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Style Management in Equity Country Allocation

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Strategies that entailed country selection based on relative strength (momentum) posted significant market risk–adjusted returns over the past 30 years, but relative-value strategies based on book value of equity to market value of equity did not. Because these two fixed-style strategies are negatively correlated, using them for style diversification and for style timing (rotation) is potentially rewarding. In the study described here, style diversification enhanced return and lowered risk but style timing provided consistent risk-adjusted performance that was superior to the performance of fixed-style strategies or style diversification.

Several studies have documented results from testing strategies based on relative strength (momentum) and relative value (based on book value of equity to market value of equity). These tests were generally conducted on individual stocks or, more rarely, country indexes.[1] The studies found that country selection based on relative strength has been statistically profitable whereas country selection based on relative value has not. We extend this field of research by reporting our investigation of strategies that used both criteria for country selection—in strategies of style diversification or style timing (rotation) or in a combination strategy.

Previous Research

In the realm of relative-strength strategies, Jegadeesh and Titman (1993) showed that strategies involving a long position in high-performance U.S. stocks and a short position in low-performance stocks on the basis of performance over the previous 3–12 months tend to produce significantly positive abnormal returns of about 1 percent a month for the following year. Such a relative-strength strategy has also been tested extensively by others. Similar results have been found in other developed markets (Rouwenhorst 1998 for European markets; Chui, Titman, and Wei 2000 for Asian markets) and emerging markets (Rouwenhorst 1999).

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Most of these studies examined the profitability of momentum strategies in individual stocks, but a few investigated relative-strength strategies at the index level. At least four studies used the Morgan Stanley Capital International (MSCI) indexes, and the sample periods ranged from the early 1970s to the early 1990s. These studies found the momentum effect to be strongest over a 6-month horizon (Richards 1997) or a 12-month horizon (Macedo 1995; Asness, Liew, and Stevens 1997). Chan, Hameed, and Tong (2000) found the effect profitable over even shorter horizons—one or two weeks.

In the case of relative-value strategies, Fama and French (1992) introduced the importance of the ratio of book value of equity to market value of equity (book to price, B/P) in capturing the cross-sectional variation in stock market returns. They subsequently highlighted the importance of a B/P-based risk factor in explaining security returns. Davis, Fama, and French (2000) and Fama and French (1998) obtained consistent results for out-of-sample tests. Other international studies corroborated these results on individual stock returns (e.g., Arshanapalli, Coggin, Doukas, and Shea 1998; Bauman, Conover, and Miller 1998; Liew and Vassalou 2000).

The studies by Asness, Liew, and Stevens and by Macedo documented the power of country versions of such variables as B/P to explain the cross-section of expected country returns. They found that equity markets with high B/Ps have higher average returns than markets with low B/Ps.

Our work is based on the premise that both of these strategies exhibit good average performance through time when country indexes are used (with relative-value strategies being the less profitable).

Each strategy exhibits relatively long, nonoverlapping periods, however, of underperformance. Furthermore, value-oriented strategies generally post good results when momentum-oriented strategies do not, and vice versa. In other words, the strategies are negatively correlated. Thus, style diversification—combining the uncorrelated strategies to reduce the risk in picking only one—and style timing—rotating between the two strategies—seem to be promising avenues of research.[2]

Style timing relies on the tendency of relative-value and relative-strength strategies to cycle into and out of favor but also on the evidence that the reward for choosing the right style at the right time might beat any additional value obtained through country picking. Arnott, Kelso, Kiscadden, and Macedo (1989) were among the first to document this intriguing possibility, in which style is viewed as an appropriate tool for active management. They explored several key variables that are likely to predict style returns in the United States and concluded that forecasting returns of such factors as relative value and relative strength seems feasible. Several studies later explored the potential of style timing (rotation) as a strategy for stock picking.[3] For country index selection, Macedo (1995) is to our knowledge the only study that examined style timing and used the power of recent volatility as a criterion for rotating between relative-value and relative-strength investment styles.

Clarke and Statman (1994) classified the most popular factors that affect style timing into two groups—economic factors and sentiment factors. Economic factors are such variables as the stage of the business cycle, the bond term spread, and the default premium. Sentiment factors are variables such as recent volatility, the risk premium, and level of confidence. In our study, we conditioned style timing on a sentiment factor derived from psychology-based asset-pricing theory (Hirshleifer 2001).

The Study

The sample consists of 18 of the largest markets in the world and a time span of January 1975 through August 2003 (344 months). We examined both diversification and timing strategies. For the style timing strategy, we used a conditioning criterion based on changes in wealth and risk aversion (Thaler and Johnson 1990)—that is, the prior relative outcome of the global market. We used the most recent 12-month return of the global market relative to its historical average as the criterion to determine whether to favor a relative-value strategy (a world market 12-month return lower than its historical average) or a relative-strength strategy (a world market 12-month return higher than its historical average). We used a formal test designed to evaluate style timing ability that we adapted from the Treynor–Mazuy (1966) procedure, which is generally used to test for market timing.

We also tested the performance of a third strategy, presented as a style management model, that combines the diversification and timing models.

Fixed-Style Performance and Country Characteristics. We calculated monthly total returns from MSCI country indexes in U.S. dollars (unhedged).[4] The 18 markets are Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Italy, Japan, the Netherlands, Norway, Singapore, Spain, Switzerland, Sweden, the United Kingdom, and the United States. We constructed a "world index" by equally weighting the 18 MSCI country indexes. We examined the performance of the relative-value and relative-strength strategies for three subperiods as well as the entire period.

We used P/B as the criterion for relative value, RV, and the one-year-past return as the criterion for relative strength, RS. For each month t, we formed four equally weighted portfolios ($P_{i,j}$, with i = 1 through 4 and j = RV or RS) according to the ranking on the value of each indicator as of the end of month t – 1. $P_{1,j}$ contained the four most attractive countries (those with the lowest P/B or those with the highest one-year-past return) and $P_{4,j}$, the four least attractive countries (highest P/B or lowest one-year-past return). We computed the zero-investment portfolio, $(P_1 - P_4)_j$, for each strategy and gauged the ability of each indicator to discriminate between attractive and unattractive markets. Each position was held for one month. **Table 1** provides the performance of the strategies.

For the full period (Panel A), the relative-strength strategy posted the highest market risk–adjusted return, with 0.79 percent a month for the $P_1 - P_4$ portfolio. This return is statistically significant (t = 2.61) at the 5 percent confidence level. The strategy was superior at identifying unattractive markets while also posting a significant positive performance when choosing attractive markets. The $P_{4,RS}$ portfolio had a strong negative and significant (t = –2.64) market risk–adjusted return, and the $P_{1,RS}$ portfolio had a strong positive and significant (t = 2.05) market risk–adjusted return. Although the market risk–adjusted return of the relative-value zero-investment (P_1 – P_4) portfolio was positive, it was not

Table 1. Descriptive Statistics for Monthly Returns to World Index, Relative-Value, and Relative-Strength Strategies, January 1975–August 2003 and Subperiods

		Relative Value			Relative Strength		
Measure	World	P_1	P_4	$P_1 - P_4$ Portfolio	P_1	P_4	$P_1 - P_4$ Portfolio
A. January 1975–August 2003							
Arithmetic average excess return (%)	0.66	0.87	0.55	0.32	1.03	0.22	0.81
Geometric average excess return (%)	0.56	0.74	0.40	0.22	0.86	0.06	0.65
Standard deviation (%)	4.49	5.15	5.38	4.34	5.58	5.72	5.58
Sharpe ratio	0.15	0.17	0.10	0.07	0.18	0.04	0.14
Market risk–adjusted return (%)		0.21	–0.14	0.35	0.32	–0.47	0.79
t-Statistic		1.49	–1.02	1.49	2.05*	–2.64*	2.61*
Beta		1.00	1.05	–0.05	1.06	1.05	0.02
t-Statistic		–0.13	1.57	–1.02	1.83	1.15	0.28
B. January 1975–December 1984							
Arithmetic average excess return (%)	0.80	0.73	0.43	0.31	0.84	–0.27	1.11
Geometric average excess return (%)	0.30	0.63	0.29	0.20	0.69	–0.44	0.91
Standard deviation (%)	4.24	4.77	5.31	4.66	5.36	6.01	6.07
Sharpe ratio	0.19	0.15	0.08	0.07	0.16	–0.04	0.18
Market risk–adjusted return (%)		0.36	0.04	0.32	0.44	–0.71	1.15
t-Statistic		1.62	0.13	0.75	1.53	–2.21*	2.07*
Beta		0.97	1.01	–0.04	1.02	1.15	–0.13
t-Statistic		–0.56	0.18	–0.41	0.37	1.99*	–0.96
C. January 1985–December 1994							
Arithmetic average excess return (%)	1.21	1.52	0.79	0.73	1.56	0.84	0.72
Geometric average excess return (%)	1.11	1.41	0.59	0.65	1.33	0.72	0.56
Standard deviation (%)	4.57	4.77	6.02	4.04	6.41	4.82	5.72
Sharpe ratio	0.27	0.32	0.13	0.18	0.24	0.17	0.13
Market risk–adjusted return (%)		0.39	–0.66	1.05	0.07	–0.16	0.23
t-Statistic		1.89	–2.80*	2.89*	0.24	–0.57	0.45
Beta		0.93	1.20	–0.27	1.23	0.82	0.40
t-Statistic		–1.65	3.92*	–3.47*	3.63*	–2.91*	3.69*
D. January 1995–August 2003							
Arithmetic average excess return (%)	0.34	0.27	0.41	–0.14	0.63	0.07	0.56
Geometric average excess return (%)	0.23	0.09	0.30	–0.23	0.52	–0.12	0.45
Standard deviation (%)	4.64	5.91	4.67	4.27	4.75	6.27	4.79
Sharpe ratio	0.07	0.05	0.09	–0.03	0.13	0.01	0.12
Market risk–adjusted return (%)		–0.11	0.09	–0.20	0.32	–0.33	0.65
t-Statistic		–0.35	0.54	–0.48	1.55	–1.13	1.42
Beta		1.09	0.94	0.16	0.92	1.19	–0.27
t-Statistic		1.41	–1.75	1.74	–1.78	2.98*	–2.72*

Notes: Excess returns measured in excess of the risk-free return (U.S. 91-day T-bills). For the *t*-statistic, the null hypothesis was that the slope coefficients are equal to 1 in the case of P_1 or P_4 and 0 in the case of $P_1 - P_4$.

*Significant at the 5 percent level.

significantly different from zero (t = 1.49). Neither the $P_{1,RV}$ nor the $P_{4,RV}$ portfolio provided significant market risk–adjusted returns for the entire period. The monthly standard deviation of the zero-investment relative-value strategy is similar to that of the world index; the relative-strength strategy exhibited much more volatility. Note that the beta of neither the RV strategy nor the RS strategy is significantly different from zero (t-statistics, respectively, of –1.02 and 0.28).

As for performance in the subperiods (Panels B–D), the relative-strength zero-investment portfolio provided a positive and significant (t = 2.07) market risk–adjusted return in the first subperiod, but relative value was the best-performing strategy for 1985–1994. Returns to neither strategy are significant for the last subperiod; the average returns to the relative-value zero-investment strategy are even negative for 1995–2003, although not statistically significantly so.

Table 2 provides descriptive statistics for each country as well as the percentage of times it entered one of the portfolios of a fixed-style strategy for the entire sample period. Hong Kong, the United Kingdom, and Sweden were the top three performers, and Austria, Spain, and Canada contributed the least to the 1.17 percent average monthly return of the world index. Belgium, Australia, and Spain were included 3 percent of the time or less in the P_4 relative-value portfolio; Germany and the United Kingdom were included 3 percent of the time or less in the P_1 relative-value portfolio, and the United States was never included in this portfolio. Therefore, these countries can be classified as growth countries. Japan, with the highest mean P/B, was included 65 percent of the time in the P_4 relative-value portfolio and is thus also a noteworthy growth country. From a momentum perspective, no country stands out in terms of being included more often than the others in the P_1 relative-strength portfolio: The range extends from 38 percent for Hong Kong to 15 percent for Germany and Canada. In contrast, the Netherlands and the United Kingdom were seldom included in the P_4 relative-strength portfolio.

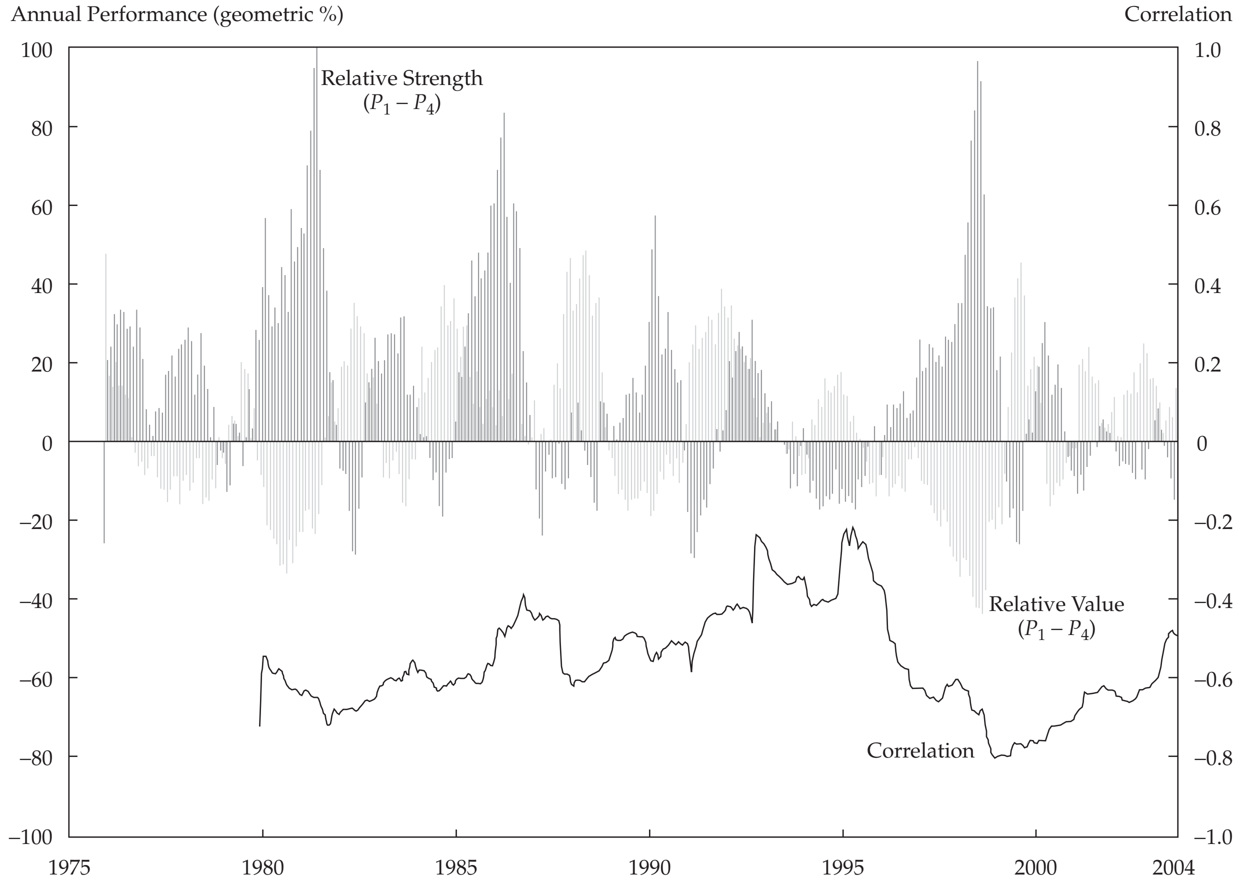
Style Management. The previous section presented the results of the fixed-style strategies separately but ignored differences in cyclical style returns. **Figure 1** shows the rolling annual compounded returns of the $P_1 - P_4$ relative-value and relative-strength strategies and the rolling correlation (60-month windows) between the $P_1 - P_4$

Table 2. Descriptive Statistics for Countries and Percentage of Times a Country Entered One of the Fixed-Style Portfolios, January 1975–August 2003

Countries	Average Return	Standard Deviation	World Market Beta	Mean P/B	Relative-Value Inclusion (% of time)			Relative-Strength Inclusion (% of time)			
					$P_{1,RV}$	$P_{4,RV}$	RV	$P_{1,RS}$	$P_{4,RS}$	RS	RV or RS
Hong Kong	1.78%	9.36%	1.35	1.74	31%	38%	68%	38%	26%	64%	66%
United Kingdom	1.43	6.70	1.11	1.87	2	23	26	16	8	24	25
Sweden	1.41	7.20	1.13	1.96	22	38	60	29	22	51	56
Netherlands	1.38	5.39	1.02	1.58	51	9	60	22	3	24	42
France	1.25	6.72	1.14	1.65	27	6	32	19	18	37	34
Singapore	1.20	8.32	1.21	1.89	22	40	61	28	26	54	58
Switzerland	1.20	5.42	0.94	1.91	9	26	34	19	12	31	33
Australia	1.19	6.81	0.96	1.56	15	3	18	23	21	44	31
Belgium	1.19	5.74	0.93	1.48	31	1	32	18	14	31	32
United States	1.15	4.46	0.70	2.34	0	49	49	22	14	36	42
Denmark	1.11	5.40	0.79	1.79	28	18	46	22	18	40	43
Germany	1.05	6.34	1.08	2.00	3	26	29	15	23	38	34
Italy	1.02	7.57	1.01	1.62	34	11	46	19	37	56	51
Norway	1.01	7.54	1.18	1.64	24	21	44	24	32	56	50
Japan	1.00	6.60	0.83	2.39	10	65	75	28	35	62	69
Canada	0.99	5.66	0.88	1.63	7	5	12	15	21	36	24
Spain	0.90	6.84	1.00	1.34	65	3	69	25	31	56	62
Austria	0.82	6.28	0.75	1.63	21	17	39	20	40	60	49
World index	1.17%	4.47%	1.00	1.78							

Notes: U.S. dollar (unhedged returns). Countries listed in descending order of average monthly return.

Figure 1. Rolling Compounded Annual Return and 60-Month Rolling Correlations between Relative-Value and Relative-Strength Monthly Returns, January 1975–August 2003



relative-value and $P_1 - P_4$ relative-strength strategies. Never was the correlation coefficient positive during the studied period. The highest correlation coefficient, –0.22, was attained in April 1995 (i.e., for the preceding 60-month period of May 1990 to April 1995); it is significantly less than zero at the 10 percent level. The correlation reached a historical low in the late 1990s, when momentum did extremely well whereas value did extremely badly. This period was the peak of the speculative bubble. Since the bursting of the bubble, the value style has again outperformed the momentum style and the correlation between the two styles has risen slightly.

The complementarity of the two investment styles, however, remains strong. For the whole sample period, the correlation averaged –0.56 and was highly statistically different from zero.

Whenever negative correlations exist between two strategies or two asset classes, two concepts come to mind—diversification and timing. Negative correlation can be easily exploited through a combination of style-oriented strategies. In addition, an indicator that would determine with some degree of success the "right" style to be adopted at a given time would be quite attractive. We report our tests of these concepts in the following subsections.

■ *Style diversification*. We built the first model (the style diversification model) to place equal emphasis on the value–growth and momentum signals in order to benefit from a strategy of diversification without betting on whether one strategy would outperform the other. Thus, we considered countries ranked separately by the momentum and value attributes, and then, we calculated a composite rank based on the average of the momentum and value ranks. Finally, we created a zero-investment portfolio $(P_1 - P_4)_{divers}$ based on that composite rank.

The return characteristics of the $(P_1 - P_4)_{divers}$ portfolio for the whole sample period and three subperiods are presented in the "Style Diversification" column of **Table 3**. For the full sample period (Panel A), the monthly market risk–adjusted return of $(P_1 - P_4)_{divers}$ of 0.88 percent is significantly different from zero (t = 4.27). Most importantly, the style diversification model performed slightly better than the best results obtained from either fixed-style strategy (see Table 1), even though the style diversification model is based on an equally

Table 3. Descriptive Statistics for Monthly Returns to Style Diversification, Style Timing, and Style Management, January 1975–August 2003 and Subperiods

Measure	World Index	Style Diversification (50/50)	Style Timing (0/100)	Style Management (25/75)
A. January 1975–August 2003				
Arithmetic average excess return (%)	0.66	0.86	1.30	1.36
Geometric average excess return (%)	0.56	0.80	1.17	1.24
Standard deviation (%)	4.49	3.68	5.07	4.91
Sharpe ratio	0.15	0.23	0.26	0.28
Market risk–adjusted return (%)		0.88	0.98	1.05
t-Statistic		4.27*	3.56*	3.95*
Beta		–0.01	0.27	0.26
t-Statistic		–0.27	4.57*	4.52*
B. January 1975–December 1984				
Arithmetic average excess return (%)	0.80	1.14	1.67	1.75
Geometric average excess return (%)	0.30	1.06	1.53	1.62
Standard deviation (%)	4.24	3.89	5.46	5.23
Sharpe ratio	0.19	0.29	0.31	0.33
Market risk–adjusted return (%)		1.23	1.42	1.50
t-Statistic		3.37*	2.78*	3.08*
Beta		–0.09	0.23	0.23
t-Statistic		–1.03	1.99*	2.02*
C. January 1985–December 1994				
Arithmetic average excess return (%)	1.21	1.50	0.97	1.36
Geometric average excess return (%)	1.11	1.42	0.83	1.23
Standard deviation (%)	4.57	3.91	5.26	5.11
Sharpe ratio	0.27	0.38	0.18	0.27
Market risk–adjusted return (%)		0.91	0.30	0.63
t-Statistic		2.55*	0.61	1.35
Beta		0.11	0.40	0.43
t-Statistic		1.45	4.04*	4.54*
D. January 1995–August 2003				
Arithmetic average excess return (%)	0.34	0.28	1.24	0.92
Geometric average excess return (%)	0.23	0.23	1.15	0.83
Standard deviation (%)	4.64	3.39	4.32	4.24
Sharpe ratio	0.07	0.08	0.29	0.22
Market risk–adjusted return (%)		0.35	1.12	0.85
t-Statistic		1.03	2.64*	2.02*
Beta		–0.09	0.18	0.10
t-Statistic		–1.29	1.95	1.08

Notes: See notes to Table 1. In each strategy, the results are for the zero-investment portfolio, $P_1 - P_4$.

*Significant at the 5 percent level.

weighted combination of the same two information signals underlying the fixed-style strategies. The zero-investment portfolio is market neutral, and its absolute risk (σ = 3.68 percent) is much lower than those of the fixed-style strategies (σ_{RV} = 4.34 percent; σ_{RS} = 5.58 percent). A positive and significant performance was achieved in the first and second subperiods (Panels B and C). Because the individual strategies produced insignificant market risk–adjusted returns in the third subperiod (see Table 1), however, the style diversification return is positive in that period but not statistically significant.

For each subperiod, in addition to the lower absolute risk for the style diversification strategy, both the raw (unadjusted) and market risk–adjusted performance of the style diversification strategy were superior to the average market risk–adjusted returns of the two fixed-style strategies (from Table 1, 0.35 percent for the relative-value portfolio and 0.79 percent for the relative-strength portfolio). In short, the combination of the negatively correlated information signals was quite profitable for country selection.

■ *Style timing*. We tested the idea of exploiting the cyclical differences between fixed-style strategies through style timing based on a conditional criterion motivated by psychological evidence. Hirshleifer suggested that a recent paradigm, dynamic behavioral asset-pricing theory, although still in an early stage, can subsume the rational investor paradigm of classical economics. Behavioral finance suggests that price deviations from fundamental value depend largely on the time-varying demand of noise traders (Shiller 1984). Therefore, in addition to the fundamentals, rational investors should consider the demand behavior of noise traders over time (Lee 2003). Identifying indicators of investor sentiment can help predict the dynamics of that demand and is critical to tactical investment strategies.

In our model, we considered the demand behavior of noise traders to be related to risk aversion. Indeed, we argue that the essence of any good style-switching model based on a sentiment indicator, under the assumption that high (low) risk aversion will support a relative-value (relative-strength) strategy, is its ability to predict investor risk aversion.

Thaler and Johnson showed that people's behavior, particularly their aversion to risk, is significantly influenced by whether they have recently encountered success or failure. Normative theory stipulates that decision makers should consider only incremental outcomes, but these authors found that the knowledge of prior outcomes and potential payoffs influences the real decision-making process. Specifically, Thaler and Johnson found that when faced with sequential gambles, people are more willing to take risks if they made money on prior games (that is, in that case, they consider themselves to be playing with the "house's money") than if they lost:[5]

> The essence of the idea is that until the winnings are completely depleted, losses are coded as reductions in gain, as if losing some of "their money" does not hurt as much as losing one's own cash. (p. 657)[6]

Barberis, Huang, and Santos (2001) also found that degree of risk aversion depends on the investor's prior investment experience. After recent gains, investors become less risk averse. In the authors' framework, changes in risk aversion were driven by past stock market movements and were used to explain the high equity risk premium, excess volatility, and predictability of observed stock returns.

Similarly, our model is based on two long-standing ideas in the psychology literature—that people care about changes in financial wealth and that their risk aversion is influenced by these changes. How risk averse they are depends on their prior investment performance. We support the notion that following disappointing stock price returns, investors become nervous and more sensitive to further potential losses. Hence, at such a time, a relative-value strategy is favored. Conversely, after a run-up in stock prices, investors tend to be less risk averse because prior gains will cushion any subsequent loss, and this form of overconfidence favors a momentum-oriented strategy.

The 1995–2002 period may illustrate these ideas: During and after the great bull market of the late 1990s, overconfidence might have led investors to become unconcerned about volatility. Even though volatility was increasing dramatically, investors might have remained only slightly risk averse and immediate gratification might have played an important role in their investment choices. That situation prevailed until the spring of 2000. After the bursting of the bubble, as the gigantic surpluses waned, the losses might have suddenly become especially painful. Risk management might have become the "in" thing, and the entire financial community might have returned to a concern with fundamental valuation ratios. This phenomenon would have led to a sharp increase in risk aversion, with value investment becoming the option of choice.

To model the success of a trading rule based on these ideas, we used as an indicator of recent investment performance the most recent 12-month return of the 18-country equally weighted world index relative to its historical average. That is, each month, we computed the world index's 12-month return and conditioned a switching model on this measure. When recent market success was below the prior average, we presumed that typical investors became nervous and that their risk aversion increased. In this case, we believe they ranked the countries on the basis of a relative-value indicator, namely, each country's P/B. In contrast, when recent market performance was above the historical average, we presumed typical investors became more tolerant of risk. We thus assumed that they ranked countries on the basis of a relative-strength indicator, namely, the one-year-past return.

In short, the model weighted relative value and relative strength at either 100 percent or 0. No look-ahead bias was introduced because we always looked at the recent global success measure for month $t - 1$ before taking the P_1 and P_4 positions for month t. The return characteristics of the portfolio strategy built on the basis of our conditional model for the whole sample period and three subperiods are presented in the "Style Timing" column of Table 3.

From January 1975 through August 2003 (Panel A), the market risk–adjusted return $(P_1 - P_4)_{timing}$ was 0.98 percent a month (t = 3.56). The zero-investment portfolio had a beta statistically different from zero, which means that the portfolio was not market neutral. Panels B, C, and D show that a positive and significant performance was achieved in the first and last subperiods. Note that although the performance of the fixed-style strategies separately is not statistically significant over the period of January 1995 through August 2003 (see Table 1), the performance of the style timing model is statistically significant.

For 1985–1994 (Panel C), however, whereas the market risk–adjusted return of $(P_1 - P_4)_{timing}$ is positive but not statistically different from zero because of the relatively strong market risk (beta), the average raw (arithmetic) return of the style timing model (0.97 percent) remained considerably higher than the average raw (arithmetic) return of the fixed-style strategies (0.73 percent for the relative-value and 0.72 percent for the relative-strength portfolios). Note also that the style timing strategy lost diversification benefits through risk reduction in comparison with the style diversification model and thus entailed greater absolute risk, as measured by the standard deviation.

To shed more light on the performance of style timing, **Table 4** decomposes the raw return over the full period (1.30 percent) along two dimensions: the style tilt (choice) and the correctness of the tilt. The left (unshaded) corner of Table 4 is a matrix that examines, for when the strategy had a relative-value tilt or a relative-strength tilt, whether the prediction of the strategy was correct or not. The prediction month was considered correct (wrong) when the style timing strategy tilted toward the outperforming (underperforming) style. Both returns and number of months (in parentheses in Table 4) are reported. Results reported in the shaded sections correspond to weighted (by frequency) average returns and total number of months for the correct and wrong prediction months and for all prediction months.

Reading down the columns of Table 4, when the relative-value strategy was selected as part of the timing model, it was a sound choice 100 out of 203 months. When the prediction was correct, however, the return from the strategy (3.32 percent) was much higher in absolute value than when the prediction was wrong (–1.38 percent), resulting in a weighted-average monthly return for a relative-value tilt in style timing of 0.93 percent for all months for which the model chose the relative-value strategy. The style timing model allows one to retain the best months or avoid the worst ones resulting from the selection of the fixed-style strategies because the relative-value tilt of the model represents an average return of 0.93 percent, compared with 0.32 percent (see Table 1) from following this strategy for the full period.

In contrast, when the timing model selected the relative-strength strategy, it was a correct choice 90 out of 141 months. However, when the prediction was correct, the return from the strategy was only slightly higher in absolute value than the return when the prediction was wrong. The result is a weighted-average monthly return of 1.81 percent when the model selected the relative-strength strategy, which is better than always following the relative-strength strategy (0.81 percent, see Table 1).

Next, reading across the rows, the style timing model posted a raw return of 4.20 percent a month when it selected the best fixed-style strategy and a –2.29 percent return when it selected the wrong fixed-style strategy. Overall, the model chose the right strategy at the right time 190 out of 344 months and led to a weighted-average raw return of 1.30 percent for the complete period.[7]

Table 4. Performance of Style Timing, January 1975–August 2003

	Relative-Value Tilt	Relative-Strength Tilt	Style Timing
Correct prediction months	3.32% (100)	5.18% (90)	4.20% (190)
Wrong prediction months	–1.38 (103)	–4.12 (51)	–2.29 (154)
Weighted average of all prediction months	0.93 (203)	1.81 (141)	1.30 (344)

Note: Number of months in parentheses

■ *Best of both worlds?* An approximation of the "best of both worlds" can be achieved by combining style diversification with skillful style timing. Accordingly, we tested a simple strategy, which we call "style management," consisting of two possible combinations of style weights. When the timing criterion favored relative value (relative strength), we constructed a composite rank for each country, assigning a 75 percent (25 percent) weight to the relative-value (relative-strength) rank and a 25 percent (75 percent) weight to the relative-strength (relative-value) rank. We then constructed a $(P_1 - P_4)_{mgmt}$ portfolio according to this composite rank.

This style management strategy maintained the timing conditional on the recent relative investment performance together with a certain diversification effect. It is a trade-off between a naive style diversification model that maintains a constant 50 percent/50 percent weight and a pure "bang, bang" timing model that places into the portfolio either 100 percent relative value and 0 relative strength or vice versa.

The last column in Table 3 presents the performance of this style management strategy. The style management market risk–adjusted return was greater than that of the pure diversification strategy except during the 1985–94 period. In each period considered (Panels A–D), the style management strategy entailed total risk (standard deviation) that is slightly lower than that of the style timing strategy but higher than the risk of the style diversification strategy. In short, although the style management strategy behaves much like the style timing strategy, it preserves some of the advantages of the style diversification model.

Robustness Tests

To estimate whether the three strategies described here remain profitable when transaction costs are considered, we first examined transaction costs and turnover ratios. In addition, we examined how exposure to the global Fama–French (1998) risk factors augmented by a momentum factor would alter the performance of the various strategies. Finally, we performed a formal test designed to evaluate whether the model's added value truly comes from the style timing ability of the conditional criterion.

Transaction Costs. To assess the robustness of the results, we first examined transaction costs and turnover ratios (average number of country changes per year divided by the number of countries in the portfolio—that is, eight). **Table 5** shows that a relative-strength strategy produces a turnover ratio that is more than twice that of a relative-value strategy (because P/B is indeed quite stable through time). Of the models discussed so far, the diversification model produced the highest turnover ratio; the turnover from a style timing model was slightly lower than that of the relative-strength and style diversification strategies. Because the diversification strategy is always based on both relative-value and relative-strength indicators, its turnover is higher than for strategies that alternate between the styles.

We performed a sensitivity analysis to find the breakeven transaction cost—that is, the maximum cost per transaction for which the market risk–adjusted performance of each strategy remained significantly profitable at the 5 percent confidence level.[8] The last column in Table 5 shows the results. Institutional investors could surely transact futures on country indexes for less than the 35.6 bps per transaction for the timing strategy or even for less than the 21.3 bps for the diversification strategy. Thus, these strategies would be profitable even after considering transaction costs.

For comparison, Table 5 includes data for a hypothetical perfect timing model—that is, a model that always tilted 100 percent to the outperforming style as if it knew the future. It would induce a turnover ratio of 558 percent, but the maximum transaction cost per country change that such a perfect model could support is high (breakeven cost of 88.4 bps) because of exceptional returns.

Risk Exposure. In addition to gross performance and performance net of transaction costs, we examined how exposure to risk factors would affect the performance of the strategies. We used the Fama–French pricing model augmented by a momentum factor. So, the risk factors were (1) the equally weighted world market benchmark excess return over the U.S. risk-free rate, $R_M - R_f$, (2) a size/liquidity (small-capitalization country minus big-capitalization country, *SMB*) factor,[9] (3) a relative-value factor, *RV*, and (4) a momentum factor, *RS*.[10] The zero-investment *SMB* portfolio was based on the country market capitalizations of the previous month. The small-cap portfolio comprised the nine countries with the smallest markets, and the big-cap portfolio comprised the nine countries with the largest markets. The returns from the small-cap and big-cap portfolios were also equally weighted.

The *RV* and *RS* returns correspond precisely to the returns of these fixed-style strategies presented in Table 1. We evaluated the risk-adjusted

Table 5. Turnover and Transaction Costs, January 1975–August 2003

	Average Number of Country Changes			Impact on Monthly Performance of Various Transaction Costs per Country Change				Breakeven Transaction Cost per Country Change
Strategy	Per Month	Per Year	Turnover (per year)	$x = 5$	$x = 10$	$x = 15$	$x = 20$	(bps)[a]
Relative value (fixed style)	0.7	8.9	111%	–0.04%	–0.08%	–0.12%	–0.15%	—[b]
Relative strength (fixed style)	1.8	21.2	265	–0.09	–0.18	–0.27	–0.36	13.8
Diversification strategy	2.2	26.5	331	–0.11	–0.23	–0.34	–0.45	21.3
Timing strategy	1.7	19.8	248	–0.08	–0.17	–0.25	–0.34	35.6
Management strategy	2.0	24.6	307	–0.10	–0.21	–0.31	–0.42	32.9
Hypothetical perfect rotation model	3.7	44.6	558%	–0.19%	–0.38%	–0.57%	–0.76%	88.4

Note: In each strategy, the results are for the zero-investment portfolio, $P_1 - P_4$.

[a]Transaction cost per country change for which the market risk–adjusted return remained significant at the 5 percent level.
[b]The market risk–adjusted return before any transaction cost of the *RV* strategy is not significant for the period.

(abnormal) performance of the zero-investment style diversification, timing, and management portfolios as the alpha coefficient from the following regression:

$$R_{model,t} = \alpha + \beta(R_M - R_f)_t + \gamma_{SMB}(SMB)_t + \gamma_{RV}(RV)_t + \gamma_{RS}(RS)_t + \varepsilon_t, \quad (1)$$

where ε is the residual.

Table 6 presents the results of the regressions. After controlling for the four risk factors, we found the alpha coefficient of the timing and management models to be still significantly different from zero but returns were lower than the market risk–adjusted returns presented in Table 4 (where we were taking only the market risk into account). The diversification model no longer provides a statistically significant positive alpha, and the two fixed-style factors account for essentially all the added value found in Table 4. (Note that all three of these strategies reflect remarkably significant *RV* and *RS* style loadings because the factors correspond to the fixed-style strategies.) The size loading γ_{SMB} is not significantly different from zero for any of the three strategies. As in Table 4, the market loadings (betas) of the style timing and management strategies are both significantly greater than zero whereas the diversification model seems to be market neutral.

Timing Ability. The models seem to have produced very good performance throughout the sample period, but bear in mind that a strategy relying on a fixed tilt toward countries with high relative value or high relative strength also added value beyond that of an equally weighted benchmark (see Table 1). Thus, a timing model that alternates between two good strategies should produce excellent performance even if the criterion for switching is completely useless. What, then, is the real worth of the conditional signal, the indicator of recent global success?

To answer this question, we explored beyond a simple hit ratio of 55 percent (as shown in Table 4). We used a measure that tests a model's real timing ability. The measure was based on existing market-timing models—specifically, those of Treynor and Mazuy. The idea is to test, through the addition of a squared term for each factor in the model, whether or not successful timing is the source of added value. If no particular ability to choose the right style at the right time is demonstrated, the addition of a squared term will not improve the fit of the regression and the associated coefficient will be zero. If the coefficient is statistically higher than zero, however (meaning that the squared term improves the fit), timing ability has been demonstrated.

Because Treynor and Mazuy used this method to analyze only the market-timing ability of mutual funds, we used a variant of their procedure to incorporate a style timing measure (that is, a measure of how good we were at using the right style at the right time). Thus, we used the following equation:

$$R_{model,t} = \alpha + \sum_F \left[(\gamma_{F,1} F_t) + (\gamma_{F,2} F_t^2) \right] + \varepsilon_t, \quad (2)$$

where *F* represents the various risk factors—namely, $R_M - R_f$, *SMB*, *RV*, and *RS*—and

$R_{model,t}$ = monthly return on the model's zero-investment portfolio

α = model's selection ability (timing-filtered, risk-adjusted performance)

$\gamma_{F,1}$ and $\gamma_{F,2}$ = model's exposure to risk factor *F*

We focused on timing ability—$\gamma_{RV,2}$ and $\gamma_{RS,2}$—to test whether the model tends to adequately time the relative-value and relative-strength strategies. **Table 7** presents the results of the regression for the style diversification, style timing, and style management models for the full sample period.

Table 6. Risk Exposure Analysis, January 1975–August 2003

	Style Diversification		Style Timing		Style Management	
Factor	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
α	0.19%	1.43	0.48%	2.04*	0.52%	2.36*
$R_M - R_f$	0.00	0.07	0.27	5.40*	0.26	5.56*
SMB[a]	–0.03	–0.56	0.14	1.57	0.10	1.15
RV	0.55	15.09*	0.50	7.66*	0.54	8.82*
RS	0.63	22.69*	0.57	11.48*	0.59	12.50*

Note: See note to Table 5.

*Significant at the 5 percent level.

[a]The average monthly *SMB* return was 0.14 percent, not significantly different from zero.

Table 7. Timing Ability Analysis, January 1975–August 2003

	Style Diversification		Style Timing		Style Management	
Factor	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
α	0.33%	1.96*	0.08%	0.27	0.22%	0.80
$R_M - R_f$	0.01	0.50	0.23	4.65*	0.22	4.75*
SMB	–0.03	–0.55	0.15	1.70	0.10	1.24
RV	0.57	15.39*	0.42	6.76*	0.47	8.05*
RS	0.62	21.75*	0.60	12.32*	0.61	13.23*
$(R_M - R_f)^2$	0.37	0.94	–1.66	–2.51*	–1.84	–2.94*
SMB^2	–0.05	–0.04	–2.52	–1.05	–2.80	–1.24
RV^2	–0.46	–0.91	2.97	3.49*	2.56	3.19*
RS^2	–0.44	–1.61	1.17	2.50*	1.30	2.94*

Note: See note to Table 5.

*Significant at the 5 percent level.

As the bottom rows in Table 7 show, the style diversification model provided insignificant (negative) style timing ability. The α for country selection ability of 0.33 percent, however, is statistically significant. This result is consistent with the expected composite ranking from the momentum and value signals, which is intended to effectively select good countries rather than time the right style at a given time. The diversification of information signals performed well at country selection but, obviously, less well at country style timing.

The opposite is true for the style timing and management models. Both $\gamma_{RV,2}$ and $\gamma_{RS,2}$ are positive and statistically different from zero, which confirms the significant style timing ability of the models. Because the timing-filtered alpha is no longer significantly different from zero, all the added value came from style timing ability and the model did not exhibit significant country selection ability. Indeed, as intended, the timing model focused exclusively on choosing the right style to be adopted at a given time, which it did quite well. An unexpected drawback is the significant negative market timing ability of the timing model and the management model: The coefficients on $(R_M - R_f)^2$ are both negative and significant.

Table 8 summarizes the explanation and decomposition of abnormal returns for the three models and shows that, in addition to providing the highest raw and risk-adjusted zero-investment portfolio return, the style management model seems to be the best-balanced strategy in terms of both timing and selection ability.

Table 8. Summary of Abnormal Performance and Return Decomposition of Three Models, January 1975–August 2003

Measure	Style Diversification	Style Timing	Style Management
Raw return	0.86%	1.30%	1.36%
Raw return explained by:			
Market exposure	0.00	0.18	0.17
Size exposure	0.00	0.02	0.01
Style exposure	0.68	0.62	0.65
Factor risk–adjusted return	0.19	0.48	0.52
Factor risk–adjusted return explained by:			
Selection ability	0.33	0.08	0.22
Timing ability	–0.14	0.40	0.30

Note: See note to Table 5.

Conclusion

This study shows the importance of style diversification and style timing in global equity allocation. We reported a significant positive market risk–adjusted return for the relative-strength strategy (0.79 percent a month) and an insignificant positive market risk–adjusted return for the relative-value strategy (0.35 percent a month). More important, we documented a strong negative correlation between the two fixed-style strategies.

For the full period studied, the style diversification model posted a higher monthly market risk–adjusted return (0.88 percent) and a lower standard deviation (3.68 percent) than either fixed-style strategy. The style timing model, which conditioned style exposure on recent global market performance, posted a significant positive market risk–adjusted return (0.98 percent a month), which is better than the style diversification model (0.88 percent), but at the price of higher total risk (standard deviation of 5.07 percent for timing versus

3.68 percent for diversification). The style management model, a combination of style diversification and style timing, posted a slightly better market risk–adjusted return (1.05 percent) and lower risk (4.91 percent) than either the style diversification or the style timing model.

Although the three zero-investment strategies based on these models generated relatively high turnover, their performance net of transaction costs remained statistically significant. A formal timing test based on the Treynor–Mazuy market-timing test confirmed the tendency of the style timing and management models to adequately time when the relative-value strategy should be favored over the relative-strength strategy and vice versa throughout the period. According to the Treynor–Mazuy expanded test, the diversification model's good performance essentially results from selection ability rather than timing ability.

We documented only the most basic strategies through the performance of zero-investment portfolios, but such models can be implemented in many other ways that would affect the magnitude of value added and active risk of a portfolio relative to a benchmark. For example, an overlay strategy could be implemented over a world cap-weighted benchmark to overweight P_1 countries and underweight P_4 countries by a certain percentage and thus limit the active (or relative) risk. One could also take into consideration the magnitude of the signal sent by the conditioning criterion by taking a neutral position when the signal was not strong in one direction or the other. All such variants would add value to a model that relies solely on a fixed-style strategy. The more the active risk taken in implementing the strategies, the greater the added value to be expected.

The results of this study seem promising for implementing style diversification and timing in country allocation, but other conditional criteria could also be examined. Moreover, a multivariate approach combining several criteria could be considered as an alternative implementation vehicle (see, for instance, Kao and Shumaker 1999). Future studies could also examine the potential of style timing in sector selection and consider timing based on the size effect (small cap versus large cap).

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Notes

1. Our analysis hinges on country indexes rather than global industry indexes, although Baca, Garbe, and Weiss (2000) pointed out that industry effects have been growing markedly in relative importance—to the extent that they now supersede country effects in explaining the variation of international stock returns. Our choice was motivated by Hopkins and Miller (2001), who emphasized that this conclusion holds only for capitalization-weighted schemes and when the U.S. stocks are included in the analysis. Together with L'Her, Sy, and Tnani (2002) and Kritzman and Page (2003), they concluded that this shift was driven mainly by the euphoria of the information technology and telecom sectors and is probably more transitory than structural. Further research could, however, explore the benefits of timing strategies around global sector indexes.
2. Cavaglia and Moroz (2002) are among the few researchers who have successfully explored the potential benefits of style diversification at a country level. Cavaglia and Moroz used a multiple regression to estimate the marginal contribution of each variable and group of variables to return. This estimation was then used to project future returns and to assess the forecasted contribution of each group of variables.
3. Arnott and Copeland (1985) found that growth (value) models are more effective during periods of high (low) inflation whereas both models are less effective in a strong economy. Levis and Liodakis (1999) studied the profitability of style rotation in the United Kingdom and found that, although "large cap versus small cap" timing is worthwhile, "value versus growth" timing is not. Copeland and Copeland (1999) used a variable based on the Market Volatility Index (VIX) of the Chicago Board Options Exchange to condition short-term style (value–growth) and size (large–small) styles in a trading rule. They concluded that market timing conditioned on the VIX may be feasible. Kao and Shumaker (1999) documented a multivariate approach based on a recursive partitioning algorithm in which a number of variables conditioned the style exposure.
4. Because forward exchange rates are available only since 1988 for the 18 countries, we used unhedged returns to obtain a longer sample period (beginning in 1975). However, we also tested all the results with fully hedged returns for the period of January 1988 through August 2003. The correlations between hedged and unhedged returns for the different models varied from 0.65 to 0.85, and the conclusions found for unhedged returns held with the hedged returns. Detailed results are available from the authors upon request.
5. Thaler and Johnson found that an increase in risk aversion after prior losses appears to be the norm but that if the proposed gamble involves a good chance of breaking even, people tend to be especially attracted to the gamble. Hence, in a breakeven situation, the subjects of their studies tended to be less risk averse even if they had recently encountered losses.

6. Gertner (1993) obtained similar results in a study involving much larger stakes than Thaler and Johnson used. The Gertner study involved participants in the television show "Card Sharks." He found evidence of less-risk-averse behavior following substantial gains.
7. The performance breakdown was quite stable for various subperiods and led to the same conclusions. Detailed results are available from the authors upon request.
8. For example, if in one period, P_1 was composed of countries #1, #2, #3, and #4 and in the next period, P_1 was composed of countries #1, #3, #5, and #6, two country changes occurred. If the same number of country changes applied to P_4, then four country changes occurred during the period for the zero-investment portfolio. Assuming transaction costs of 35.6 bps per country change, one would subtract 142.4 bps from the gross return for that month only.
9. Macedo argued that (1) overweighting of smaller markets induces liquidity constraints, (2) underweighting of smaller markets cannot be material because they already represent a small proportion of the cap-weighted benchmark, and (3) the small markets suffer from much higher transaction costs than the large markets.
10. See Cavaglia and Moroz for a recent application of the Fama–French three-factor pricing model augmented by a momentum factor. Although we constructed the risk factors directly from country index returns, Cavaglia and Moroz discussed the construction of equally weighted and value-weighted risk factors with country weights, global industry weights, or no country/industry stratifications.

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