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## Articles

# The Frontier From Different Views

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June 12, 2008 12:00 AM | [Related ETFs: RAW](#)



The two-asset risk/return frontier is a classic graph. It conveys information which displays the “price of return” better than any other graphing technique.

A 27-year two-asset frontier map from 1980 through 2006 is presented in Figure 1. One asset is the Lehman Brothers Aggregate Bond Index and the other is the Standard & Poor’s 500 Index. A 100 percent investment in the bond index (dark blue dot) had an average annualized return of 9.1 percent and a standard deviation of return of 7.5 percent over the 27 years from 1980–2006. The next dot (pink) represents a 10 percent allocation to the S&P 500 Index and a 90 percent allocation to the bond index. Return improves and risk is reduced.

The far right side of the frontier represents a 100 percent commitment to the S&P 500 Index (red dot). This allocation produced a 27-year average annualized return of 13.3 percent with a standard deviation of return of 15.8 percent. An all-stock portfolio generated a 420 bps return premium over bonds, but at the price of 830 bps greater volatility in annual returns. Thus, every basis point of added return came at the “price” of 2 additional basis points of volatility.

A 60 percent equity/40 percent bond portfolio (magenta dot) generated a 27-year annualized return of 11.9 percent with a standard deviation of return of 10.6 percent—representing a return premium of 280 bps over bonds but with only 310 bps more volatility than bonds. The risk/return characteristics of a 60 percent equity/40 percent bond portfolio is nearly a one-to-one trade-off, meaning that each additional basis point of return over the return of an all-bond portfolio produced one additional basis point of volatility (or “risk”).

While the Lehman Brothers Aggregate Bond Index is a reasonable approximation of the overall U.S. bond market, the S&P 500 represents a limited perspective of the U.S. equity market. As a large-cap blend index, it does not represent the distinctly different return patterns of large-cap value or large-cap growth stocks. Moreover, it does not capture the performance of mid-cap or small-cap stocks. In spite of this, the S&P 500 is nearly universally chosen to represent “the” U.S. equity asset class in such a graph.

This paper introduces several new versions (or views) of a two-asset frontier using six additional U.S. equity asset classes (beyond the S&P 500 Index). The six include large-cap value, large-cap growth, mid-cap value, mid-cap growth, small-cap value and small-cap growth (see Figure 2).

As shown in Figure 2, value-based indexes—particularly mid-cap and small-cap—significantly outperformed the S&P 500 Index in both raw return and on a risk-adjusted return basis over the 27-year period from 1980–2006. Growth indexes, on the other hand, underperformed the S&P 500 Index on a risk-adjusted basis and on a raw-return basis.

The performance of small-cap growth is particularly interesting. Its 27-year annualized return of 10.68 percent was only 158 bps higher than the return of the LB Aggregate Bond Index, but small-growth U.S. equity had a standard deviation of return three times higher than bonds (see Figure 3).

The annual returns of each index (LG, LV, MG, MV, SG, SV) represent the average performance of two separate index providers, Dow Jones and Wilshire (Wilshire is presently known as Dow Jones Wilshire). For example, in 1982,

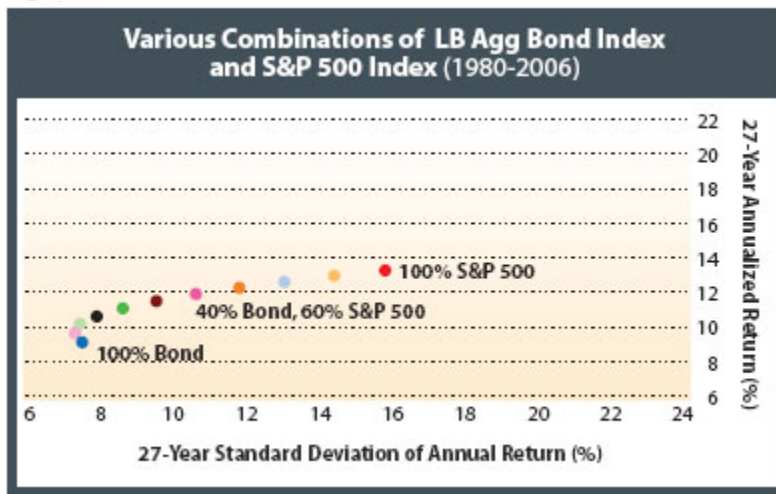
the Dow Jones Large Value Index's return was 23.26 percent, while the Wilshire Large Value Index had a return of 17.68 percent. The average of the two LV indexes in 1982 was 20.47 percent, as shown in Figure 3. Each annual return for each of the six separate style box categories was calculated accordingly for the 27-year period.

Figure 4 shows the decade of the '80s. The 10 years from 1980–1989 was a stellar decade for value-based U.S. equity indexes as demonstrated by the northwest-quadrant-seeking MV, LV and SV frontiers. Growth indexes, particularly small-cap growth, generated far worse risk-adjusted performance compared with the S&P 500 Index. Notice how high the origin point (i.e., 100 percent bond portfolio) is on the Y-axis. The 10-year annualized return for the 100 percent bond portfolio was over 12 percent, while a 100 percent S&P 500 portfolio averaged nearly 18 percent.

The decade of the '90s was a very different story (Figure 5). It was a period in which growth-based equity indexes generally provided superior risk-adjusted return compared with value-based U.S. equity indexes. However, they were all outperformed by the S&P 500 Index. No wonder the growth of index funds (most of which were and are based on the S&P 500) was meteoric during this decade.

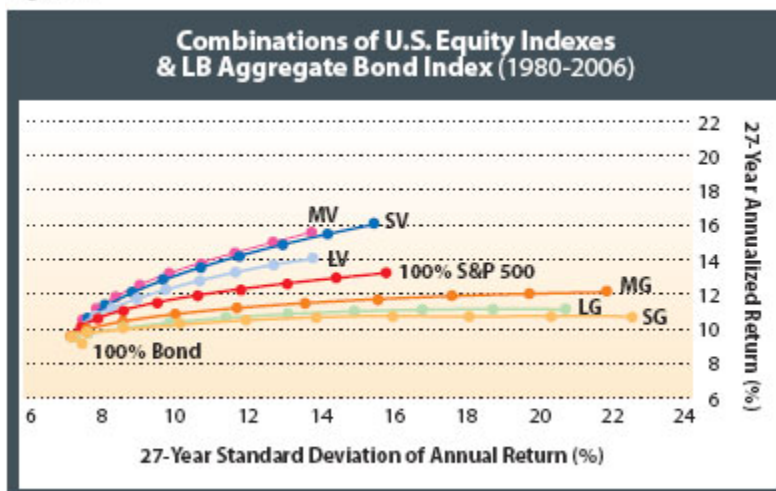
As an example, Vanguard Index 500 (VFINX) had net assets of \$2.2 billion at the end of 1990. By the end of 1999, its assets had surged to \$105 billion, representing an increase of over 4,600 percent.

Figure 1



Source: Morningstar Principia

Figure 2



Source: Morningstar Principia

Figure 3

Annual Index % Performance 1980–2006								
Year (Color-Coded By Decade)	S&P 500 Index	LB Aggregate Bond Index	U.S. Large Growth <sup>1</sup>	U.S. Large Value <sup>2</sup>	U.S. Mid Growth <sup>3</sup>	U.S. Mid Value <sup>4</sup>	U.S. Small Growth <sup>5</sup>	U.S. Small Value <sup>6</sup>
1980	32.22	2.71	39.70	24.88	47.89	23.56	48.71	22.58
1981	-5.08	6.25	-11.13	1.98	-7.37	9.34	-12.18	13.36
1982	21.46	32.62	16.49	20.47	21.79	26.05	19.91	31.35
1983	22.46	8.36	19.15	24.23	22.22	28.33	21.64	37.86
1984	6.26	15.15	1.59	10.98	-7.60	3.47	-11.33	7.80
1985	31.74	22.10	32.59	31.13	32.69	31.87	27.51	35.71
1986	18.68	15.26	15.51	19.90	10.47	15.60	8.79	14.36
1987	5.26	2.76	6.02	1.46	0.82	3.20	-3.31	-2.01
1988	16.61	7.89	13.45	22.39	12.01	19.31	21.01	26.47
1989	31.68	14.53	32.53	30.18	24.93	24.08	18.04	17.62
1990	-3.12	8.96	-0.73	-6.34	-9.21	-10.83	-14.73	-17.45
1991	30.48	16.00	37.93	24.87	51.88	38.90	49.95	39.36
1992	7.62	7.40	4.25	9.44	11.12	17.82	13.99	22.71
1993	10.06	9.75	0.57	16.39	15.29	15.29	16.23	20.12
1994	1.31	-2.92	3.37	-1.73	-2.94	-2.43	-2.28	-1.81
1995	37.53	18.47	38.02	39.25	35.21	32.26	35.24	26.39
1996	22.94	3.63	23.59	22.53	15.65	22.42	10.71	24.66
1997	33.35	9.65	33.45	34.23	20.56	35.01	14.99	31.35
1998	28.57	8.69	42.15	16.66	9.43	5.04	5.34	-4.18
1999	21.04	-0.82	36.64	3.08	57.46	-1.87	55.87	0.48
2000	-9.10	11.63	-28.11	8.62	-21.75	26.85	-21.32	19.24
2001	-11.88	8.44	-23.02	-5.75	-15.43	6.55	-8.27	12.75
2002	-22.09	10.25	-29.15	-16.06	-28.62	-7.96	-33.72	-5.53
2003	28.67	4.10	28.49	28.21	43.52	35.05	49.76	45.26
2004	10.71	4.34	7.36	13.48	17.14	21.54	17.25	18.99
2005	4.91	2.43	4.84	5.42	15.61	8.17	9.23	5.99
2006	15.79	4.33	8.32	22.11	11.14	16.26	11.43	20.49
27-Year Avg Annualized Return (%)	13.26	9.10	11.12	14.06	12.16	15.59	10.68	16.16
27-Yr Std Dev of Return (%)	15.79	7.47	20.68	13.77	21.83	13.78	22.52	15.44
Growth of \$10,000	\$288,108	\$104,923	\$172,205	\$348,756	\$221,465	\$500,062	\$154,815	\$570,743

Source: Morningstar Principia

<sup>1</sup> Average of Dow Jones Large Growth Index and DJ Wilshire Large Growth Index  
<sup>2</sup> Average of Dow Jones Large Value Index and DJ Wilshire Large Value Index  
<sup>3</sup> Average of Dow Jones Mid Growth Index and DJ Wilshire Mid Growth Index

<sup>4</sup> Average of Dow Jones Mid Value Index and DJ Wilshire Mid Value Index  
<sup>5</sup> Average of Dow Jones Small Growth Index and DJ Wilshire Small Growth Index  
<sup>6</sup> Average of Dow Jones Small Value Index and DJ Wilshire Small Value Index

During the '90s, the 10-year annualized return of bonds was markedly lower at just under 8 percent. Compared with the '80s, the standard deviation of return was uniformly higher during the '90s for all the equity indexes in this study.

Finally, results from the current decade are shown in Figure 6. With seven years under our belt, the overall pattern has been less than encouraging for a growth-oriented investor. For the current decade, the Y-axis had to be modified (in comparison with the Y-axis of Figures 1-4) to accommodate the poor performance of growth-oriented U.S. equity indexes.

Value-based indexes have fared far better this decade, particularly mid-cap and small-cap value indexes. The S&P 500 Index and the throng of index funds that track it have not enjoyed the great success of the '90s. To continue the example, Vanguard 500 Index had \$72 billion in total assets as of year-end 2006. That represents a decline in assets of 31 percent since its net asset peak in late-1999/early-2000.

The risk/return frontier is far more useful—and interesting—when considering more than simply the S&P 500 as the representative U.S. equity asset class. When doing so, the case for a value orientation is compelling over most time frames. Clearly, there is a value premium over the long haul, particularly among mid-cap value and small-cap value indexes.

The premium (growth or value) of each five-year rolling annualized return from 1980–2006 is shown in Figure 7. For instance, over the five-year period from 1980–1984, large-cap value U.S. equity demonstrated a 432 bps premium over large-cap growth U.S. equity. Among mid-cap U.S. equities during the same period, there was a value premium of 422 bps. Among small caps, the five-year value premium from 1980–1984 was 1,110 basis points.

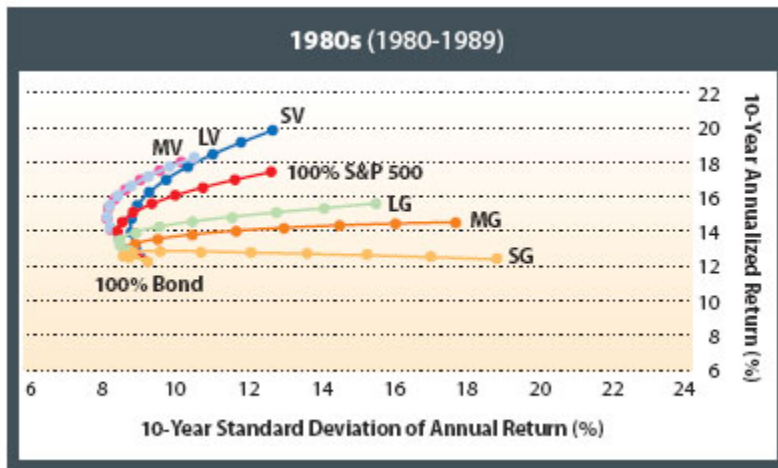
Over the entire 27-year period, large-cap value demonstrated a value premium 70 percent of the time, with the average five-year value premium equaling 505 bps. Large-cap growth outperformed large-cap value 30 percent of the time by an average of 353 bps.

Among mid-cap equity indexes, value outperformed growth 78 percent of the time by an average of 575 basis points. When growth outperformed value (22 percent of the time), the margin of victory averaged 260 bps. Among mid caps, a value tilt has historically provided better performance than a growth tilt.

Among the small-cap equity indexes in this study, value beat growth 83 percent of the time by an average of 756 basis points. However, when small-cap growth wins (albeit not very often), the margin of victory can be large. For example, during the five-year period of 1995–1999, small-cap growth beat small-cap value by 831 basis points. Overall, when small-cap growth outperformed small-cap value, the average margin of victory was 257 bps (and the median margin of victory was 94 bps compared with the median small-cap value margin of victory of 818 bps).

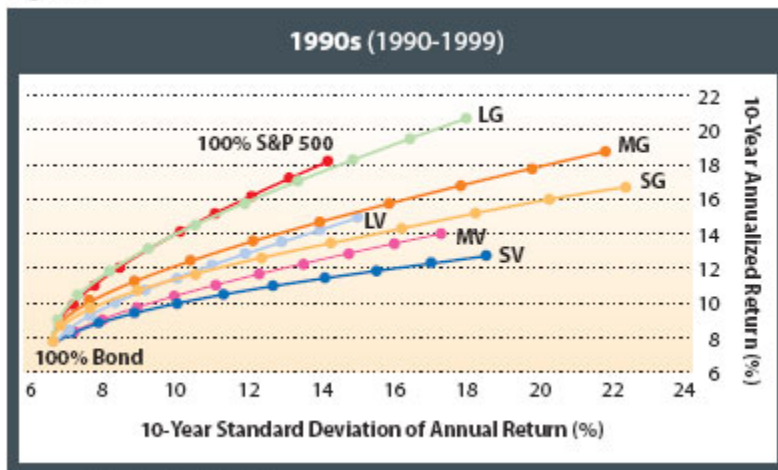
In light of the historical performance of dominance of small-cap value over small-cap growth, it is peculiar that small-cap growth U.S. equity funds outnumber small-cap value U.S. equity funds more than 2-to-1. Apparently small-cap growth managers (and small-cap growth investors) are optimists. They are willing to pay a high price (in the form of volatility) for a relatively rare, but potentially large, burst of outperformance relative to small-cap value. They must see a rewarding small-cap growth frontier off in the distance. That’s about the only place they could see it ... because such a frontier hasn’t surfaced very often in the past 27 years.

Figure 4



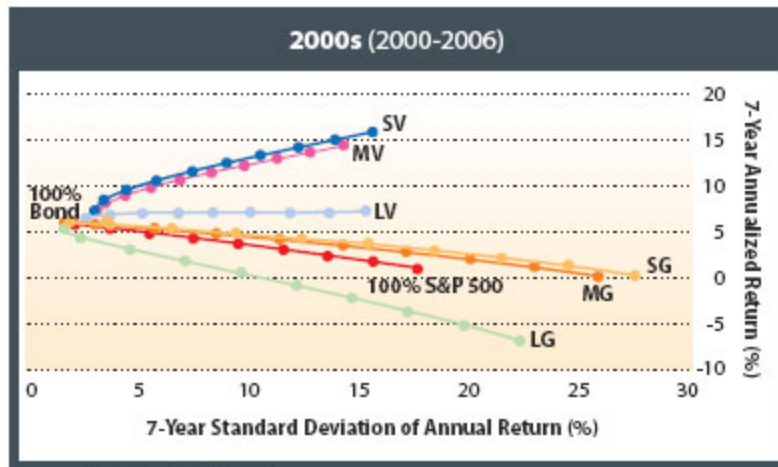
Source: Morningstar Principia

Figure 5



Source: Morningstar Principia

Figure 6



Source: Morningstar Principia

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Figure 7

Value vs. Growth Premium 5-Year Rolling Return Premium (basis points)						
5-Year Period	U.S. Large-Cap Equity		U.S. Mid-Cap Equity		U.S. Small-Cap Equity	
	Growth <sup>1</sup>	Value <sup>2</sup>	Growth <sup>3</sup>	Value <sup>4</sup>	Growth <sup>5</sup>	Value <sup>6</sup>
1980-1984		432		422		1,110
1981-1985		662		819		1,693
1982-1986		452		556		1,241
1983-1987		260		509		1,007
1984-1988		337		532		818
1985-1989		96		277		388
1986-1990	15			228		152
1987-1991	330		63		118	
1988-1992	118			18		18
1989-1993		44	130		9	
1990-1994	29		98			9
1991-1995		123	111		71	
1992-1996		330		228		377
1993-1997		243		360		519
1994-1998	602			263		214
1995-1999	1,217		897		831	
1996-2000	160			314		304
1997-2001		312		684		485
1998-2002		599		912		889
1999-2003		979		919		1,098
2000-2004		1,615		1,988		2,056
2001-2005		859		849		1,121
2002-2006		737		466		864
Percent of Years With "Premium"	30%	70%	22%	78%	17%	83%
Mean Premium (bps)	353	505	260	575	257	756
Median Premium (bps)	160	385	111	488	94	818

Source: Morningstar Principia

1 Average of Dow Jones Large Growth Index and DJ Wilshire Large Growth Index

2 Average of Dow Jones Large Value Index and DJ Wilshire Large Value Index

3 Average of Dow Jones Mid Growth Index and DJ Wilshire Mid Growth Index

4 Average of Dow Jones Mid Value Index and DJ Wilshire Mid Value Index

5 Average of Dow Jones Small Growth Index and DJ Wilshire Small Growth Index

6 Average of Dow Jones Small Value Index and DJ Wilshire Small Value Index