

**Active Share Methodology
For Multiple Portfolio Attribution**

May 9, 2013

Introduction

Active Share is a measure designed to determine similarity of holdings between a fund and an index and was developed by Professors Cremers and Petajisto of the Yale School of Management. Because it is portfolio driven, active share makes a valuable complement to best fit r-squared and tracking error. Whereas those are based on performance, a portfolio-based measure such as Active Share can capture differences in the actual portfolios.

This data point is gaining traction in the advisor and institutional community and requests to Morningstar by outside vendors, clients, and institutions are increasing.

The calculation is based on portfolio-level holdings of a fund and identified index or ETF proxy.

Methodology

For a fund's portfolio, calculate the following (long and short stocks, ignore bonds and cash):

$$\text{Active Share} = \frac{1}{2} \sum_{i=1}^n |w_{fund,i} - w_{index,i}|$$

Where:

$w_{fund,i}$ = portfolio weight of asset i in the fund

$w_{index,i}$ = portfolio weight of asset i in the index

If the asset position of either the fund or the index is long, the portfolio weight is positive. If the asset position of either the fund or the index is short, the portfolio weight is negative. (An index will rarely if ever have a short position in a stock, but if it does, that should be counted as a negative weighting for the index portion of the calculation.)

- 1) If the fund holds the same stock as the index holds, calculate the weighting differences to measure heavy-weighting or under-weighting effect;
- 2) If the fund holds a different stock than index, the weighting difference equals to stock's port weight. It is to measure actively stock-select effect;
- 3) Only common stocks (both long and short positions) are included into the calculation. All other security types such as cash, bond, warrants and derivatives are excluded. If a security's type is unknown, it will be excluded. After exclusion, rescale each stock's weight to entire equity portion for Fund and Index.
- 4) Treat ADR & ORD securities the same if they refer to same company.
- 5) Induce the holdings weight by using closet prior portfolio if there is no portfolio available on the specific date.
- 6) For FOF, expand composite asset into stock level if report setting has Expand Composite Asset option checked. Otherwise, don't expand composite asset. In this case, the fund holding will be excluded in terms of 3).

Appendix: Example

Fund A Portfolio 7/31/2012

Holding Name	Detail Type	SecId	MV	Rescaled Weight over Equity	Calculation
Apple, Inc.	Equity	0P000000GY	1,000,000,000	29.41%	= 1,000,000,000/3,400,000,000
Exxon Mobil Corporation	Equity	0P00000220	800,000,000	23.53%	= 800,000,000/3,400,000,000
Microsoft Corporation	Equity	0P000003MH	600,000,000	17.65%	= 600,000,000/3,400,000,000
International Business Machines Corp	Equity	0P000002RH	550,000,000	16.18%	= 550,000,000/3,400,000,000
General Electric Co	Equity	0P000002DO	350,000,000	10.29%	= 350,000,000/3,400,000,000
AT&T Inc	Equity	0P00000031	100,000,000	2.94%	= 100,000,000/3,400,000,000
Continental Air 1998-1 6.748%	Bond - Asset Backed	210805CC9	200,000,000		
S + p 500 E Mini Index Futures Sep12 Xiom	Equity Index - Future		100,000,000		
Goldman Sachs Ultra-Short Duration Gov	Mutual Fund - MMK	38141W208	100,000,000		
Cash	Cash		50,000,000		
University Of California Cp 08-13-12	Unidentified Holding		10,000,000		
LONG Equity Sum Total			3,400,000,000	100%	

Category Index Portfolio 7/31/2012

Holding Name	Detail Type	SecId	MV	Rescaled Weight over Equity	Calculation
Apple, Inc.	Equity	0P000000GY	1,838,716,992	24.56%	= 1,838,716,992/7,488,137,338
Exxon Mobil Corporation	Equity	0P00000220	1,347,090,602	17.99%	= 1,347,090,602/7,488,137,338
Microsoft Corporation	Equity	0P000003MH	772,131,183	10.31%	= 772,131,183/7,488,137,338
International Business Machines Corp	Equity	0P000002RH	759,129,884	10.14%	= 759,129,884/7,488,137,338
General Electric Co	Equity	0P000002DO	742,974,009	9.92%	= 742,974,009/7,488,137,338
AT&T Inc	Equity	0P00000031	703,472,665	9.39%	= 703,472,665/7,488,137,338
Chevron Corp	Equity	166764100	700,411,652	9.35%	= 700,411,652/7,488,137,338
Johnson & Johnson	Equity	0P0000032S	624,210,351	8.34%	= 624,210,351/7,488,137,338
Cash	Cash		300,000,000		
LONG Equity Sum Total			7,788,137,338	100.00%	

Active Share of Fund A =

$$(|29.41\% - 24.56\%| + |23.53\% - 17.99\%| + |17.65\% - 10.31\%| + |16.18\% - 10.14\%| + |10.29\% - 9.92\%| + |2.94\% - 9.39\%| + |0 - 9.35\%| + |0 - 8.34\%|) / 2 = 24.14\%$$

Fund B Portfolio 7/31/2012 (Include Short Stock Position)

Holding Name	Detail Type	SecId	MV	Rescaled Weight over Equity	Calculation
Apple, Inc.	Equity	0P000000GY	1,000,000,000	29.41%	= 1,000,000,000/3,400,000,000
Exxon Mobil Corporation	Equity	0P00000220	800,000,000	23.53%	= 800,000,000/3,400,000,000
Microsoft Corporation	Equity	0P000003MH	600,000,000	17.65%	= 600,000,000/3,400,000,000
International Business Machines Corp	Equity	0P000002RH	550,000,000	16.18%	= 550,000,000/3,400,000,000
General Electric Co	Equity	0P000002DO	250,000,000	7.35%	= 250,000,000/3,400,000,000
AT&T Inc	Equity	0P00000031	200,000,000	5.88%	= 200,000,000/3,400,000,000
Bank of America Corp	Equity	0P000000PA	100,000,000	2.94%	= 100,000,000/3,400,000,000
Google Inc	Equity	0P000002HD	-100,000,000	-2.94%	= -100,000,000/3,400,000,000
Continental Air 1998-1 6.748%	Bond - Asset Backed	210805CC9	200,000,000		
S+p 500 E Mini Index Futures Sep12 Xiom	Equity Index - Future		100,000,000		
Goldman Sachs Ultra-Short Duration Gov	Mutual Fund - MMK	38141W208	100,000,000		
Cash	Cash		50,000,000		
University Of California Cp 08-13-12	Unidentified Holding		10,000,000		
LONG Equity Sum Total			3,400,000,000	100%	

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Cash	Cash		300,000,000		
LONG Equity Sum Total			7,788,137,338	100.00%	

Active Share of Fund B =

$$(|29.41\% - 24.56\%| + |23.53\% - 17.99\%| + |17.65\% - 10.31\%| + |16.18\% - 10.14\%| + |7.35\% - 9.92\%| + |5.88\% - 9.39\%| + |2.94\% - 0\%| + |-2.94\% - 0\%| + |0 - 9.35\%| + |0 - 8.34\%|) / 2$$

$$= 26.71\%$$

Fund C Portfolio 7/31/2012 (Two Securities Refer to Same Company)

Holding Name	Detail Type	SecId	MV	Rescaled Weight over Equity	Calculation
Apple, Inc.	Equity	0P000000GY	1,000,000,000	29.41%	=1,000,000,000/3,400,000,000
Exxon Mobil Corporation	Equity	0P00000220	800,000,000	23.53%	=800,000,000/3,400,000,000
Microsoft Corporation	Equity	0P000003MH	600,000,000	17.65%	=600,000,000/3,400,000,000
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General Electric Co	Equity	0P000002DO	250,000,000	7.35%	=250,000,000/3,400,000,000
AT&T Inc	Equity	0P00000031	100,000,000	2.94%	=100,000,000/3,400,000,000
Samsung Electronics Co Ltd (US)	Equity	0P000009UW	-100,000,000	-2.94%	=-100,000,000/3,400,000,000
Samsung Electronics Co Ltd (South Korea)	Equity	0P0000B2XZ	200,000,000	5.88%	=200,000,000/3,400,000,000
Continental Air 1998-1 6.748%	Bond - Asset Backed	210805CC9	200,000,000		
S+p 500 E Mini Index Futures Sep12 Xiom	Equity Index - Future		100,000,000		
Goldman Sachs Ultra-Short Duration Gov	Mutual Fund - MMK	38141W208	100,000,000		
Cash	Cash		50,000,000		
University Of California Cp 08-13-12	Unidentified Holding		10,000,000		
LONG Equity Sum Total			3,400,000,000	100%	

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Holding Name	Detail Type	SecId	MV	Rescaled Weight over Equity	Calculation
Apple, Inc.	Equity	0P000000GY	1,838,716,992	24.56%	=1,838,716,992/7,488,137,338
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Chevron Corp	Equity	166764100	700,411,652	9.35%	=700,411,652/7,488,137,338
Samsung Electronics Co Ltd (US)	Equity	0P000009UW	624,210,351	8.34%	=624,210,351/7,488,137,338
Cash	Cash		300,000,000		
LONG Equity Sum Total			7,788,137,338	100.00%	

Active Share of Fund C =

$$(|29.41\% - 24.56\%| + |23.53\% - 17.99\%| + |17.65\% - 10.31\%| + |16.18\% - 10.14\%| + |7.35\% - 9.92\%| + |2.94\% - 9.39\%| + |(-2.94\% + 5.88\%) - 8.34\%| + |0 - 9.35\%|) / 2 = 23.77\%$$