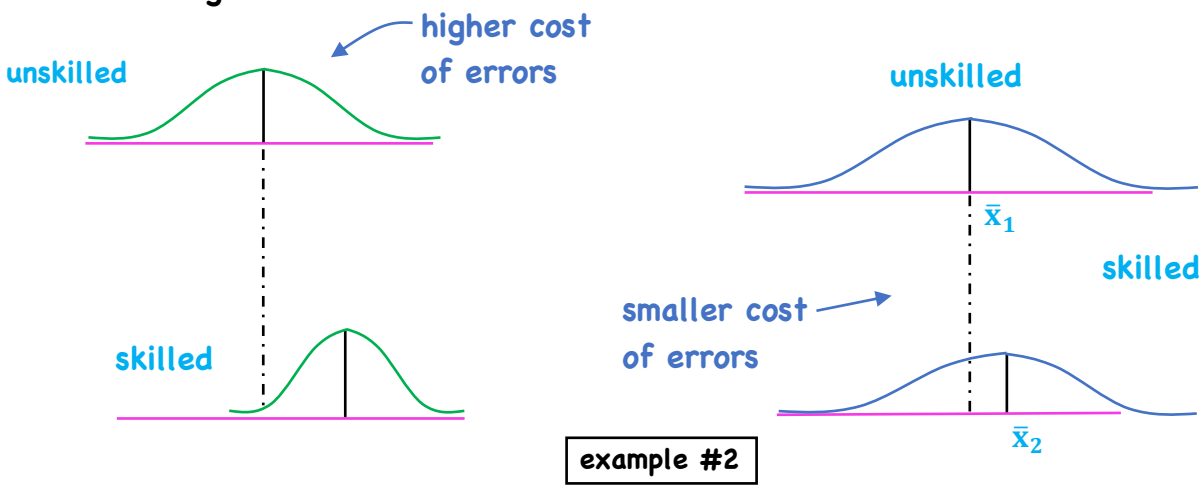
1/ - type I errors are errors of commission → create explicit costs
(vs. Type 2 → errors of omission → create opportunity costs)
- psychologically, Type I errors are more painful

2/ Type I errors are relatively straightforward to measure and are directly linked to decision maker's compensation
- Type II errors are less likely to be measured

Page 3
LOS b
- contrast

- general predisposition to focus on Type I errors/
3/ Type I errors are more transparent to investors
- what actually happened vs. what could have happened
- note: a consistent pattern of Type II errors suggest weakness in the manager selection process

→ cost of Type I error is holding a manager w/o skill
- cost driven by characteristics of the return distributions of the managers



example #2

Page 4
LOS c
- describe

- Quantitative Elements/
→ Style analysis/ - understand the manager's risk profile (risk exposures relative to the benchmark)
- mgr.'s self-report risk exposures are compared to the results of a returns-based or holdings-based style analysis
- should be consistent over time
- deviations signal issues such as style drift
- style analysis will be most useful with strategies that hold publicly-traded securities where pricing is frequent

1/ Returns-based style analysis → top-down approach
- involves estimating the portfolio's sensitivities to security market indexes representing a range of distinct factors

$$R_p = b_0 + b_1 LCV + b_2 LCG + b_3 MCV + b_4 MCG + b_5 SCV + b_6 SCG$$

Page 5
LOS c
- describe

- Quantitative Elements/
→ Style analysis/
1/ Returns-based style analysis → does not require a large amount of difficult or hard to acquire data
- comparable across managers and through time
- provides an objective check NOT subject to window dressing

-/ - portfolio being analyzed may not reflect the current or future portfolio exposures
- illiquid securities tend to have stale prices (smoothed returns)

2/ Holdings-based style analysis → bottom-up approach
- classifies the actual holdings in a portfolio at a point in time (estimates current risk factors)
- comparable across managers and through time

Page 6
LOS c
- describe

- Quantitative Elements/
→ Style analysis/
2/ Holdings-based style analysis →

-/ - subject to window dressing
- more complex strategies increase the computational effort
- requires manager transparency
- may not reflect the portfolio going forward, particularly for high turnover strategies

LOS d
- describe

- Capture ratios, Drawdowns → complete repeat from previous reading

Page 7
LOS e
- evaluate

Qualitative Elements/

- investment due diligence → attempt to assess the repeatability and consistency of the investment process

1/ Investment philosophy → the managers underlying assumptions about the factors that drive performance

i.e. market efficiency → assumptions lead to passive or active strategies

- passive → seek risk premiums from factor exposures
- active → security mispricing can be both identified and exploited
  - inefficiencies can be
    a) behavioral - created by the actions of other market participants → temporary
    b) structural - created by internal or external rules and regulations → long lived

Page 8
LOS e
- evaluate

1/ Investment philosophy

- other active assumptions concern correlations, intrinsic value and market price convergence, macroeconomic influences, etc.

Questions/

a) Can the manager clearly and consistently articulate their investment philosophy?
b) Are the assumptions credible and consistent?
   e.g. I don't believe technical analysis has any value.
   ∴ a manager's assumption of the usefulness of technical patterns as a basis for investment decisions is not a creditable assumption
c) How has the philosophy developed over time - ideally it is unchanged through time → changes should reflect changing market conditions vs. reactions to performance

Page 9
LOS e
- evaluate

1/ Investment philosophy

Questions/

d) Are the return sources linked to credible and consistent inefficiencies?

- is it of sufficient frequency
- does it provide a sufficient level of return to justify active mgmt. fees
- is it repeatable
- is it sustainable → what is the opportunity's capacity

2/ Investment Personnel

- even the best process can be compromised by poor execution

a) Does the investment team have sufficient expertise and experience

b) Do they have sufficient depth

Page 10
LOS e
- evaluate

2/ Investment Personnel

- what is the level of key person risk
- what kinds of agreements and incentives exist to retain and attract key employees
- what has been the turnover

3/ Investment Decision-Making Process

4 elements

1/ Signal creation (Idea Generation)

- how are investment ideas generated?
- is the information → unique (informational edge)
  → timely (timing edge)
  → Interpreted differently

2/ Signal capture (Idea Implementation)

- translating the idea into an investment position
- what is the process? - is it repeatable?

Page 11
LOS e
- evaluate

3/ Investment Decision-Making Process

3/ Portfolio Construction - how positions are implemented

- how are allocations set and adjusted - should be consistent with the investment philosophy and process
- are allocations consistent with conviction - over/under-weightings
- how has growth in AUM affected portfolio characteristics
- are stop-losses used to manage risk
- what types of securities are used
- how are hedges implemented
- how are long and short ideas expressed - paired or indep.
- what levels of liquidity are maintained
  - any limitations

4/ Monitoring the portfolio

Page 12
LOS f
- discuss

- investment decisions are often made by teams
  - teams mitigate some individual behavioral biases but introduce new ones

1/ groupthink - occurs when a team minimizes conflict and dissent in reaching and maintaining a consensus
- some members may withhold information and perspectives
(go along to get along)

2/ Authority bias - groups defer to a group member that is a subject matter expert or in a position of authority

3/ Aversion to complexity - disproportionate attention is given to trivial issues at the expense of important but harder-to-grasp topics
(aka Parkinson's Law)

mitigation: 1/ keep team size to 3-5
2/ secret ballot for votes
3/ meeting agendas drafted in advance → most important topics covered first

Page 12
LOS g
- evaluate

• Investment Vehicle/
- 2 broad options for implementing investment strategies

1/ individual separately managed accounts

- adv. • ownership - investor owns the individual securities directly
- liquidity events for other investors do not affect the account holder
• customization - constraints/preferences can be handled
• tax efficiency - no capital gains taxes as a result of liquidity events in other accounts for other investors
• transparency - real-time, position level detail

- disadv. • Cost → SMAs do not scale well
→ higher transaction costs since trades cannot be aggregated

Page 13
LOS g
- evaluate

• Investment Vehicle/

1/ individual separately managed accounts

- disadv. • tracking risk → if SMA is customized
- performance will reflect investor constraints
- makes attribution messy
• Investor behavior → attempts to manage the account negate the benefit of hiring a manager

2/ Pooled or comingled vehicle
- money from multiple investors is held as a single portfolio and managed without potential customization for any investor

Page 14
LOS h
- compare

→ terms of the investment → in the prospectus,
private placement memorandum and/or
limited partnership agreement

- these documents are the contract between the investor and the manager

a) Liquidity - different vehicles provide different degrees of liquidity

- most liquid → closed-end funds, ETFs (listed securities)
- open-ended are slightly less liquid - daily liquidity at closing NAV
- limited partnerships → limited/no liquidity

a) hedge funds
- redemption frequency - limits how often an investor can withdraw capital
- notification period - how far in advance notice of a redemption must be given

Page 15
LOS h
- compare

a) Liquidity

a) hedge funds
- lockup - period during which there are no redemptions
  - → hard lock → no redemptions
  - → soft lock → penalty on redemption
- gates - limit the amount of funds that can be redeemed at one redemption date

b) private equity/venture capital

- least liquidity
- investors are contractually obligated to contribute committed capital and wait for distributions (10-12 yrs. period)

- LP disadv.
  - reduced flexibility to adjust portfolio allocations
  - reduced ability to meet unexpected liquidity needs

Page 16
LOS h
- compare

a) Liquidity
LP-adv. - funds can hold less liquid securities with reduced risk of having to sell at inopportune times
- removes investor's potential for overreaction during times of market stress

b) Mgmt. Fees - cover operating costs
- fixed costs → technology, lease, etc.
- variable → human capital, marketing

c) Assets under Management Fee (AUM)
- ad valorem fee
→ related to ability to attract and retain capital and increase asset value

d) Performance Based Fees - determined by portfolio returns

Page 17
- describe
- analyze

d) Performance Based Fees
- structured in one of 3 ways
1/ a symmetrical structure in which the manager is fully exposed to both the downside and upside

Computed Fee = Base + Sharing of Performance
↓
minimum

e.g. Standard fee = 50bps, base = 25bps, Max. = 75bps

2/ bonus structure with downside limit but no upside limit

Computed Fee = higher or ① Base
② Base + upside

e.g. Base = 25bps, upside = 20% (Active Return - 25bps)

Page 18
- describe
- analyze

d) Performance Based Fees
- structured in one of 3 ways

3/ Bonus in which downside and upside are limited, but not symmetrical

Computed Fee = higher or ① Base
② Base + upside to limit

e.g. Base = 25bps, upside = lower of limit or 20% (Active Return – 25bps)

exhibit #7
- performance fees paid annually
- may include high water marks (HF)
- PE, HF, and RE funds typically have no limits
- low R_A, low performance fee → investor benefit
- high R_A, higher performance fees → manager benefit

Page 19
- describe
- analyze

d) Performance Based Fees
→ in the event of underperformance → base fee still paid (negative for investor)

→ low manager revenue as a result of only a base fee increases operational risk
(big reason why symmetrical fee structures are not popular with managers)

- if managers have clients with varying fee structures, may favour clients with performance-based fees
- when managers can control the timing of profit realization, may have an incentive to hold on to assets until a profit is earned
(clients may benefit from selling at a loss and investing elsewhere)
- HF managers may have an incentive to return funds if MV_p < high water mark

Overview of the Global Investment Performance Standards

a. discuss the objectives and scope of the GIPS standards and their benefits to prospective clients and investors, as well as investment managers

b. explain the fundamentals of compliance with the GIPS standards, including the definition of the firm and the firm's definition of discretion

c. discuss requirements of the GIPS standards with respect to return calculation methodologies, including the treatment of external cash flows, cash and cash equivalents, and expenses and fees

d. explain the recommended valuation hierarchy of the GIPS standards

e. explain requirements of the GIPS standards with respect to composite return calculations, including methods for asset-weighting portfolio returns

f. explain the meaning of "discretionary" in the context of composite construction and, given a description of the relevant facts, determine whether a portfolio is likely to be considered discretionary

g. explain the role of investment mandates, objectives, or strategies in the construction of composites

h. explain requirements of the GIPS standards with respect to composite construction, including switching portfolios among composites, the timing of the inclusion of new portfolios in composites, and the timing of the exclusion of terminated portfolios from composites

i. explain requirements of the GIPS standards with respect to presentation and reporting

j. explain the conditions under which the performance of a past firm or affiliation may be linked to or used to represent the historical performance of a new or acquiring firm

k. discuss the purpose, scope, and process of verification

Overview of GIPS

Page 1
LOS a
- discuss

2020 GIPS - 3 chapters

The GIPS Standards for
- Firms
- Asset Owners
- Verifiers

- a globally accepted set of standards for investment management firms in calculating and presenting their investment returns to prospective: clients → segregated accounts (SMAs)
  investors → pooled funds
- based on ideals of fair representation and full disclosure
  - fair representation: returns are objectively comparable for a given strategy with those reported by other firm's claiming compliance
  - full disclosure: firm's performance history is adequately disclosed

Benefits/Investors
- improve client's ability to make sound decisions in selecting investment managers

Page 2
LOS a
- discuss

Benefits/Investors
- enable reasonable comparisons among different investment management firms

/Investment Management Firms
- industry as a whole → restore and support credibility
- reassure investors about veracity of performance results → builds trust
- non-compliance becoming a competitive disadvantage
- help firms compete in international markets
- internal benefits → identify opportunities to strengthen managerial controls, improve oversight of investment operations, improve the quality of information available to the firm

Scope/ only investment management firms and asset owners that manage assets on a discretionary basis - and compete for business - may claim compliance with GIPS for Firms

Page 3
LOS a
- discuss

Scope/ • compliance must be firmwide
- all fee-paying discretionary segregated accounts and limited distribution pooled funds are assigned to at least one composite

Composite: an aggregation of one or more portfolios that are managed according to a similar investment mandate, objective, or strategy

Segregated account: a portfolio owned by a single client (SMA)

Limited distribution pooled account: only available to firm's clients

Objectives/ (5)
- promote investor interests and instill investor confidence
- ensure accurate and consistent data
- obtain worldwide acceptance of a single standard for calculating and presenting performance
- promote fair global competition among investment firms
- promote industry self-regulation on a global basis

Page 4
LOS a
- discuss

- firms must meet all requirements set forth in GIPS
- verification is recommended
- if local laws/regulations conflict with GIPS - follow local laws/regulations
  - disclose conflict in the GIPS report

LOS b
- explain

- Fundamentals of Compliance/

Section 1: 39 requirements, 7 recommendations

- **Definition of firm:** an investment firm, subsidiary, or division held out to the public as a 'distinct business entity'

  unit, division, department, or office that is organizationally and functionally segregated from other units, divisions, departments, or offices and that retains discretion over the assets that it manages and that should have autonomy over the investment decision-making process

- **Implementation (Box)**

Page 5
LOS b
- explain

- Definition of firm: sets the boundaries for determining total firm assets (both discretionary and non-discretionary)
  - includes assets managed by subadvisers that the firm has the authority to select (performance of subadvisers must also be reflected in a composite)
- Definition of Discretion: when a manager is able to implement the intended investment strategy
  - if a client has investment restrictions that impede the intended investment strategy - the account may no longer be discretionary

Other fundamentals of compliance/ Section 2.3

Page 6
LOS c
- discuss

TWR - time weighted return - mandated for calculating portfolio and composite returns

- measures the growth of $1 investment over time (geometric avg. ret.).
- negates (not ignores) the effect of external cash flows

- portfolios using TWR must be valued monthly and the TWR calculated at least monthly as of calendar month end or last business day
- if portfolio experiences an intra-month large cash flow (large defined by firm), the portfolio must be valued and a sub-period return must be calculated (if r_P is not already calculated daily)
  - private market portfolios (not publicly traded) must be valued quarterly
  - pooled funds - if not included in a composite, must be valued and returns calculated at least annually
    - must also be valued on any subscription or redemption and a sub-period return calculated

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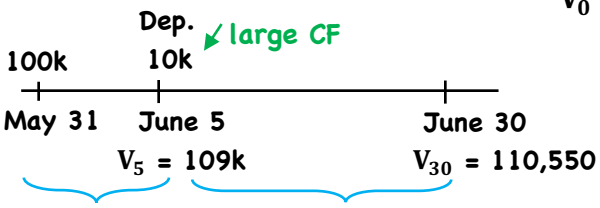
LOS c
- discuss

TWR No external CFs: $r_t = \frac{V_1 - V_0}{V_0}$ or $= {}^{V_1}/_{V_0} - 1$



V_1 - will reflect deposits/withdrawals
∴ sub-period returns are used

$({}^{99}/_{100}) - 1 = -.01$ $\quad$ $({}^{110,500}/_{109,000}) - 1 = 0.01422$ → geometrically linked:
(.99)(1.01422) - 1 = 0.40779%

- if CFs are not large, sub-period returns not required
  - returns must be calculated using a method that adjusts for daily weighted CFs : Modified Dietz approach:

$$r_{mod.Dietz} = \frac{V_1 - V_0 - CF}{V_0 + \sum_{i=1}^{n}(CF_i \times w_i)}$$

$$= \frac{110,550 - 100,000 - 10,000}{100,000 + \left(10,000 \times {}^{25}/_{30}\right)} = 0.5076923\%$$

days in the period

$$W_i = \frac{CD - D_i}{CD}$$ - days from beg. period to CF

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LOS c
- discuss

- Modified IRR (mwrr) $\quad V_1 = \underbrace{\sum_{i=1}^{n}[CF_i \times (1+r)^{W_i}]}_{\text{if = 0}} + V_0(1+r)$

$V_1 = V_0(1+r)$ → $1 + r = {}^{V_1}/_{V_0}$ and $r = {}^{V_1}/_{V_0} - 1$

Box-True vs. Estimated TWR

- requirement: document policies for the treatment of external CFs and to adhere to them consistently
  - document firm's methodology for computing TWR
- Other points:
  - if a firm has control over external CFs, may elect to present MWR instead for portfolios that:

1/ are closed-end, fixed-life, or fixed commitment
or/ 2/ illiquid investments are a significant part of the investment strategy

  - annualized, since inception, MWRs must be calculated at least annually and valued at least annually

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LOS c
- discuss

- Annualizing returns: returns for periods < 1 yr. must not be annualized (tantamount to a prediction about investment returns for the rest of the year)
- Treatment of cash/cash equivalents - C/CE returns must be included in the total return calculation
  - holding cash is an active decision
- Treatment of expenses and fees - returns are calculated after the deduction of transaction costs (buying/selling assets) related to assets actually purchased/sold
  - if a bundled fee is paid, transaction costs should be separated
  - if they can't be, gross of fees return must be reduced by the entire amount of the bundled fee (or that part of the bundled fee that contains the transaction costs)

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LOS d
- explain

- Valuation Requirements/
  - firms are required to apply a fair value methodology when valuing assets
- GIPS defines FV → the amount at which an investment could be sold in an orderly, arm's length transaction between willing parties
  - should be the objective, observable, unadjusted quoted market price for an identical investment in an active market as of the measurement date
- if not available, then must use, in order:
  1/ quoted prices for similar investments in active markets
  2/ quoted prices for identical or similar investments in markets that are not active
  3/ market-based inputs, other than quoted prices, that are observable for the investment
  4/ subjective, unobservable inputs

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LOS e
- explain

- Composite TWR calculations/
  - all actual, fee-paying, discretionary segregated accounts and pooled funds must be included in at least one composite
    if they meet a composite definition
    - if not, no composite needs to be created
  - non-discretionary → not included
  - non-fee paying may be included if the fee was waived for a reason or firm was using its own capital
  - Composite TWR calculation done in one of 3 ways
    1/ asset weighting using beginning period values
    2/ a method that reflects both beginning values and CFs
    3/ the aggregate return method

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- explain

exh. #5

	Cash Flow Weighting Factor	Portfolio ($ Thousands) A	B	C	D	Total
Beginning assets (31 May)		100.00	97.40	112.94	124.47	434.81
External cash flows:						
5 June	0.83	10.00	15.00			25.00
8 June	0.73				−15.00	−15.00
17 June	0.43		−5.00			−5.00
24 June	0.20				−6.50	−6.50
29 June	0.03		−2.50		−4.00	−6.50
Ending assets (30 June)		110.55	105.20	113.30	100.50	429.55
Beginning assets + Weighted cash flows		108.30	107.63	112.94	112.10	440.97
Percent of total beginning assets		23.00%	22.40%	25.97%	28.63%	100.00%
Percent of total beginning assets + Weighted cash flows		24.56%	24.41%	25.61%	25.42%	100.00%

$$V_p = V_0 + \sum_{i=1}^{n} (CF_i \times w_i)$$

$$= \frac{V_{p_i}}{\sum V_p} = \frac{124.47}{434.81} = 28.626\%$$

$$= \frac{112.10}{440.97} = 25.4212\%$$

exh. #6

	Percent of Beginning Assets	Percent of Beginning Assets + Weighted Cash Flows		Return for Month of June
Portfolio A	23.00%	(24.56%	×	0.51%)
Portfolio B	22.40%	+ (24.41%	×	0.28%)
Portfolio C	25.97%	+ (25.61%	×	0.32%)
Portfolio D	28.63%	+ (25.42%	×	1.36%)
	100.00%	100.00%		=
Composite Return:				
Based on beginning assets				0.65%
Based on beginning assets plus weighted cash flows				0.62%

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LOS e
- explain

• Aggregate return method: treats the composite as one portfolio

$$r_{mod.Dietz} = \frac{V_1 - V_0 - CF}{V_0 + \sum(CF_i \times w_i)} = \frac{\text{end. assets} - \text{beg. a.} - CF}{\text{beg. assets} + \text{weighted CFs}} = \frac{429.55 - 434.81 + 8}{440.97}$$

• composite TWR must be calculated monthly (except private market investments)

LOS f
- explain
- determine

Qualifying Portfolios/

- investor IPSs often list constraints
  e.g. weighting, sector exposure, exclusions, inclusions

- may impede the manager's investment strategy materially

• if not material, include in composite

• if material - include in a composite with other similarly constrained portfolios

or/ classify as non-discretionary

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LOS f
- explain
- determine

• if a large legacy holding cannot be sold, remaining assets could be classified as discretionary

• large withdrawals over time may impede the investment strategy due to liquidity needs

→ Firm must have a clear, written definition of discretion

- model or hypothetical portfolios may not be included in any composite
  (considered theoretical performance, not actual performance)

LOS g
- explain

• composites must be defined according to an investment mandate, objective, or strategy

- composite definition must be documented in the firm's policies and procedures

- all portfolios that meet the composite definition must be included

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LOS g
- explain

• GIPS guidance statement on 'Composite Definition' suggests a hierarchy

Investment Mandate - summary product or strategy description
Asset Classes
Style or Strategy
Benchmark - especially if portfolios are restricted to securities in the benchmark
Risk/Return Characteristics

- defined too broadly (i.e. Asset Class → Domestic Equities), may overlook significant differences (i.e. small vs. large cap.)
- may result in a composite with wide dispersion of portfolio returns
- too narrow, proliferation of composites that are too much alike - incurs unnecessary costs, may compromise client confidentiality

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LOS h
- explain

• Including/Excluding portfolios:

• a composite must include new portfolios on a timely and consistent basis after the portfolio comes under management

• should be included as of the beginning of the next performance measurement period after the firm receives the funds

- if not enough time to implement the strategy, inclusion may be delayed → must be a policy for timing of inclusion on a composite-by-composite basis

- for deletions/exclusions, a terminated portfolio must be included in the composite through the last full measurement period in which the firm had full discretion
- typically last full period prior to receiving notification

- firms must have written policies setting forth when portfolios may be added or removed from a composite (composite specific policies)

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LOS h
- explain

• Switching/ • portfolios can only be switched to another composite if:

1/ the portfolio's investment mandate, objective, or strategy changes

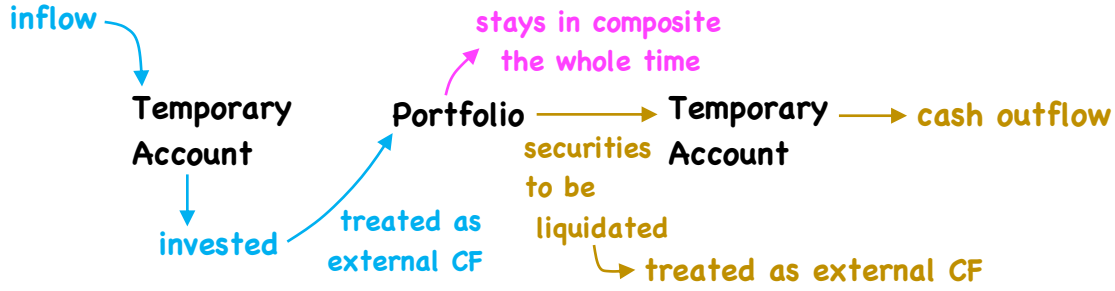
or/ 2/ the composite is redefined

- historical performance of the portfolio must remain with the original composite

• In the event of significant cash flows (in or out), a portfolio may be temporarily removed from the composite

- firms must define significant

- Alternative:



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LOS h
- explain

• Minimum asset levels

• firms may set a minimum asset level for a composite

- portfolios below the minimum size would be considered non-discretionary

- must have a written policy of when to remove/add a portfolio from a composite with a minimum size requirement

- removed portfolio's prior performance cannot be removed from the composite

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LOS i
- explain

• firms must make every reasonable effort to provide a GIPS Report to all prospective clients/investors

- two types of reports • GIPS Composite Report
• GIPS Pooled Fund Report

• GIPS Composite Report - must show at least 5 years of annual performance (or from inception if less)

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LOS i
- explain

- GIPS Composite Report
  - must be extended each year until 10 years are presented
- Required Elements/
  - composite and benchmark annual returns for all years
  - # of portfolios (if ≥ 6) in each composite at period end
  - amount of assets in the composite
  - total firm assets at the end of each period
  - a measure of internal dispersion of individual portfolio returns for each annual period for each composite (# p ≥ 6)
  - 3 yr. annualized ex-post s.d. of the composite and benchmark (if monthly composite returns are available)

Internal Dispersion/ for each annual period, a measure of internal dispersion of the returns of the individual portfolios in the composite must be presented (should be a low level of dispersion)

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LOS i
- explain

Internal Dispersion/
- can use
  - high/low range
  - s.d. - equal-weighted or asset-weighted

$$\sqrt{\frac{\sum(r - \bar{r})^2}{n}} \qquad \sqrt{\sum(r - \bar{r}_w)^2 \times w_i} \rightarrow \sum r_i w_i$$

LOS j
- explain

- Firm A acquires Firm B:
  - Firm A can link the past performance of Firm B to its own if:

1/ substantially all the investment decision makers are employed by Firm A

2/ the decision-making process remains substantially intact and independent within Firm A

3/ Firm A has records which document and support the reported performance

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LOS j
- explain

- Firm A acquires Firm B:

4/ there must be no break in the track record between Firm A and Firm B

- if there is a break, Firm A can still present Firm B's past performance, but cannot link it with Firm A

- Firm A: GIPS compliant, Firm B - not

- Firm A is given a one-year grace period to bring any non-compliant assets into compliance

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LOS k
- discuss

Verification/ provides greater confidence in a claim of compliance

- does not provide assurance of accuracy of returns

- not a requirement but a recommendation

Scope/ provides assurance that policies/procedures related to composites, as well as calculation/presentation/distribution of performance is in compliance with GIPS on a firm-wide basis

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LOS k

Scope/ • a single report is issued only with respect to the whole firm

- verification cannot be carried out on a single composite/product
- to claim compliance, all GIPS requirements must be met
- may choose to have a detailed 'performance examination' conducted on one or more specific composites

Verification Process/ Verifiers:

1/ learn firm's policies/procedures
- for complying with GIPS
- for valuing portfolios and computing investment performance

2/ sampling of portfolios → even though verification is firm wide

- errors or deficiencies require either a larger sample or additional verification procedures

3/ sufficient testing on the sample to ensure the firm satisfies certain fundamental requirements

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LOS k

Verification Process/

3/ e.g.: definition of the firm, complete list of composites, portfolios are properly assigned to composites, evaluation of outliers

4/ Review selected portfolios - treatment of interest, dividends, taxes

- ensure holdings supported by documentation from custodian
- test firm's performance-related calculations are in compliance (involves recalculation of rates of return)

5/ Test construction/maintenance of composites

- list of all portfolios, select a sample for review, ensure they are appropriately classified (disc. or non-disc.) and assigned
- verify timing of inclusion/exclusion/switching

6/ Review the firm's GIPS Report for compliance

- accurate calculations, all disclosures included