

C A M B R I D G E   A S S O C I A T E S   L L C

## DIVERSIFICATION A WARNING NOTE

February 2000

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## Equity Allocation and Portfolio Diversification

Endowment funds have steadily increased their allocation to equities in the past decade: the old 60/40 equity/bond ratio has been displaced by 70/30, 75/25, and even 80/20 in many cases. A similar, though less aggressive, rise in the average allocation to equities also occurred in the 1960s, when the long bull market gradually enticed institutions into ever-higher equity allocations, culminating in a 65% exposure to equities in 1968, with less than 2% held in cash. Bear markets reduce investors' appetite for risk, of course, and by 1978, the equity allocation of leading endowment funds had retreated back to 60%, with cash holdings close to 11%. Even a decade later, in 1988, the scars inflicted by the bear were still evident in equity exposures of less than 60%, with cash holdings of just over 9%. Only in the 1990s have equity allocations risen above 60% again, ramping up substantially as the decade has progressed.

Knowledgeable readers will rightly protest that "this time it's different" because in 1968 virtually all that 65% equity allocation was invested in the U.S. stock market, whereas today the average allocation to U.S. equities among the larger, more diversified endowment funds is only about 40%, approximately six percentage points less than it was in 1990, despite the huge bull market. The whole thrust of the asset allocation policies of the 1990s has been toward higher equity allocations without the assumption of greater risk, achieved by diversifying among multiple equity investments, including non-U.S. equities, private investments, hedged equity, and absolute return funds. Percentage allocations to bonds have been reduced (to single digits in some cases) as their role has been narrowed to the provision of insurance against prolonged economic contraction. Allocations to "alternative equities" have doubled and tripled. Efficient frontier analyses demonstrate that the resulting portfolios deliver more return for the same level of risk as the old stock/bond model, and spending shortfall risk analyses demonstrate that the probability of being able to sustain spending through adverse periods has been enhanced.

At Cambridge Associates we have endorsed this approach. However, most long-term asset allocation models are driven by static input assumptions that attempt to capture the long-term, average, estimated return, risk, and correlations of the asset classes included. How much and for how long the risk, return, and correlations might deviate from these long-term estimates is nowhere reflected in the models. For example, for modeling purposes, we assume a correlation of 0.52 between U.S. and non-U.S. equity market returns; in recent years that correlation has been substantially higher, generally exceeding 0.70, and even 0.80 (see Exhibit 1). Similarly, we assume a correlation of 0.54 between U.S. venture capital and U.S. stocks, but there can be little doubt that if they could somehow be marked-to-market each day (or even each month), recent venture returns would exhibit a much higher correlation with small-cap growth stocks than is embedded in this long-term assumption. In marketable alternatives, risk arbitrage funds are dependent on a continuation of the merger and acquisition binge, in which most deals are now financed with the dirt-cheap currency of equity swaps, many of which could become

uneconomic if the price of that currency were to rise-for this very reason, most deals have a provision that allows cancellation in the event of a decline in stock prices. And in recent years, the aggregate net exposure of long/short equity hedge funds has become increasingly long, decreasingly short, in Pavlovian response to a market that has so richly rewarded net long investors, with many funds benefiting from access to "hot" new issues in the IPO frenzy.

In other words, portfolio diversification is not necessarily achieved simply by investing in asset classes with different names. Rising correlations and higher concentrations of specific risk exposures can erode the diversification many investors believe they have attained in their equity portfolios, increasing potential volatility and the probability of negative returns. This erosion may occur both across asset classes and within asset classes. For example-as has been widely noted-an S&P 500 index fund is a more concentrated portfolio today than it was five years ago (see Exhibit 3), and has far greater exposure to technology (Exhibit 5), historically a relatively volatile and cyclical economic sector. In addition, U.S. and non-U.S. equities have been more closely correlated in recent years than in the past (as noted above); in particular, the Asian markets, with which U.S. equities have had relatively low correlations historically, have exhibited a systematically higher correlation with the NASDAQ in recent years (see Exhibit 2). Meanwhile, U.S. venture capital has become increasingly associated with emerging technology, highly dependent on the hot IPO market, and closely tied to public equities as a result of venture managers' distributions of restricted, post-IPO stocks to their investors. Finally, private equity firms are also now seeking avenues into this sector in the hope of riding the tech bandwagon.

As a result, many investors whose portfolios appear well diversified among various asset classes may in fact have greater exposure than they realize to what we have characterized as a "dangerous bubble" in U.S. technology stocks. In the investment world, nothing is more exhilarating than sitting on a bubble while it inflates, and nothing more sickening than the free-fall when it bursts.

## **Diagnosis and Prescription**

### **What should investors do?**

1. Diagnose risk exposures in their portfolios to determine whether these remain within acceptable boundaries. For example:
  - Identify the percentage of the portfolio exposed to the technology stock bubble by looking at aggregate holdings across all asset classes. What happens to the portfolio if these technology holdings-whatever asset classes they reside in-decline in value by 60% or more (which is about average for post-bubble declines)?

- Stress-test asset allocation and spending shortfall risk models. Do not assume historical risk, return, and correlation data necessarily capture the full range of what could happen in a changing world. After all, in different five-year periods in the 1990s, both the return and the volatility of U.S. equities exceeded the five-year limits (top and bottom, respectively) previously realized in the 20th century. If correlations across asset classes have in fact shifted systematically higher, for example, then slumps could prove more contagious and more prolonged than standard probabilistic risk analysis would suggest.
- Evaluate the other major dimensions of portfolio risk that cut across all asset classes: leverage, quality, and liquidity. For example, those institutions faced with the fortunate problem of huge paper gains on venture capital distributions should recognize that among the other issues presented by these windfalls, their aggregate portfolios (not just the part invested in turbo-charged equities) are now far more highly concentrated, less liquid, and of lower quality than envisaged in their carefully diversified policy portfolios. In assessing leverage, investors should try to gauge not only how leveraged their own portfolios are (for most, the answer will be, very little or not at all), but the leverage of other investors owning the same assets-not an easy thing to determine. For example, U.S. equity investor margin debt is now greater than at any time since the early 1930s, and the extraordinary growth in margin debt in 1999 certainly contributed to the unprecedented rise in the NASDAQ. When changed circumstances force margined speculators to liquidate assets to meet margin calls-as always happens sooner or later-prices of those assets will melt down indiscriminately, hammering speculators and investors alike. The Long-Term Capital Management fiasco of 1998 is a classic illustration of how innocent boats can founder in the whirlpool created by a speculative vessel springing a fatal leak in their vicinity.
- Few investors attempt to measure total portfolio beta, but this would be good time to undertake such an exercise. The policy portfolio, with its underlying assumptions as to risk, return, and correlations, would in this case represent the baseline against which the actual portfolio should be measured. At times the beta of the actual portfolio will necessary drift higher, or sink lower, than that of the policy, but what is an acceptable range, and has the upper limit recently been exceeded?
- Recognize that the S&P 500 has become dominated by growth stocks and is far from style neutral. Consequently, if we were to take the S&P 500 of 1990 as representing "the market," we would find that the beta of today's S&P 500 is considerably higher than 1.0. At the least, investors that have simply accepted the S&P 500 without question as an appropriate proxy for "U.S. equities" should now think about the matter and make an explicit decision about its suitability as a benchmark for their U.S. equity portfolio.

- Revisit equity manager guidelines and managers' recent compliance. Such guidelines often include a provision that no more than, say, 25% of a manager's portfolio may be concentrated in a single economic sector. To comply, both core and more dramatically-growth stock equity managers would have had to underweight technology, with the attendant risk of underperforming and thereby incurring the wrath of clients. If the sector exposure guidelines still seem an appropriate way to control risk, don't rewrite them, and don't fire complying managers for underperforming a market heavily concentrated in one sector. On the other hand, if managers have loaded up on tech stocks, in violation of such constraints, that represents a concentration which should be addressed, regardless of the fact that this risky strategy has recently generated stellar results.
  - Evaluate whether U.S. equity value managers that should not have participated in the tech-driven rally (and have therefore miserably underperformed the market), have remained true to their value disciplines. We have noted elsewhere, for example, that the best-performing "value" managers in recent years generally have substantial allocations to technology and telecom stocks, stretching the definition of "value" well beyond the pale.
  - Assess whether the portfolio still has a sufficient allocation to high-quality, non-callable, intermediate- to long-term bonds as protection against a prolonged economic contraction that would inflict severe damage on equities. In recent years, bond managers have pressed clients to allow them to invest in emerging market, high-yield, and other lower quality issues, arguing that this enhances portfolio returns without raising risk. This may be true on average, over time, but absolutely not when some shock rocks the system, sending investors scurrying to Treasuries, nor during a prolonged economic contraction. A "sufficient" allocation to high-quality bonds means enough to sustain current nominal dollar spending without having to liquidate equity holdings at fire-sale prices under adverse conditions.
  - In absolute return and hedge fund programs, assess recent changes in net and gross exposures to systematic risk, portfolio concentration, and reliance on hot new issues.
2. Rebalance, rebalance, rebalance. Failure to rebalance undermines the optimization of risk-return that is the whole objective of diversification. But because rebalancing is counter-intuitive, investment committees often balk at implementing in practice what they know in theory they should do.
- Rebalance from equities to bonds—a strong case can be made that U.S. equities (as represented by the S&P 500) are now priced to deliver less than the real return of 4.3% currently available, risk-free, from Treasury Inflation-Protected Securities (TIPS).
  - Rebalance from growth managers that have shot the lights out to those miserable value managers languishing in the doghouse.

- Rebalance from financial assets to real assets, like real estate and natural resources, that provide genuine portfolio diversification because the economic bases of their returns are different from those for stocks and bonds.

Note, however, that rebalancing is no panacea: if the risk, return, and correlation characteristics of the portfolio are no longer consonant with those on which policy allocations are based, then rebalancing to those allocations will provide only an illusion of risk management.

### **Conclusion**

Are we recommending investors shift their policy allocations? No, only that they recheck these allocations in terms of risk exposures rather than assume all is well because they are invested across multiple asset classes and strategies.

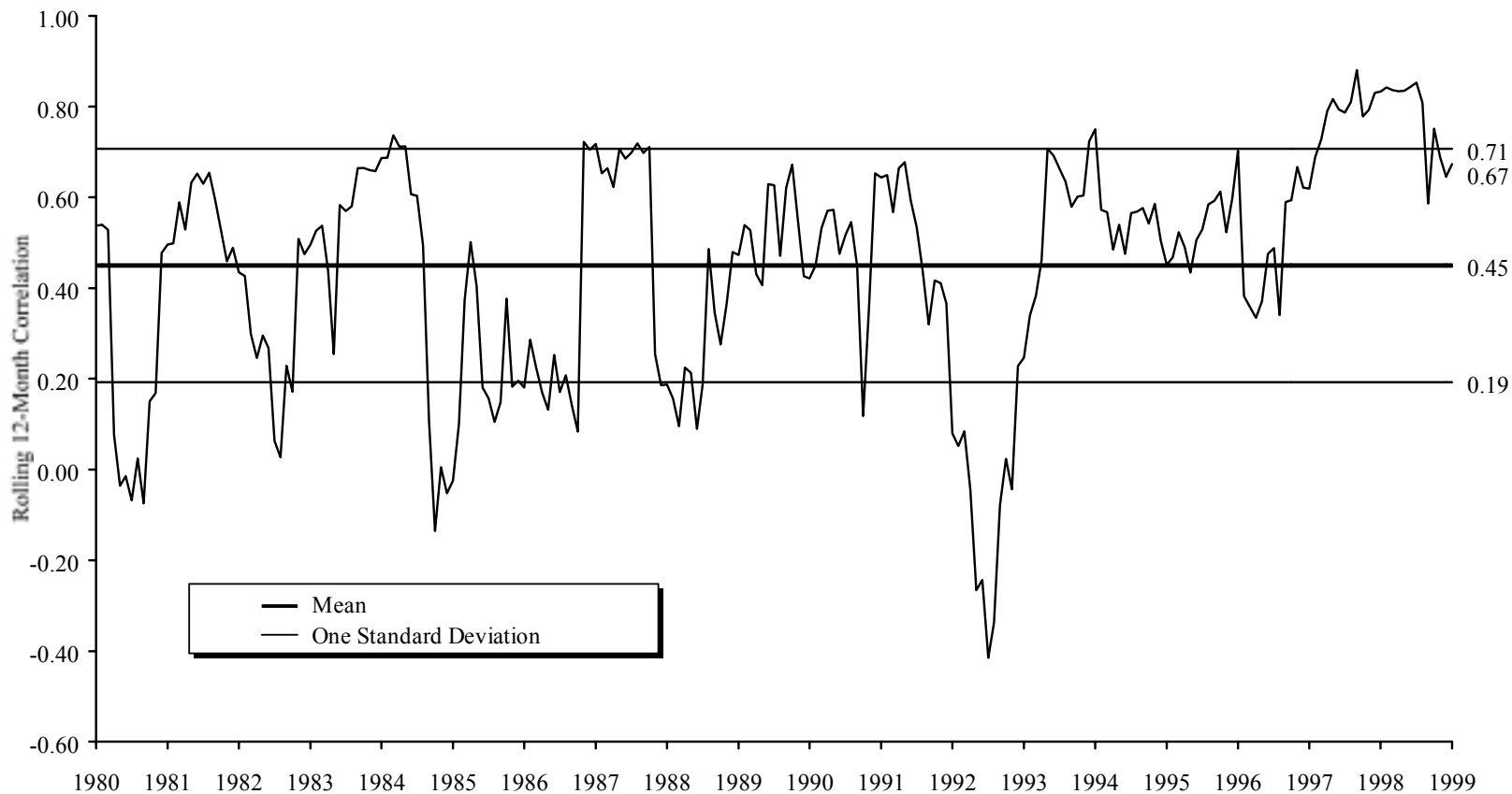
However, we have been concerned for some time that bond exposures and the protective character of many bond portfolios may have been reduced to dangerously low levels, particularly by investors that have not thought carefully about how to achieve sustainable diversification within their equity allocation, but have simply concluded that the stock market will always outperform the bond market except for occasional short periods of a year or two at most. Capital market history tells a different tale.

Similarly, few endowment funds have bothered to hedge against an inflation shock, and could re-enact the agony of the 1970s if the current complacency about inflation ever proved misplaced. At a time when growth sells at a premium and inflation-hedging assets either at reasonable value or a discount, investors can redress this imbalance cheaply.

Exhibit 1

ROLLING 12-MONTH CORRELATIONS: S&P 500 VERSUS MSCI EAFE

January 1, 1980 - December 31, 1999



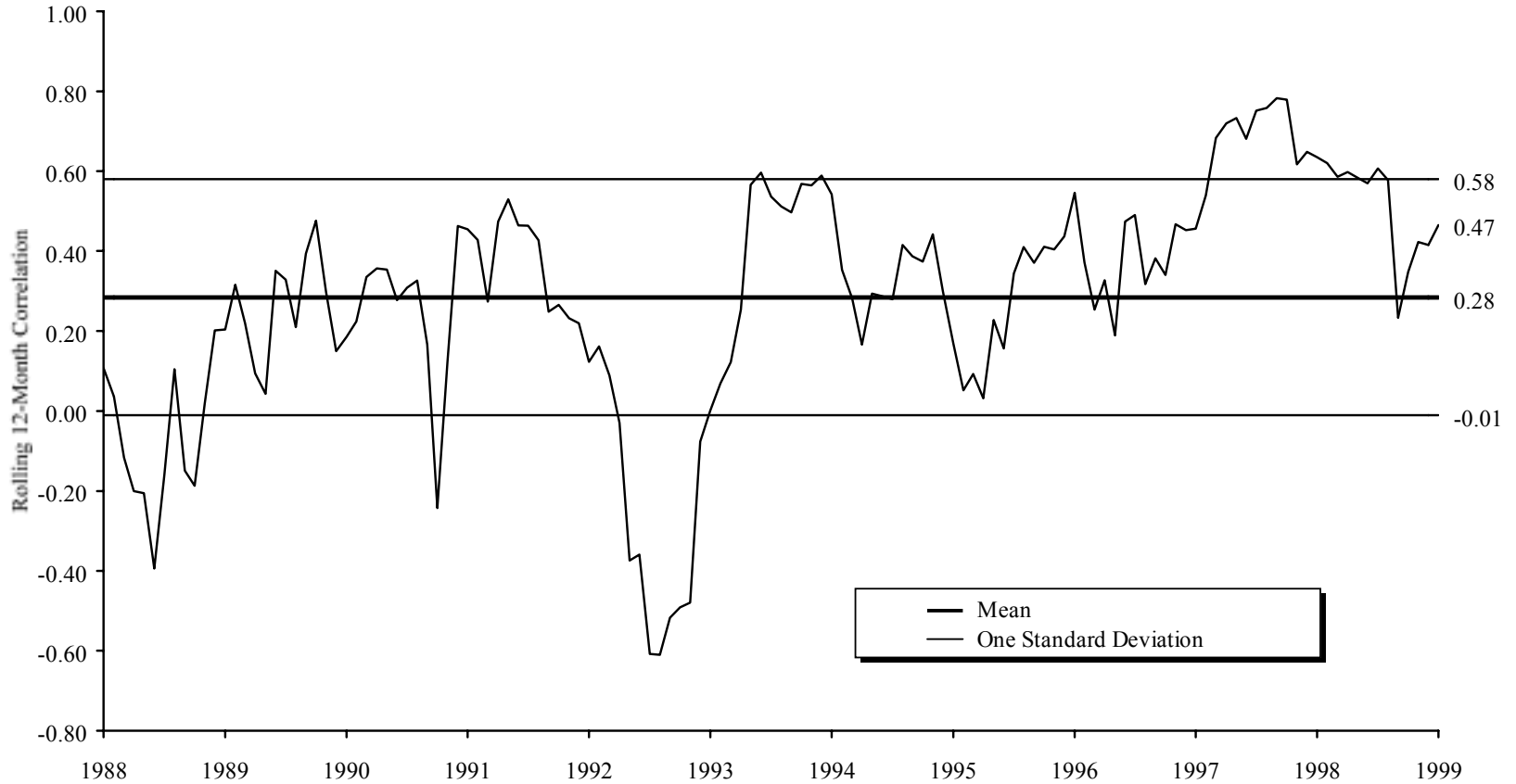
Sources: Datastream International and Standard & Poor's. MSCI data are copyrighted by and proprietary to Morgan Stanley Capital International, Inc.



Exhibit 2

ROLLING 12-MONTH CORRELATIONS: NASDAQ VERSUS MSCI ALL COUNTRY ASIA PACIFIC

January 1, 1988 - December 31, 1999



Sources: Datastream International and *The Wall Street Journal*. MSCI data are copyrighted by and proprietary to Morgan Stanley Capital International.

**Exhibit 3****S&P 500 MARKET DISTRIBUTION ANALYSIS****As of December 31, 1999**

<u>Date</u>	<u>S&amp;P 500 Total Market Value</u>	<u>Top 50 Market Value</u>	<u>Top 50 Percent of Market Share</u>	<u>Top 20 Market Value</u>	<u>Top 20 Percent o Market Share</u>
1977	603,293	331,482	54.95%	228,858	37.93%
1978	627,460	341,003	54.35%	236,808	37.74%
1979	720,501	374,604	51.99%	251,228	34.87%
1980	934,018	490,891	52.56%	338,209	36.21%
1981	869,095	434,585	50.00%	289,904	33.36%
1982	1,021,413	493,586	48.32%	334,760	32.77%
1983	1,233,474	577,454	46.82%	392,131	31.79%
1984	1,216,816	555,678	45.67%	352,824	29.00%
1985	1,506,879	669,763	44.45%	412,455	27.37%
1986	1,707,665	771,872	45.20%	457,167	26.77%
1987	1,720,501	796,434	46.29%	480,762	27.94%
1988	1,895,125	867,110	45.75%	520,698	27.48%
1989	2,365,838	1,120,881	47.38%	665,114	28.11%
1990	2,200,600	1,124,729	51.11%	690,185	31.36%
1991	2,846,523	1,411,013	49.57%	889,608	31.25%
1992	3,031,921	1,427,341	47.08%	863,110	28.47%
1993	3,322,587	1,510,555	45.46%	891,601	26.83%
1994	3,349,089	1,552,483	46.36%	922,768	27.55%
1995	4,605,423	2,141,655	46.50%	1,263,491	27.43%
1996	5,637,028	2,681,906	47.58%	1,598,289	28.35%
1997	7,548,165	3,719,620	49.28%	2,212,795	29.32%
1998	9,788,794	5,369,814	54.86%	3,272,112	33.43%
1999	12,149,941	7,247,536	59.65%	4,597,935	37.84%
Mean			49.18%		31.01%

Source: Standard &amp; Poor's Compustat.

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## Exhibit 4

## S&amp;P 500 STYLE INDEXES TOP 30 HOLDINGS

As of December 31, 1999

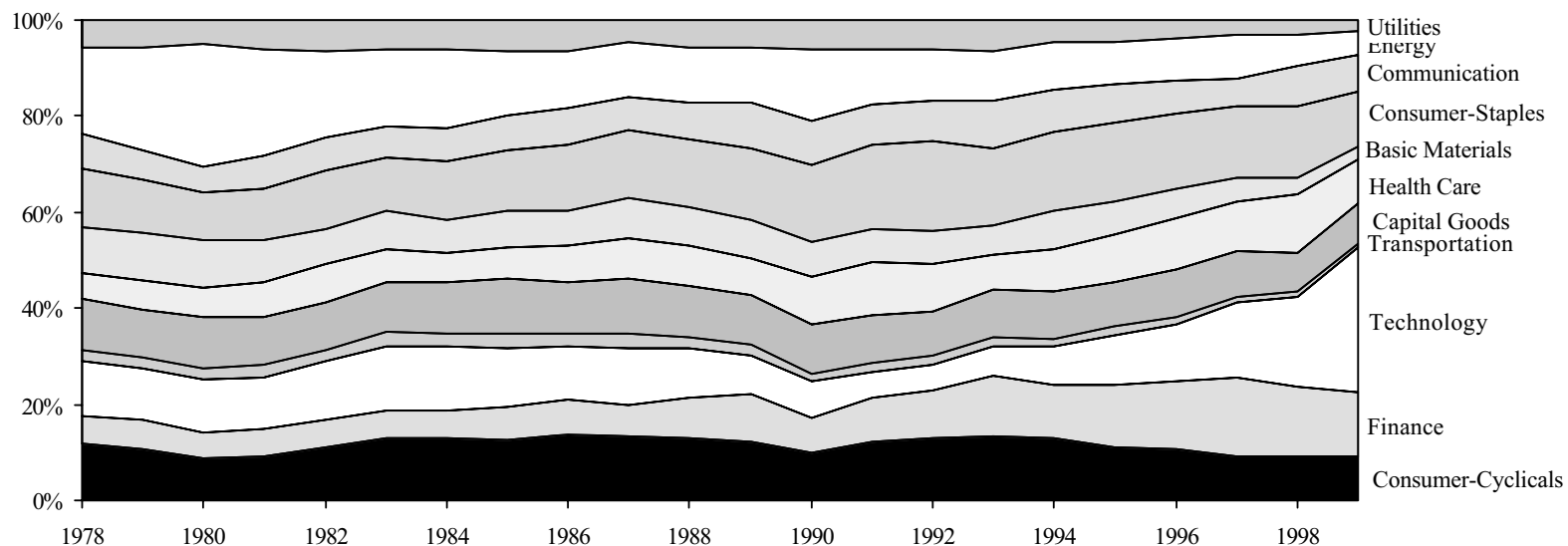
S&P BARRA Growth		S&P BARRA Value	
Rank	Holder	Rank	Holder
	% of Market Value		% of Market Value
1	Microsoft Corp	1	Exxon Mobil Corp
2	General Electric Co	2	Citigroup Inc
3	Cisco Systems Inc	3	American International Group
4	Wal-Mart Stores	4	MCI Worldcom Inc
5	Intel Corp	5	Nortel Networks Corp
6	Lucent Technologies Inc	6	Royal Dutch Pet
7	At&T Corp	7	Hewlett-Packard Co
8	Intl Business Machines Corp	8	Motorola Inc
9	America Online Inc	9	Bank of America Corp
10	Oracle Corp	10	Morgan Stanley Dean Witter
11	Home Depot Inc	11	American Express
12	Merck & Co	12	Wells Fargo & Co
13	Procter & Gamble Co	13	Ford Motor Co
14	Coca-Cola Co	14	Du Pont (E I) De Nemours
15	Dell Computer Corp	15	Fannie Mae
16	Bristol Myers Squibb	16	Chase Manhattan Corp
17	Pfizer Inc	17	Disney (Walt) Company
18	Johnson & Johnson	18	Chevron Corp
19	Sun Microsystems Inc	19	Philip Morris Cos Inc
20	Yahoo Inc	20	McDonalds Corp
21	Qualcomm Inc	21	Sprint Fon Group
22	Emc Corp/MA	22	MediaOne Group Inc
23	SBC Communications Inc	23	General Motors Corp
24	Bell Atlantic Corp	24	Compaq Computer Corp
25	Time Warner Inc	25	CBS Corp
26	Bellsouth Corp	26	Sprint PCS Group
27	Texas Instruments Inc	27	Viacom Inc
28	Lilly (Eli) & Co	28	Minnesota Mining & Mfg Co
29	Warner-Lambert Co	29	Comcast Corp
30	GTE Corp	30	Boeing Co
	% in Largest 10 Holdings		% in Largest 10 Holdings
	% in Largest 20 Holdings		% in Largest 20 Holdings
	% in Largest 30 Holdings		% in Largest 30 Holdings

Source: Standard &amp; Poor's Compustat.

Notes: Boxed rows represent the top 20 holdings of the S&P 500. Fifteen of these holdings represent 54.0% of the S&P Barra Growth Index. Five of these holdings represent 16.2% of the S&P Barra Value Index. The growth and value indexes are created by ranking the constituent members of the three S&P cap-weighted indexes by price-to-book ratios. The value index contains firms with lower ratios, the growth index contains firms with high ratios, and the two groups are mutually exclusive.

Exhibit 5

S&P 500 ECONOMIC SECTOR WEIGHTS



	Annual Sector Weights (%)											
	1978	1980	1982	1984	1986	1988	1990	1992	1994	1996	1998	1999
Consumer-Cyclicals	11.68	8.94	10.88	12.82	13.73	12.90	10.11	13.07	12.86	10.50	9.27	9.34
Finance	5.89	5.32	6.06	6.04	7.37	8.52	7.04	9.82	11.16	14.17	14.41	13.16
Technology	11.57	10.87	11.97	13.25	10.92	10.09	7.54	5.35	7.90	11.89	18.80	30.16
Transportation	2.28	2.43	2.51	2.72	2.77	2.53	1.72	1.80	1.72	1.60	0.95	0.71
Capital Goods	10.51	10.43	9.88	10.47	10.45	10.71	10.32	9.39	9.97	9.92	8.14	8.35
Health Care	5.54	6.38	7.84	6.10	7.76	8.17	9.86	9.93	8.83	10.65	12.25	9.09
Basic Materials	9.29	9.72	7.47	7.05	7.36	8.00	7.04	6.65	7.85	6.00	3.18	2.96
Consumer-Staples	12.41	10.14	12.23	12.31	13.65	14.38	16.22	18.91	16.30	15.81	15.03	11.18
Communication	7.21	5.21	6.92	6.64	7.70	7.62	9.17	8.34	9.02	6.74	8.51	7.93
Energy	17.80	25.44	17.69	16.42	11.77	11.51	14.69	10.76	9.69	8.83	6.30	4.85
Utilities	5.80	5.12	6.56	6.19	6.52	5.57	6.28	5.95	4.65	3.89	3.15	2.26

Source: Standard & Poor's Compustat.

Notes: The technology sector, at 30% of the S&P 500, now represents a greater weighting than the energy sector did in 1980. Economic sectors of the S&P 500 are shown in order of the sectors' betas relative to the S&P 500 ranked from low (utilities) to high (consumer-cyclicals). Boxed numbers represent the highest weight for each sector.

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**Exhibit 6**

**REBALANCING OF U.S. AND GLOBAL EX U.S. EQUITY PORTFOLIOS**

**Rolling 5-Year, 10-Year and 20-Year Average Annual Compound Returns**

Periods Ended	5-Year AACR				10-Year AACR				20-Year AACR			
	S&P 500	MSCI EAFE	Annual Rebalance	Never Rebalance	S&P 500	MSCI EAFE	Annual Rebalance	Never Rebalance	S&P 500	MSCI EAFE	Annual Rebalance	Never Rebalance
1974	-2.3	0.4	-1.4	-1.5								
1975	3.2	9.4	5.1	5.0								
1976	4.8	4.4	4.8	4.7								
1977	-0.3	1.4	0.4	0.2								
1978	4.2	10.8	6.5	6.5								
1979	14.6	17.9	15.9	15.7	5.8	8.8	6.9	6.8				
1980	13.7	15.6	14.7	14.3	8.4	12.4	9.8	9.6				
1981	7.9	14.5	10.1	10.0	6.3	9.3	7.4	7.3				
1982	13.9	10.3	13.1	12.7	6.6	5.8	6.6	6.3				
1983	17.2	8.8	14.7	14.2	10.5	9.8	10.5	10.3				
1984	14.7	9.3	13.2	12.8	14.6	13.5	14.5	14.3				
1985	14.5	14.7	14.8	14.6	14.1	15.2	14.7	14.5				
1986	19.7	28.1	22.7	22.9	13.7	21.1	16.3	16.3				
1987	16.3	34.4	22.0	23.0	15.1	21.7	17.4	17.8				
1988	15.2	35.3	21.4	22.9	16.2	21.3	18.0	18.4				
1989	20.3	36.1	25.4	26.1	17.4	22.0	19.1	19.3	11.5	15.2	12.9	12.8
1990	13.1	18.0	15.2	14.9	13.8	16.4	15.0	14.8	11.1	14.4	12.4	12.1
1991	15.3	8.7	13.6	12.7	17.5	18.0	18.1	17.7	11.8	13.6	12.6	12.4
1992	15.9	1.3	11.7	9.9	16.1	16.7	16.7	16.3	11.2	11.1	11.5	11.2
1993	14.5	2.0	11.1	9.0	14.9	17.5	16.1	15.7	12.7	13.6	13.3	13.0
1994	8.7	1.5	6.8	5.7	14.3	17.5	15.8	15.4	14.5	15.5	15.1	14.8
1995	16.6	9.4	14.7	13.9	14.9	13.6	15.0	14.4	14.5	14.4	14.8	14.5
1996	15.2	8.2	13.4	12.9	15.3	8.4	13.5	12.8	14.5	14.6	14.9	14.5
1997	20.3	11.4	18.0	17.7	18.0	6.2	14.8	13.8	16.6	13.7	16.1	15.7
1998	24.1	9.2	19.8	19.6	19.2	5.5	15.3	14.2	17.7	13.2	16.7	16.3
1999	28.6	12.8	24.0	23.6	18.2	7.0	15.1	14.3	17.8	14.3	17.1	16.8

**Rebalancing Is More Likely to be Beneficial Over Longer Holding Periods**

	5-year periods 26	10-year periods 21	20-year periods 11
Number of Periods:			
Number of Periods in which Rebalancing Outperformed or Equaled Never Rebalancing:	22 (85%)	18 (86%)	11 (100%)

Note: Portfolios begin with an asset allocation of 70% S&P 500/30% MSCI EAFE.

Exhibit 6 (continued)

REBALANCING OF U.S. AND GLOBAL EX U.S. EQUITY PORTFOLIOS

Rolling 5-Year, 10-Year and 20-Year Standard Deviations

Periods Ended	5-Year Standard Deviation				10-Year Standard Deviation				20-Year Standard Deviation			
	S&P 500	MSCI EAFE	Annual Rebalance	Never Rebalance	S&P 500	MSCI EAFE	Annual Rebalance	Never Rebalance	S&P 500	MSCI EAFE	Annual Rebalance	Never Rebalance
1974	19.9	19.0	18.4	18.3								
1975	21.0	23.6	20.7	20.7								
1976	21.5	23.3	20.8	20.7								
1977	21.6	22.0	20.4	20.3								
1978	21.5	20.6	20.1	20.0								
1979	16.5	17.0	15.2	15.2	18.5	18.3	17.1	17.1				
1980	13.0	12.8	11.3	11.3	17.3	18.8	16.6	16.6				
1981	13.5	14.8	12.8	12.9	17.7	19.3	17.1	17.0				
1982	15.5	17.8	15.2	15.3	18.8	19.8	18.0	17.9				
1983	14.9	16.9	14.9	15.0	18.4	18.6	17.5	17.5				
1984	15.4	18.6	15.2	15.3	15.8	17.7	15.0	15.1				
1985	15.7	18.2	14.8	14.9	14.2	15.5	13.0	13.1				
1986	15.4	19.9	14.3	14.4	14.5	17.6	13.7	13.8				
1987	19.2	19.5	17.4	17.1	17.2	19.2	16.3	16.1				
1988	18.7	20.9	17.3	17.1	16.7	19.7	16.0	16.0				
1989	18.3	19.8	16.7	16.5	16.8	19.9	16.0	16.0	17.7	19.2	16.7	16.7
1990	19.1	26.0	19.4	19.9	17.3	22.1	17.0	17.4	17.2	20.4	16.7	16.9
1991	18.7	22.9	18.6	19.1	16.9	21.6	16.5	16.8	17.4	20.5	16.8	17.0
1992	12.1	20.8	13.6	14.6	15.9	21.2	15.6	16.0	17.4	20.6	16.9	17.0
1993	12.0	19.7	13.3	14.0	15.5	21.4	15.4	15.8	17.0	20.0	16.4	16.6
1994	11.6	18.8	12.7	13.4	15.4	20.6	15.3	15.6	15.5	19.1	15.0	15.2
1995	9.1	11.0	8.0	7.9	14.8	19.9	14.6	15.0	14.4	17.7	13.8	14.0
1996	7.4	9.8	6.3	6.3	14.0	17.4	13.7	14.0	14.2	17.6	13.7	13.9
1997	9.1	9.7	7.7	7.5	10.6	16.2	10.9	11.6	14.2	18.0	13.8	14.0
1998	13.9	14.8	13.7	13.5	13.0	17.3	13.4	13.8	14.9	18.8	14.7	14.9
1999	14.4	16.0	14.3	14.3	13.7	17.4	13.9	14.3	15.2	18.9	14.9	15.1

	5-year periods	10-year periods	20-year periods
Number of Periods:	26	21	11
Number of Periods in which Rebalanced Portfolio had a Higher Standard Deviation	10 (38%)	3 (14%)	0 (0%)

Sources: Datastream International and Standard & Poor's. MSCI data are copyrighted by and proprietary to Morgan Stanley Capital International, Inc.

Note: Portfolios begin with an asset allocation of 70% S&P 500/30% MSCI EAFE.

**Exhibit 7**

**REBALANCING OF GROWTH AND VALUE EQUITY PORTFOLIOS**

**Rolling 5-Year, 10-Year and 20-Year Average Annual Compound Returns**

Periods Ended	5-Year AACR				10-Year AACR				20-Year AACR			
	Growth	Value	Annual Rebalance	Never Rebalance	Growth	Value	Annual Rebalance	Never Rebalance	Growth	Value	Annual Rebalance	Never Rebalance
1979	10.3	19.4	14.9	13.3								
1980	11.6	15.9	13.9	13.0								
1981	6.5	9.1	7.9	7.5								
1982	13.6	14.0	13.9	13.8								
1983	15.6	18.5	17.1	16.7								
1984	12.8	16.3	14.7	14.2	11.5	17.8	14.8	13.8				
1985	11.8	17.5	14.7	14.0	11.7	16.7	14.3	13.5				
1986	17.2	22.2	19.7	19.2	11.7	15.5	13.7	13.2				
1987	14.1	18.4	16.3	15.8	13.9	16.2	15.1	14.8				
1988	13.2	17.1	15.2	14.9	14.4	17.8	16.2	15.8				
1989	19.9	20.2	20.1	20.1	16.3	18.3	17.4	17.1				
1990	13.3	12.5	13.0	13.0	12.5	15.0	13.8	13.5				
1991	17.7	12.7	15.2	15.6	17.5	17.3	17.5	17.4				
1992	17.3	14.1	15.8	16.0	15.7	16.3	16.1	15.9				
1993	15.1	13.5	14.5	14.4	14.2	15.3	14.8	14.6				
1994	8.8	8.3	8.7	8.6	14.3	14.1	14.3	14.2	12.9	15.9	14.5	14.0
1995	16.1	16.9	16.6	16.4	14.7	14.7	14.8	14.7	13.2	15.7	14.5	14.1
1996	13.5	16.8	15.3	14.8	15.6	14.7	15.2	15.2	13.6	15.1	14.5	14.2
1997	19.6	20.7	20.2	20.1	18.5	17.4	18.0	18.0	16.2	16.8	16.5	16.4
1998	27.9	19.9	24.0	24.7	21.4	16.7	19.1	19.5	17.8	17.2	17.6	17.6
1999	33.6	22.9	28.4	29.5	20.6	15.4	18.1	18.6	18.4	16.8	17.7	17.9

**Rebalancing Is More Likely to be Beneficial Over Longer Holding Periods**

	5-Year periods	10-Year periods	20-Year periods
Number of Periods:	21	16	6
Number of Periods in which Rebalancing Outperformed or Equaled Never Rebalancing:	17 (81%)	14 (88%)	5 (83%)

Note: Portfolios begin with an asset allocation of 50% S&P BARRA Growth/50% S&P BARRA Value.

Exhibit 7 (continued)

**REBALANCING OF GROWTH AND VALUE EQUITY PORTFOLIOS**

**Rolling 5-Year, 10-Year and 20-Year Standard Deviations**

Periods Ended	5-Year Standard Deviation				10-Year Standard Deviation				20-Year Standard Deviation				
	Growth	Value	Annual Rebalance	Never Rebalance	Growth	Value	Annual Rebalance	Never Rebalance	Growth	Value	Annual Rebalance	Never Rebalance	
1979	18.0	15.7	16.5	16.9									
1980	14.3	12.7	12.8	13.1									
1981	15.4	12.6	13.4	13.8									
1982	17.3	14.3	15.4	15.8									
1983	16.7	13.7	14.7	15.1									
1984	17.3	14.1	15.3	15.7	17.5	14.8	15.7	16.1					
1985	17.9	14.0	15.7	16.1	16.0	13.2	14.1	14.5					
1986	18.1	13.3	15.4	15.8	16.8	13.1	14.5	14.9					
1987	21.7	17.3	19.2	19.5	19.4	15.7	17.2	17.5					
1988	21.0	17.0	18.7	19.0	18.7	15.3	16.6	17.0					
1989	20.7	16.5	18.3	18.6	18.9	15.2	16.7	17.1					
1990	21.2	17.6	19.1	19.4	19.4	15.7	17.2	17.6					
1991	20.6	17.3	18.7	18.9	19.1	15.4	16.9	17.2					
1992	14.2	10.9	12.0	12.4	18.1	14.3	15.8	16.1					
1993	14.6	10.9	12.0	12.3	17.8	14.1	15.5	15.8					
1994	14.2	10.4	11.6	11.9	17.8	14.0	15.4	15.7	17.5	14.3	15.4	15.8	
1995	11.6	8.1	9.0	9.4	16.9	13.6	14.7	15.0	16.3	13.3	14.4	14.7	
1996	9.1	7.5	7.4	7.6	15.8	13.2	14.0	14.3	16.2	13.1	14.2	14.5	
1997	10.8	8.9	9.1	9.3	12.5	9.9	10.6	10.8	16.2	13.1	14.2	14.5	
1998	14.9	13.5	13.9	14.1	14.8	12.2	13.0	13.3	16.8	13.7	14.8	15.1	
1999	15.3	14.5	14.3	14.4	15.6	12.9	13.6	13.9	17.2	14.0	15.1	15.5	
Number of Periods:					5-Year periods 21				10-Year periods 16				20-Year periods 6
Number of Periods in which Rebalanced Portfolio had Higher Standard Deviation					0				0				0

Source: BARRA, Inc.

Note: Portfolios begin with an asset allocation of 50% S&P BARRA Growth/50% S&P BARRA Value.