

# PEVA



Day 2 Slides

# Portfolio Holdings-Based PEVA



## The Economic Importance of the Active/Passive Debate

- Roughly \$4 trillion in equities managed by mutual funds
- Industry-average mutual fund expense ratio is 100 basis points per year
- Vanguard 500 Index Fund expense ratio is 20 basis points per year
- The 80 basis point difference amounts to \$32 billion per year
- Higher transactions costs on top of this (probably about half as much as the expenses)

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## Academic Studies on the Persistence Issue

- The evidence is mixed:
  - Hendricks, Patel, and Zeckhauser (1993)
    - Fund managers have “hot hands” in year-over-year results, but not beyond that
  - Brown and Goetzmann (1995)
    - Persistence is mainly due to persistence of poor performers
  - Carhart (1997)
    - No evidence of persistence in style-adjusted net returns
    - *“the results do not support the existence of skilled or informed mutual fund portfolio managers”*
      - Carhart, now at G-S Asset Management

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## While the Academic Literature has Cast (at Best) an Ambiguous Light on Performance Persistence...

- Mutual fund trading activity (and expenses) has increased significantly over the past 20 years. Are these trends largely wasteful ?
- And, as my paper will show, fund **turnover** is persistent over several-year periods
  - E.g., high turnover funds remain high-turnover
  - Do these funds trade merely to appear to have “hot hands” in picking stocks?

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## Several Controversies in these Studies

- Survivor bias
  - Carhart estimates an upper bound of 1%/year
- Sample selection period
- Performance measurement method
  - **Example:** Jensen measure has timing-related biases

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## Controversies (continued)

- Adjustment for style
  - Hendricks, Patel, and Zeckhauser (1993) fail to control for momentum
  - Carhart (1997) adjusts using covariance-based matching with style-mimicking portfolios

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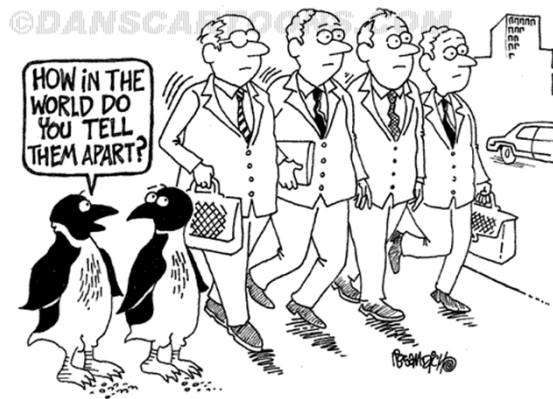
## The Reasons Why the Literature Has Not Provided a Full Attribution of Performance of Winners vs. Losers

- No proper style benchmarks (DGTW, 1997)
- No integrated database of mutual fund holdings, net returns, turnover, etc. (Wermers (2000))
- No estimates of transactions costs (Wermers (2000))

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## Returns-Based PEVA...



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9

### **My Paper Decomposes Returns and Costs of Winners vs. Losers into:**

- Talents in picking stocks that beat their characteristic benchmarks
- Holdings of stocks having characteristics that provide higher average returns
- Transactions costs (of stock trades)
- Expense ratios
- Returns on non-stock mutual fund holdings
- Return drag of consumer flows

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## **Why Use Security Holdings to Measure and Adjust for Style?**

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**Because Substantial “Style Drift”  
Occurs at Fairly High Frequency  
(for example, quarterly)**

Let’s examine this issue.

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# Sources of Style Drift

- Individual stocks exhibit style drift over time
- Portfolios of stocks are more stable, but can still drift
  - Asset weights change in a passive portfolio, as well as the component stocks changing characteristics
- Managers tend to actively “tilt” the portfolio over time across different styles
  - Changing strategies, behavioral tendencies

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13

<i>Exxon</i>	Size	BTM	PR1YR	
1985	5	3	3	Consistent Large-Cap
1986	5	4	1	
1987	5	4	5	Value Neutral
1988	5	3	4	
1989	5	3	1	Changing Momentum
1990	5	3	3	
1991	5	3	4	
1992	5	3	3	
1993	5	3	3	
1994	5	3	2	

**Exxon's style?**

Consistent Large-Cap

Value Neutral

Changing Momentum

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14

## Overall Style Drift Example #1

	Size	BTM	PR1YR
1991	4.7	3.2	3.1
1992	4.7	3.3	3.2
1993	4.7	3.4	2.8
1994	4.7	3.0	3.2
1995	4.9	2.8	3.4
1996	4.8	2.9	3.5
1997	4.8	2.8	3.6
1998	4.9	2.7	3.3
1999	4.9	2.3	3.5
2000	4.9	2.0	3.7

### Telecommunication Pension Fund

Maintained Large-Cap Presence

Drift Toward Growth by 1995

Drift to Increasing Momentum Presence

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15

## Investment Outcomes

	Gross Return (%)	S&P 500 (%)
1991	12.0*	13.9*
1992	8.1	7.7
1993	14.8	9.9
1994	- 1.7	1.4
1995	38.3	37.7
1996	25.1	23.2
1997	33.7	33.6
1998	33.0	29.3
1999	24.4	21.5
2000	- 7.1	- 8.5

### Telecommunication Pension Fund

\*1991 is April through December)

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16



## Overall Style Drift Example #2

	Size	BTM	PR1YR
1991	4.7	2.3	2.9
1992	4.6	2.5	2.8
1993	4.8	2.4	3.0
1994	4.7	2.4	3.1
1995	4.3	2.6	3.5
1996	4.3	2.4	3.2
1997	4.5	2.5	3.3
1998	3.2	2.4	3.3
1999	3.1	1.8	4.0
2000	3.7	2.0	4.2

**University  
Endowment**

Drift to  
Smaller Cap

Drift to  
Growth

A Large Drift  
to Momentum Stocks

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17

## Active Style Drift Example #2

	Size	BTM	PR1YR
1991	---	---	---
1992	-0.1	0.1	0.2
1993	0.1	-0.1	0.1
1994	-0.1	-0.1	0.2
1995	-0.4	0.1	0.2
1996	-0.1	-0.1	0.1
1997	-0.1	-0.1	-0.1
1998	-1.3	-0.1	0.2
1999	-0.5	-0.2	0.5
2000	0.1	0.5	-0.3

**University  
Endowment**

Active Move Toward  
Small Cap in 1998

Continued Active Move  
Toward Growth,  
Followed by Value

Continued Active  
Move Toward  
Momentum Stocks

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18

## Investment Outcomes

	Gross Stock Return (%)	S&P 500 (%)
<b>1991</b>	15.2*	13.9*
<b>1992</b>	6.5	7.7
<b>1993</b>	8.8	9.9
<b>1994</b>	- 1.0	1.4
<b>1995</b>	35.7	37.7
<b>1996</b>	29.1	23.2
<b>1997</b>	24.5	33.6
<b>1998</b>	25.0	29.3
<b>1999</b>	22.5	21.5
<b>2000</b>	17.9	- 8.5

## University Endowment

\*1991 is April through December)

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19

## The Measures Used in this Paper

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## Stock-Picking Talent

- “Characteristic-Selectivity Measure” (CS)

$$CS_t = \sum_{j=1}^N w_{j,t-1} (R_{j,t} - R_t^{b_{j,t-1}})$$

- CS measures the ability of the fund manager to pick stocks that beat their matching characteristic-based benchmarks

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## Stock Benchmarks Based on Stock Characteristics (DGTW (1997))

- Non-covariance based matching--matching based on characteristics, not based on factor loadings derived from regressions
- We form quintiles of CRSP stocks based on (1) size, (2) book-to-market, and (3) prior-year return
  - 125 value-weighted control portfolios (5x5x5)
- Each CRSP stock is matched with one of the 125 portfolios
  - The stock return, adjusted for stock characteristics, is computed as raw return minus value-weighted control portfolio return
- Performance measurement is easy: just subtract the matched portfolio return for month t from stock i’s return during month t, then portfolio weight the difference

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## Analyzing Stock Drift

- Rank all NYSE stocks by Mkt. Cap. -  
Divide into 5 Quintiles
- Rank Quintiles = Book Value/Market Value (BTM)  
Subdivide into 5 more quintiles
- Rank the 25 fractiles by past year stock return  
Subdivide into 5 more quintile

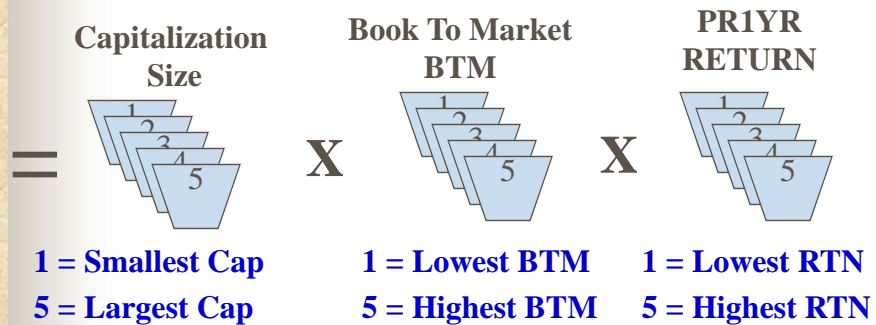
A rank of:

Size=5,                      BTM=5,                      PR1YR=5  
Large Cap                      High BTM                      High Past Return

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## RANK ALL STOCKS NYSE - CRSP DATA



**POSSIBLE RANKINGS** = ( SIZE x BTM x PR1YR ) = 125

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## Performance Measurement Is Easy

YEAR	SIZE	BTM	RETURN	JAN
2000	1	1	1	1.93%
2000	1	2	1	9.17%
2000	1	3	1	5.99%
2000	1	4	1	6.67%
2000	1	5	1	9.91%
2000	2	1	1	0.18%
2000	2	2	1	-3.09%
2000	2	3	1	0.88%
2000	2	4	1	0.04%
2000	2	5	1	-2.55%
2000	3	1	1	-4.52%
2000	3	2	1	-5.81%
2000	3	3	1	-6.38%
2000	3	4	1	-1.91%
2000	3	5	1	-3.15%
2000	4	1	1	-3.54%
2000	4	2	1	1.24%
2000	4	3	1	-6.16%
2000	4	4	1	-6.70%
2000	4	5	1	-8.48%
2000	5	1	1	-5.80%
2000	5	2	1	-4.07%
2000	5	3	1	-2.40%
2000	5	4	1	-5.60%
2000	5	5	1	-5.54%

( SMALL CAP) (LOWEST BTM) (LOWEST RTN)






( LARGE CAP) (LOWEST BTM) (LOWEST RTN)

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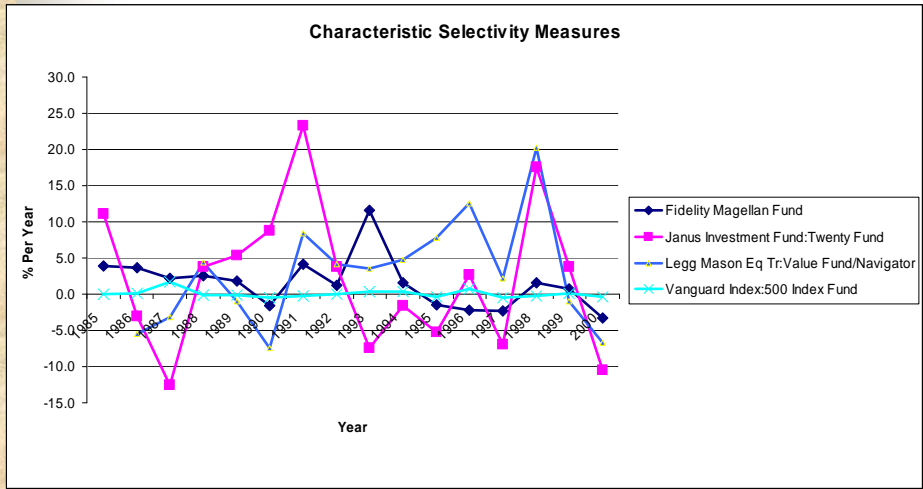
## A Look at All of Our “Star Manager” Funds



		CS Measure (%/year) (1985 to 2000)
Magellan		1.5
LM VT		2.9
Janus 20		2.1
Vanguard		0.0
PIMCO		NA

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Slide #28

## Style-Based Returns

- “Average Style Measure” (AS)

$$AS_t = \sum_{j=1}^N w_{j,t-5} R_t^{b_{j,t-5}}$$

- AS measures the tendency (ability?) of the fund manager to hold stocks with characteristics that paid off over long time-periods

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## Style-Timing Returns

- “Characteristic Timing Measure” (CT)

$$CT_t = \sum_{j=1}^N (w_{j,t-1} R_t^{b_{j,t-1}} - w_{j,t-5} R_t^{b_{j,t-5}})$$

- CT measures the ability of the fund manager to hold stocks with characteristics at times when those characteristics really pay off

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## A Nice Property of These Measures...

$$CS_t + AS_t + CT_t = \text{Gross Return}$$

- In practice, only approximately true, since AS, CS, and CT measures require stock to be listed in Compustat
- And, AS and CT require a 1-year fund history

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## Transactions Costs

- I apply the Keim & Madhavan (1997) total institutional trading costs, with Stoll (1995) yearly execution cost factors, to my holdings data:

$$C_{i,t}^B = Y_t^k \left[ 1.1 + .3D_{i,t}^{Nasd} + .09Trsize_{i,t} - .08Logmcap_{i,t} + 13.8 \left( \frac{1}{P_{i,t}} \right) \right]$$
$$C_{i,t}^S = Y_t^k \left[ .98 + .06D_{i,t}^{Nasd} + .21Trsize_{i,t} - .06Logmcap_{i,t} + 6.5 \left( \frac{1}{P_{i,t}} \right) \right]$$

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## Expense Ratios, Net Returns, and Non-Stock Returns

- Expense ratios and net returns available directly from the merged database
  - Expense ratios include all fees and expenses except direct and indirect trading costs, load fees, and taxes
  - Provided as a percentage of TNA
- Non-stock returns must be inferred by what is unexplained between gross and net returns

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## Measuring Performance at the Net Return Level

### Measure 1: Carhart (1997) regression alpha

- Regress time-series of monthly mutual fund excess returns on portfolio returns accruing to four zero-investment factor-mimicking portfolios:
  - High book-to-market minus low book-to-market (**HML**)
  - Small size minus big size (**SMB**)
  - High prior-year return less low prior-year return (**PR1YR**)
  - CRSP value-weighted index less T-bills (**RMRF**)

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## Measuring Performance at the Net Return Level

### Measure 2: Fama and French regression alpha

(Carhart measure, without the PR1YR factor)

- Regress time-series of monthly mutual fund excess returns on portfolio returns accruing to four zero-investment factor-mimicking portfolios:
  - High book-to-market minus low book-to-market (**HML**)
  - Small size minus big size (**SMB**)
  - CRSP value-weighted index less T-bills (**RMRF**)

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## Measuring Performance at the Net Return Level

### Measure 3: Ferson-Schadt (1996) conditional alpha

- Regressors are Carhart unconditional factors (**RMRF, HML, SMB, PR1YR**), plus:
  - RMRF times each of five lagged publicly available economic variables:
    - One-month T-bill yield
    - CRSP NYSE/AMEX dividend yield
    - Slope of the term structure
    - Quality spread in corporate bonds
    - January dummy

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## The Databases Used in this Paper

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## The CDA Mutual Fund Database

- End-of-quarter equity holdings of virtually all publicly traded equity mutual funds
- 1975-1994
- Quarterly Investment objectives from 6/30/80 (supplemented by 12/31/74 data)
- No survivorship bias
- 1995-2000 data is in the works (a “holdout sample”)!

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## The CRSP Mutual Fund Database

- Contains, for all mutual funds existing at any time between 1962 and 2000:
  - monthly net returns
  - annual portfolio turnover
  - annual expense ratios
- No survivorship bias

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## The Database Merging Process

- Funds were matched through similarities in:
  - Fund names
  - Management company names
  - Total assets under management
  - Self-declared investment objectives
- Only 60 funds in CRSP could not be matched to CDA, all during the last four years of the sample period
- Missing 110 “fund-years” out of 10,000 fund-years
- No survivorship bias during 16 out of 20 years

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## Success of Database Merging (Wermers (2000))

- Limited to funds having an investment objective of AG, G, GI, I, or B:
  - All funds in CRSP are matched to a CDA fund from 1975-1990
  - Unmatched funds:
    - 11 out of 690 in 1991
    - 14 out of 829 in 1992
    - 31 out of 980 in 1993
    - 54 out of 1,333 in 1994
    - Total of 110 fund-years out of 10,000 fund-years

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## Potential Sources of Bias in the Merged Database

- **“Survival Bias”**—likely very minimal, and will not impact TNA-averaged results significantly
- **“Incubator Bias”**—related to survival bias—only relevant if “crib deaths” occurring to funds available to the public did not make it into the databases—trivial impact on TNA results anyway
- **“Inherited Performance Record Bias”**—merging fund “inherits” performance record of better fund—no known impact, as the CRSP mutual fund database used net returns available each year, not backfilled numbers

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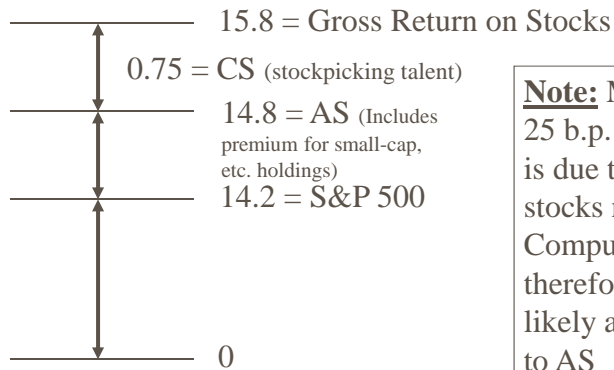
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## Results of Wermers (2000)

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## Return Sources (1976 to 1994) (TNA-average, percent per year)

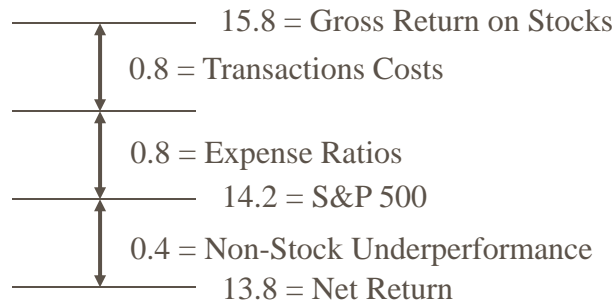


**Note:** Missing 25 b.p. per year is due to small stocks not in Compustat, and, therefore, is likely attributable to AS

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## Return Uses (1976 to 1994) (TNA-average, percent per year)



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