

# Returns-Based Style Analysis

By  
John J. Lah

Presentation  
FIN660  
Dr. Brooks Marshall  
Summer 1998

## Returns-Based Style Analysis

The introduction of returns-based style analysis by William Sharpe in 1989 has provided mutual fund investors and pension fund sponsors with a sophisticated tool for asset allocation and investment performance measurement. Returns-based style analysis is a statistical technique using a quadratic algorithm that identifies the combination of passive index holdings that would have most closely replicated the actual performance of a portfolio over a specified time period. The composition of the customized benchmark of passive indexes provides an insight into the fund's investment objective.

The most common application of returns-based style analysis is in determining portfolio attributes for data inputs to determine an optimal portfolio allocation. Because of its ability to match fund behavior with asset classes described on the efficient frontier, style analysis can be a useful tool to accurately implement a targeted portfolio mix.

However, returns-based style analysis is also controversial in that, the technique used for fund analysis is dramatically different from the traditional method of fundamental analysis. While fundamental analysis looks at the accounting based characteristics of individual portfolio holdings, returns-based style analysis only looks at historical returns relative to a passive benchmark. William Sharpe has been quoted as saying "returns-based style analysis is not going to dissect the creature to determine if its DNA belongs to that of a duck, but it will tell you if it has enough duck-like characteristics to qualify". (William F. Sharpe, "Determining a Fund's Effective Asset Mix", *Investment Management Review*, December 1988, pp.59-69)

## Application of Returns-Based Style Analysis

The usefulness of a regression method such as returns-based style analysis is dependent on the data inputs, or in this case the asset classes selected for its implementation. According to Sharpe, the selected asset class indexes should have either low correlation, or different standard deviations. "Other things equal, the fewer the asset classes, the more likely the model is to represent continuing fundamental relationships with predictive content". (William F. Sharpe, "Asset allocation: Management style and performance measurement", The Journal of Portfolio Management, Winter 1992, p. 8)

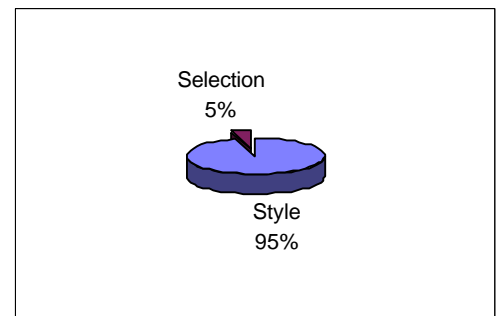
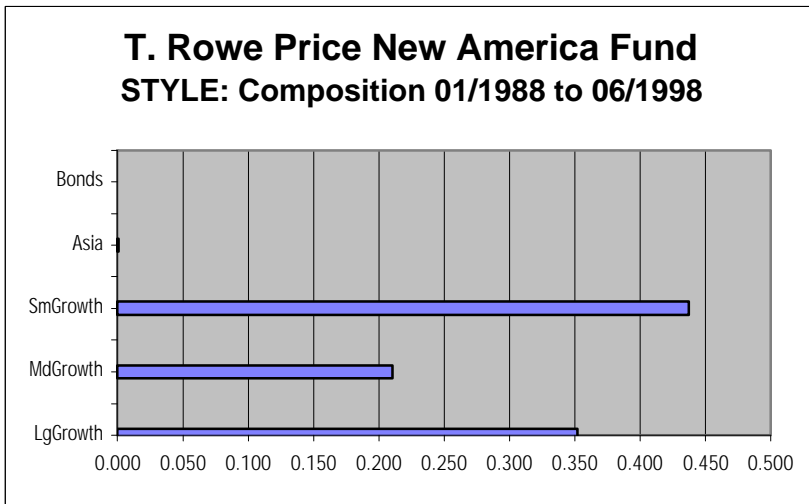
The asset classes used for this exercise were:

S&P/BARRA Large Growth  
 S&P/BARRA Large Value  
 Wilshire Midcap Growth  
 Wilshire Midcap Value  
 Wilshire Smallcap Growth  
 Wilshire Smallcap Value  
 MSCI Pacific  
 MSCI Europe  
 Vanguard Total Bond Market Portfolio  
 30-Day CD rate

Asset class correlation from Jan. 1987 to June 1998 were:

	LgGowh	LgVáue	MtGowh	MtVáue	StrGowh	StrVáue	FaEast	Europe	Bonds	MM
LgGowh	1.0000									
LgVáue	0.9052	1.0000								
MtGowh	0.8585	0.8523	1.0000							
MtVáue	0.7891	0.8915	0.8540	1.0000						
StrGowh	0.7972	0.8004	0.9803	0.8141	1.0000					
StrVáue	0.7601	0.8591	0.8595	0.9723	0.8396	1.0000				
FaEast	0.2995	0.3331	0.2898	0.2275	0.2962	0.2441	1.0000			
Europe	0.6319	0.6662	0.5522	0.5292	0.5323	0.5190	0.5310	1.0000		
Bonds	0.3070	0.3221	0.1864	0.3460	0.1256	0.2799	0.0531	0.1388	1.0000	
MM	0.0468	-0.0148	-0.0355	-0.0625	-0.0453	-0.0999	-0.0708	0.0029	0.0965	1.0000

## T. Rowe Price New America Fund



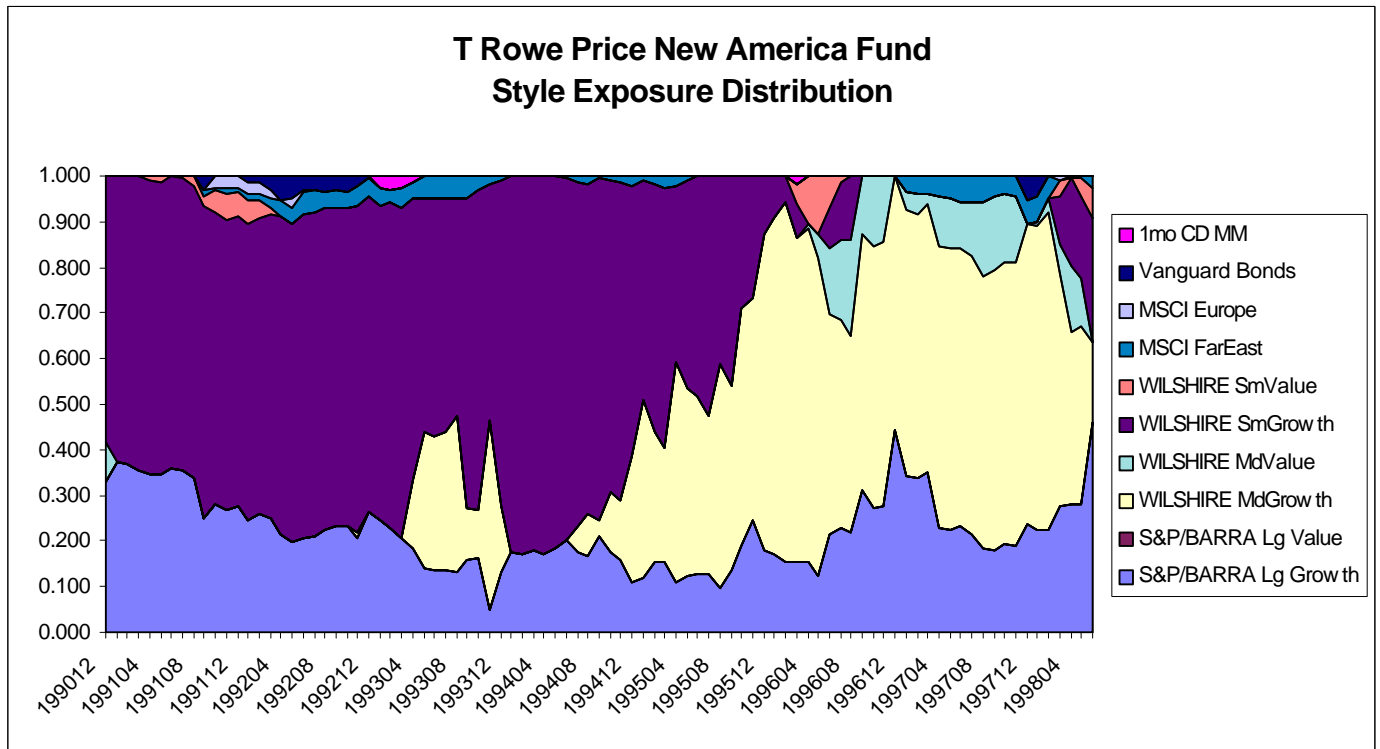
The results of the style analysis for the T. Rowe Price New America for the 10 year period shows the fund exposure to 35.2% large growth, 21% to mid cap growth, and 43.7% to small cap growth stock indices. Furthermore, approximately 95% of the fund's return can be explained by the fund's exposure to these styles, and 5% from selection.

### ANNUALIZED VALUES:

	Fund	Style	Selection	R <sup>2</sup>
Mean	18.076	17.221	0.855	0.85
Std. Dev.	16.834	15.135	6.681	

If the analysis were to stop here, we would not be utilizing the full potential of style analysis. One of the pitfalls of implementing style analysis is that, it requires the user to determine not only the benchmarks, but also the time frame. The above analysis does not provide a complete picture of the behavior of the New America Fund. One of the most

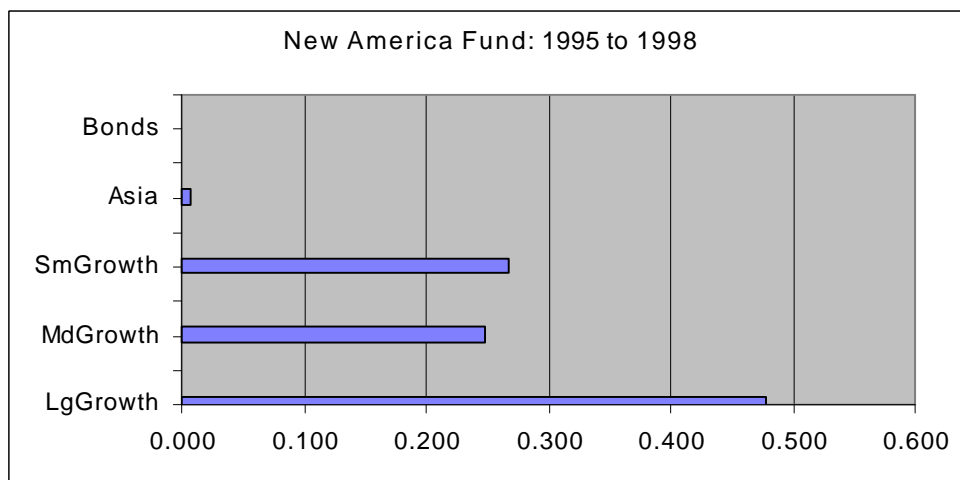
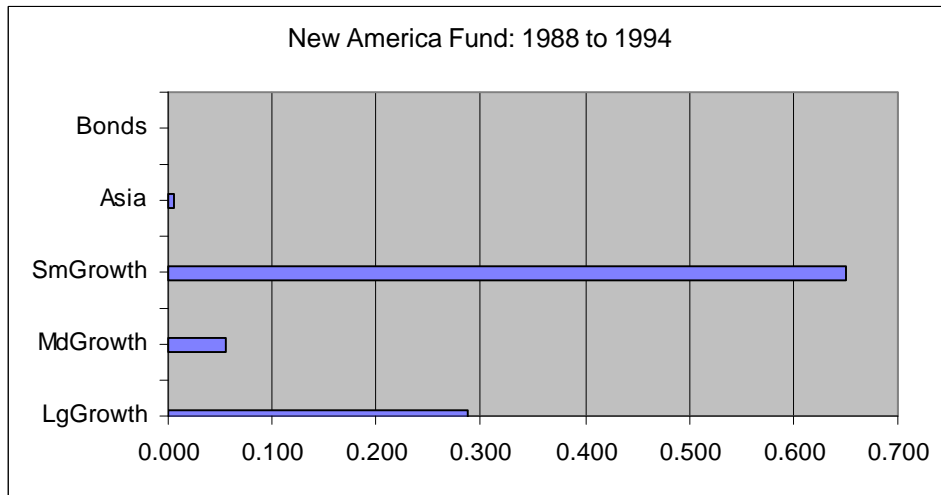
useful tools that style analysis provide, is the ability to trend the fund's exposure through the exposure distribution area graph.



An examination of the style exposure distribution area graph using a rolling 36 month period shows us clearly that the New America Fund is not the same fund in 1998 as it was in the mid to early 1990's. The fund has evolved from a mostly small cap growth fund to a mostly large growth and mid cap growth fund. It appears that the large growth style is becoming even more dominant. The style distribution alerts us to the fact that the 10 year period used to analyze the fund's style was not appropriate.

Comparison of the 1988 to 1994 and 1995 to 1998 period shows that, the small growth style has declined from 65% to 27%, while the mid cap growth has increased from 5.6% to 24.8% and large growth from 28.8% to 47.7%. If we wish to know why this

change may have occurred, we would have to rely on traditional fundamental analysis, checking the prospectus or interview the fund manager for any changes in objectives.



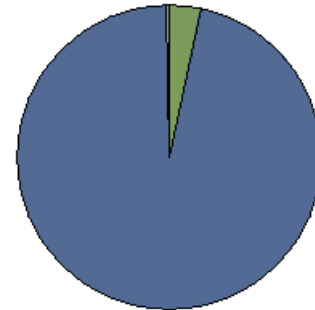
To confirm that the style analysis was depicting an accurate picture of the New America Fund, the results of the style analysis was compared to the fundamental characteristics of the New America Fund. The fundamental characteristics for the equity asset classes came from the S&P/BARRA fundamental data ([www.barra.com](http://www.barra.com)), and the fundamental data for the New America Fund were from Morningstar ([www.morningstar.net](http://www.morningstar.net)). The portfolio

composition comparison was made for the 36 months period ending March 1998, to compare with the latest available Morningstar report.

% net assets

**Asset Allocation Summary**

Cash	3.09
Stocks	96.44
Bonds	0
Other	0.46
Foreign	1.93
(as % of Stocks)	



General data as of 03-31-98.

**Investment Style Statistics**

**Size**

Median Market Capitalization (\$ mil)	6,987.70
---------------------------------------	----------

**Investment Valuation**

Average Price/Book	5.15
Average Price/Earnings	36.47

Data as of 03-31-98

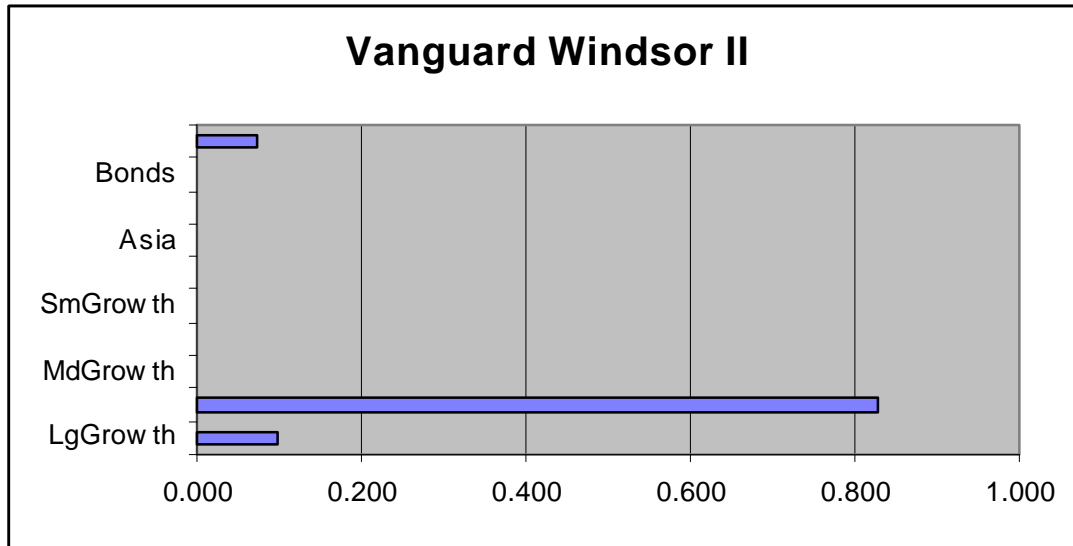
<b>TRowePrice New America</b>	S&P/BARRA Lg Growth	WILSHIRE MdGrowth	WILSHIRE MdValue	WILSHIRE SmGrowth	WILSHIRE SmValue	Portfolio Profile
Style Exposure As of 199803	0.28	0.51	0.07	0.11	0.04	
Mean Capitalization	7,705.03	1,472.46	119.60	83.21	17.32	9,397.61
Price/Earnings	8.03	13.41	1.23	2.60	0.68	25.94
Price/Book	2.05	2.47	0.15	0.47	0.07	5.21
Data Item:	[S&P/BARRA U.S. Equity Indices]					
Median Capitalization	27,816	2,910	1,785	785	468	
Price/Earnings	28.98	26.50	18.30	24.55	18.30	
Price/Book	7.40	4.89	2.18	4.43	1.90	

The portfolio profile was constructed using the weights provided by the style analysis, and the results are weighted average of the S&P/BARRA equity index characteristics.

The Price/Earnings comparison was significantly higher for the New America Fund according to the Morningstar report, while the Capitalization estimate was somewhat higher using the style analysis estimate, and the Price/Book was almost the same. Based

on this finding, it appears that the returns-based style analysis provided a reasonably close approximation of the fundamental characteristics of the T. Rowe Price New America Fund.

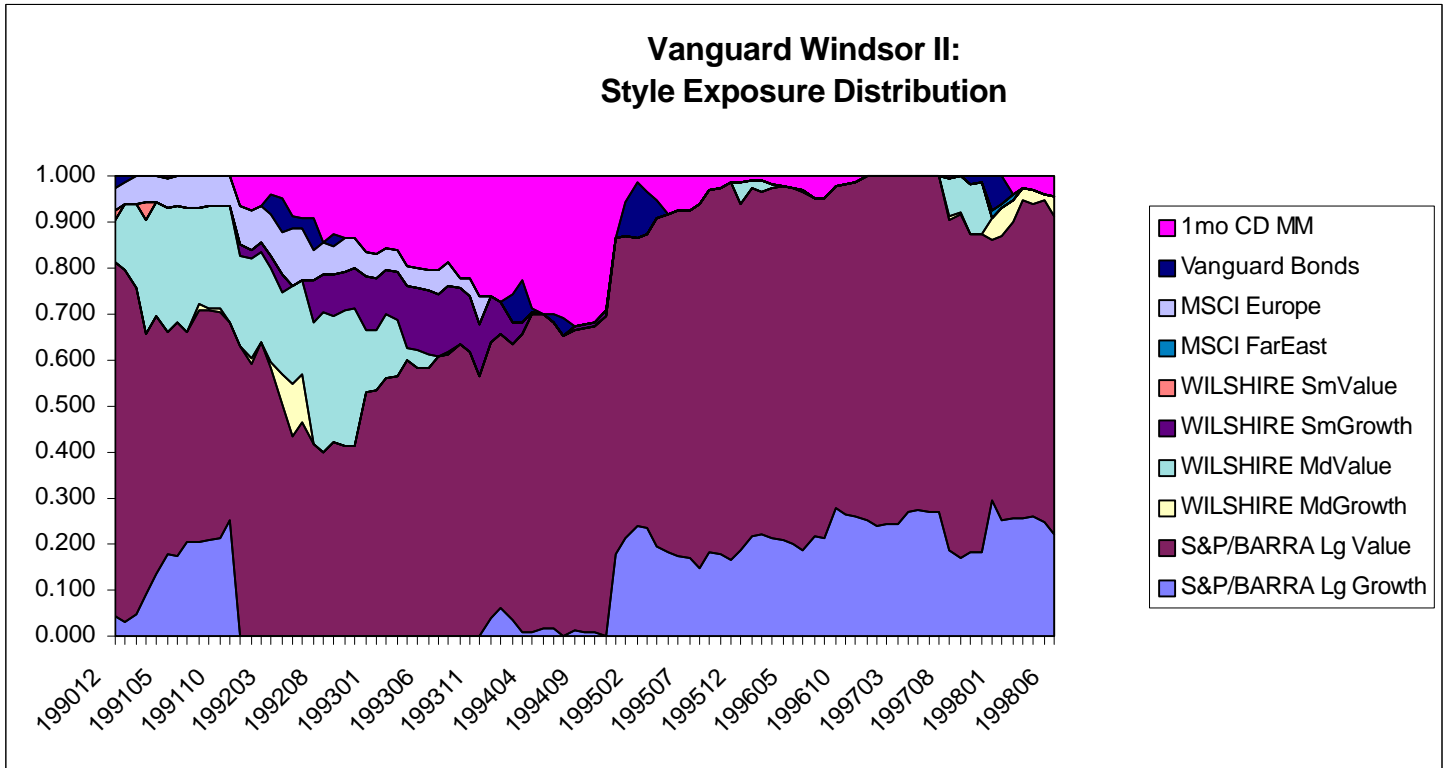
## Vanguard Windsor II



STYLE:	Proportions	ANNUALIZED VALUES:			
		Fund	Style	Selection	R <sup>2</sup>
LgGrowth	0.098	12.670	16.482	-3.812	0.73
Lg Value	0.829	Mean	12.198	10.687	5.950
MdGrowth	0.000	Std. Dev.	0.000	0.000	0.000
MdValue	0.000				
SmGrowth	0.000				
SmValue	0.000				
Asia	0.000				
Europe	0.000				
Bonds	0.000				
MM	0.073				

The style analysis for the Vanguard Windsor II fund for the period from Jan. 1988 to June 1998 shows that the fund captures approximately 83% of the behavior of the large cap value index. In addition, the style analysis also tells us that this fund has also held a

relatively large amount (over 7%) of its portfolio in short-term interest bearing instruments, and that this fund has underperformed its passive benchmark indexes.



A review of the rolling 36 month style exposure distribution graph tells us that, the Windsor II had not always invested in large U.S. value stocks, and in late 1994 held a fairly high proportion of portfolio in short term interest bearing securities. Comparison of the style analysis with the Morningstar report appears to support this conclusion.

#### Vanguard/Windsor II VWNFX

% net assets

##### Asset Allocation Summary

Cash	9.22
Stocks	90.78
Bonds	0
Other	0
Foreign	1.86
(as % of Stocks)	

General data as of 04-30-98.



## Vanguard/Windsor II VWNFX

### Investment Style Statistics

#### Size

Median Market 25,464.80  
Capitalization (\$mil)

#### Investment Valuation

Average Price/Book 4.23  
Average Price/Earnings 24.16

Data as of 04-30-98

Vanguard Windsor II	S&P/BARRA Growth	S&P/BARRA Value	MidCap/BARRA Growth	Portfolio Profile
Style Exposure as of 199804	0.259	0.680	0.031	
Median Capitalization	3970.21	18914.88	320.14	23,205.23
Price/Earnings	5.81	19.71	0.56	26.08
Price/Book	1.04	5.03	0.08	6.15

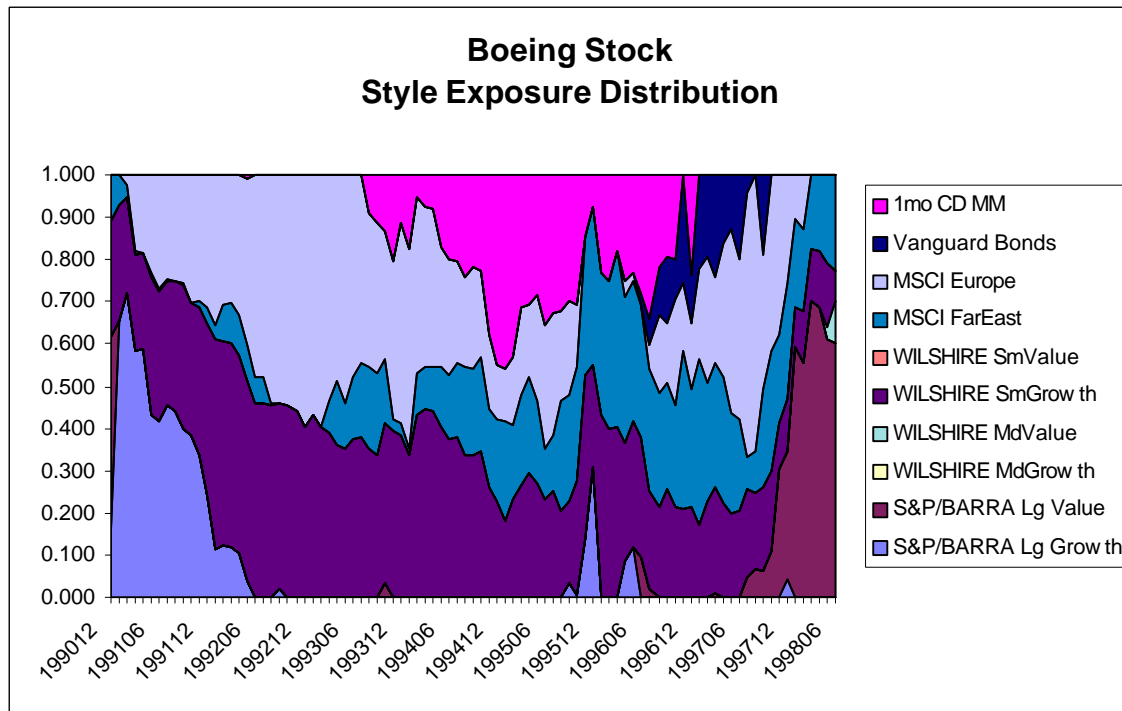
Comparison of the Morningstar report for Windsor II with the profile created using a weighted average of the style analysis seems to confirm the reasonable accuracy of the style analysis. Although the Price/Book estimate using style analysis is higher than reported by Morningstar, the estimated market capitalization and Price/Earnings ratio are fairly close to the Morningstar report. In conjunction with the style exposure distribution graph, the analysis tells us that the Windsor II has added more large growth exposure to its portfolio in recent years.

## Conclusion

This brief examination of Sharpe's returns-based style analysis does indicate that analyzing mutual funds using style analysis will provide the investor with some very useful information. It should also be noted that, returns-based style analysis is really limited to analyzing returns at the portfolio level. There have been some attempts at

applying this technique to analyze style characteristics at the individual security level.

According to Sharpe in an interview with Dow Jones Fee Advisor, he believed that there were too many variables affecting individual stocks, and that the "noise" from the data would make this analysis relatively ineffective. The exposure distribution graph of Boeing stock seems to bear this out.



Although this chart depicts Boeing as a large growth stock in the early 1990's with consistent exposure to European and Pacific markets, the large variations in exposure to Asian markets, and the exposure to money market and bonds brings into question the usefulness of style analysis in describing Boeing stock. There may have to be some adjustments to the selection of the benchmarks, possibly removing the money market and bonds, and the results may better describe Boeing. This is where the application of returns-based style analysis becomes more of an art than science.

However, regardless of the limitations in analyzing individual stocks, the brief examination of returns-based style analysis tells us that this is a very powerful tool for portfolio evaluation, and it can yield a great deal of useful information. Furthermore, style analysis can be an effective means of controlling our portfolio performance within the context of the overall asset allocation decision.