SEIZE THE Momentum OF GLOBAL EQUITY INDUSTRIES

Is industry allocation the next big wave in global investing?

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Recent studies show that industry effects are becoming more important than country effects in explaining the cross-sectional variance of international equity returns.[1] It is now at least as important to manage a portfolio not solely on a country basis, but also on an industry basis. This paper examines whether the momentum of industry index returns allows the construction of profitable industry allocation strategies for a worldwide equity portfolio.

We focus on momentum because it is one of the most documented market anomalies (Griffin et al, 2005). The failure of the Fama-French (1996) three-factor pricing model (TFPM) to capture the continuation of short-term returns leads Carhart (1997) to recognize the importance of the momentum effect by adding a momentum factor to the TFPM. Grundy and Martin (2001, p. 72) also conclude: "If it remains a fact, it becomes a factor." Our study is largely motivated by the results of Moskowitz and Grinblatt (1999), and Scowcroft and Sefton (2005). Moskowitz and Grinblatt (1999) contend that, first, industry momentum strategies in the U.S. stock market are profitable even after controlling for risk and for individual stock momentum[2]; and, second, that momentum strategies are significantly less profitable after controlling for industry effects. In the same vein, Scowcroft and Sefton (2005) conclude that price momentum is driven largely by industry momentum. Decomposing momentum return profits obtained at the stock level in the MSCI world index universe, they show that industry-specific effects (58%) dominate country- (34%), and company-specific effects (8%).[3]

The three distinctive elements of our paper are as follows. First, we provide out-of-sample evidence of the profitability of momentum-based industry allocation strategies for a global equity portfolio. We use the monthly returns of 38 MSCI world industry indexes during the period of January 1970 to June 2001. Second, we assess the robustness of our results by testing the significance of risk-adjusted returns when we control for world market, size and book-to-market equity factors, and when we take into account transaction costs. Third, we document regularities in industry momentum profits. Returns from zero-investment winner-loser portfolios are significantly positive in non-January, up-markets and, most of the time, in stable and expansive monetary policy periods.

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Data and Portfolio Construction

We use the monthly price returns denominated in U.S. dollars (unhedged) of 38 MSCI world industry indexes for the period ranging from January 1970 to June 2001.[4] We looked at summary statistics of monthly returns for the 38 MSCI world industry indexes. With average monthly returns of 1.01% and 0.95%, the Electronic Components & Instruments and Financial Services indexes post the best returns, whereas the Metals—Steel and Metals—Non Ferrous indexes post the worst returns (0.19% and 0.25%). The Gold Mines industry has the highest monthly standard deviation of the 38 industries (11.5%). The minimum monthly standard deviation is 4.0% for Utilities—Electrical & Gas. The Financial Services industry presents the highest systematic risk, with a beta of 1.44, whereas Utilities—Electrical & Gas presents the lowest market risk, with a beta of 0.65.

Portfolio Construction

We use the methodology developed by Jegadeesh and Titman (1993) to implement momentum-based global industry strategies. Each month, we rank global industry indexes according to their previous J-month returns (J = 3, 6, 9, and 12 months). Based on this ranking, we assign the N (N = 4, 8, and 12) winner global industry indexes to an equally weighted portfolio P_W, and the N loser global industry indexes to another equally weighted portfolio P_L. Therefore, portfolio P_W corresponds to the N global industry indexes with the highest returns over the previous J months, and portfolio P_L corresponds to the N global industry indices with the poorest returns over the previous J months. P_{W-L} corresponds to the zero-investment portfolio that takes a long position in the winning industries and a short position in the losing industries. We hold these portfolios for K months, with the holding period K being equal to 3, 6, 9, or 12 months. We thus represent each strategy by the notation [J/K, N].[5] Similar to Jegadeesh and Titman (1993), we construct K independent series of returns in order to avoid the problems of overlapping in the series. We equally weight them to obtain a single series of monthly momentum returns. The methodology involves rebalancing 1/K of the holdings each month since only one of the K series is due for rebalancing.

Performance of Industry Momentum Strategies

We discuss in turn raw performance and risk-adjusted performance.

Raw Performance:

We report in Table 1, Panels A to D, the global industry momentum results for [J/K, N] strategies (J = K = 3, 6, 9, and 12; N = 4, 8, and 12). For space considerations, we only discuss the results relative to the [9/9, N] zero-investment P_{W-L} portfolios (Panel C), which correspond to the most profitable strategies. We find the highest average monthly return (0.68%) when portfolios P_W and P_L comprise four industries each. The return decreases to 0.46% when winner and loser portfolios comprise twelve industries. Taking risk into consideration, the addition of industries creates a beneficial diversification effect. The monthly standard deviation decreases from 4.9% for the [9/9, 4] strategy to 3.6% and 2.9% for the [9/9, 8] and [9/9, 12] strategies respectively. The t-statistics of winner portfolios are more often significant and higher in absolute value than those of loser portfolios.[6]

Risk-Adjusted Performance

Fama and French (1996) document that three risk factors are important in explaining equity returns: the market excess return (R_m - R_f), a size factor (difference in returns between a portfolio of small capitalization firms and big capitalization firms; *SMB*, small minus big), and a book-to-market equity factor (difference in returns between a portfolio of high book-to-market equity and small book-to-market equity firms; *HML*, high minus low). We examine how exposure to these three risk factors alters the performance of our industry momentum strategies.

We use the equally weighted (by industry) MSCI world index return as a proxy for the world market return (WR_{mt}) and the U.S. 91-day T-bills as a proxy for the risk-free rate (R_{ft}). We construct world version of size ($WSMB_t$) and book-to-market ($WHML_t$) risk factors from the country-specific components.[7] We regress the return of the P_{W-L} portfolios and the excess return of winner and loser portfolios (R_{pt}) on the excess world market return and the size ($WSMB_t$) and book-to-market equity ($WHML_t$) world risk factors. We examine whether our strategy return is explained by the market, size and book-to-market world factors respectively. The alpha coefficient, α_p, stands for the world three-factor risk-adjusted return. The model is written as follows:

$$R_{pt} = \alpha_p + \beta_p (WR_{mt} - R_{ft}) + s_p (WSMB_t) + b_p (WHML_t) + e_{pt} \quad (1)$$

Table 2 shows that all zero-investment P_{W-L} portfolios, except for the [12/12, 4] strategy, present positive and significant three-factor risk-adjusted returns (alphas). The P_{W-L} portfolios of [9/9, N] strategies have the highest alpha coefficients with *t*-statistics greater than 3 in all cases, even when the loadings on the *WSMB* and *WHML* factors are significantly negative. No P_{W-L} portfolio market beta coefficients are statistically different from zero.

Winner portfolios largely generate the P_{W-L} portfolio performance as alpha coefficients of those portfolios are significant.[8] This result could then facilitate the implementation of industry tilts in long-only portfolios since the profitability of global zero-investment industry portfolios is mainly driven by past winners, not past losers. We can also conclude that the performance of industry momentum strategies is not explained by the world three Fama-French risk factors.

Implementation Costs

Momentum investment strategies require frequent trading that could hamper the profitability of the strategies. Many authors document extensively the impact of market frictions induced by trading.[9] Their detailed analysis is beyond the scope of this paper. We nonetheless examine the extent to which transaction costs could hinder the implementation of the industry momentum strategies in practice.

First, we calculate the turnover ratio for the component of the portfolio (one of the K series of returns) that is rebalanced each month. It represents the ratio of the average number of industries that move from and to P_W and P_L to the total number of industries. Second, we divide this turnover ratio by K since only 1/K of the momentum portfolio is rebalanced monthly. Finally, we compute the average rebalancing ratio over the return

TABLE 1: MONTHLY PERFORMANCE OF INDUSTRY MOMENTUM STRATEGIES—JANUARY 1970 TO JUNE 2001

	P_{W-L}	P_L	P_W	P_{W-L}	P_L	P_W	P_{W-L}	P_L	P_W
	4 Industries			8 Industries			12 Industries		
Panel A: Strategies [3/3,N]									
Average return	0.53%	0.49%	1.12%	0.31%	0.61%	0.99%	0.25%	0.63%	0.92%
Standard deviation	4.8%	5.2%	5.3%	3.4%	4.8%	4.7%	2.7%	4.6%	4.5%
t-Statistic[a]	2.61*	-1.68	2.53*	2.09*	-1.34	2.32*	2.06*	-1.64	2.25*
Panel B: Strategies [6/6,N]									
Average return	0.62%	0.38%	1.11%	0.49%	0.48%	1.03%	0.41%	0.53%	0.98%
Standard deviation	4.8%	5.3%	5.2%	3.5%	4.8%	4.8%	2.8%	4.6%	4.5%
t-Statistic[a]	2.93*	-2.30*	2.77*	3.01*	-2.60*	2.99*	3.11*	-2.83*	3.18*
Panel C: Strategies [9/9,N]									
Average return	0.68%	0.38%	1.17%	0.56%	0.42%	1.04%	0.46%	0.47%	0.97%
Standard deviation	4.9%	5.3%	5.5%	3.6%	4.8%	4.8%	2.9%	4.6%	4.6%
t-Statistic[a]	3.08*	-2.04*	3.21*	3.26*	-2.80*	3.28*	3.24*	-3.05*	3.25*
Panel D: Strategies [12/12,N]									
Average return	0.26%	0.56%	0.93%	0.26%	0.58%	0.90%	0.25%	0.59%	0.88%
Standard deviation	5.0%	5.3%	5.6%	3.7%	4.8%	4.9%	3.0%	4.6%	4.7%
t-Statistic[a]	1.45	-0.82	1.62	1.65	-1.23	1.81	1.83	-1.50	2.02*

[a] The *t*-statistics correspond to a test in relation to zero for the P_{W-L} portfolios, and in relation to the equally weighted MSCI world index return for the winner or loser portfolios.
* Statistically significant at the 5% level.

time-series of the portfolio. Based on this information, we perform a sensitivity analysis to find the maximum transaction costs for which the three-factor risk-adjusted return of the P_{W-L} portfolios would remain significant at the 5% level. The following formula allows finding that maximum transaction cost:

$$[\alpha_p \text{ - (average rebalancing ratio} \times \text{max. transaction cost)]} / \text{standard error}_\alpha = 1.96 \quad (2)$$

where α_p is the P_{W-L} portfolio three-factor risk-adjusted return.

The rebalancing ratio decreases when the holding period lengthens and when the number of industries in the portfolio increases. It ranges between 46% for the [3/3, 4] strategy and 13% for the [9/9, 12] strategy.[10] For the [6/6, N] and [9/9, N] strategies, we find that the risk-adjusted return (alpha) of P_{W-L} portfolios would remain significantly different from zero at a 5% level, with transaction costs higher than 100 basis points. It is reasonable to assume that real transaction costs in developed stock markets (including transaction fees and price impact) are lower than this figure. Indeed, many authors use a one-way 100 basis points (200 basis points round-trip) of the portfolio value as a conservative estimate of the transaction costs for individual stocks.[11]

Regularities in industry momentum profits

In order to examine regularities in the profits of global industry momentum strategies, we focus our analysis on the world market risk-adjusted return (Jensen alpha) of the P_{W-L} portfolios.

Turn-of-the-year effect

In Table 3 (Panel A) we examine the seasonality in momentum profits using a dummy-variable technique to separate the January (*J*) months from the February to December (*F-D*) months. We use the following time-series regression:

$$R_{pt} = \alpha_J J + \alpha_{F-D} (1 - J) + \beta_J (WR_{mt} - R_{ft}) J + \beta_{F-D} (WR_{mt} - R_{ft}) (1 - J) + e_{pt} \quad (3)$$

where J=1 if month t is January, and J=0 otherwise, and R_{pt} stands for the P_{W-L} returns.

We find a seasonality effect in global industry momentum profits. For the P_{W-L} portfolios, the alpha coefficients corresponding to January are all negative, though not significant. The alpha coefficients corresponding to the months of February to December are significantly positive.[12]

Up- and down-markets

Griffin et al. (2005) document the profitability of momentum strategies at the stock level in many international markets during up- and down-markets—both states of the world being defined on an *ex post* basis. We adopt a more practitioner-oriented approach, and provide an *ex ante* definition of up- and down-markets. We estimate the sensitivity of momentum returns to the market performance over the previous 12-month period. We use the following dummy-variable time-series regression:

$$R_{pt} = \alpha_U U + \alpha_D (1 - U) + \beta_U (WR_{mt} - R_{ft}) U + \beta_D (WR_{mt} - R_{ft}) (1 - U) + e_{pt} \quad (4)$$

where U=1 if the previous 12-month period stands for an up-market ($WR_{m\ t-12\ to\ t-1} \geq 0$), and U=0 for a previous 12-month down-market period ($WR_{m\ t-12\ to\ t-1} < 0$).

Table 3 (Panel B) shows that P_{W-L} portfolio returns are always positive and significant following an up-market. After down-markets, P_{W-L} portfolio returns are negative, though not significantly different from zero. P_{W-L} portfolios are not market-neutral following up-markets (positive and significant betas) and down-markets (negative and significant betas).

Monetary environment

Jensen et al. (2000) show that the average return of industry indexes is higher in expansive monetary policy periods than in restrictive periods in the U.S. stock market. The industries that rely the most on discretionary consumer spending should be the most sensitive to changes in the monetary environment (cyclical versus defensive industries). We follow the same procedure as Jensen et al. (2000) to stratify our sample in restrictive, stable, and expansive monetary policy periods. We estimate the following time-series regression:

$$R_{pt} = \alpha_R R + \alpha_S S + \alpha_E E + \beta_R (WR_{mt} - R_{ft}) R + \beta_S (WR_{mt} - R_{ft}) S + \beta_E (WR_{mt} - R_{ft}) E + e_{pt} \quad (5)$$

where R=1 if month t follows a discount rate increase (restrictive monetary policy) and zero otherwise, S=1 if month t follows a stable discount rate and zero otherwise, and E=1 if month t follows a discount rate decrease (expansive monetary policy) and zero otherwise.

Table 3 (Panel C) shows that P_{W-L} portfolio return is not significantly different from zero at a 5% level in restrictive monetary policy periods. The return is positive and statistically significant in all but the [12/12, N] strategies in stable monetary policy periods, and for the [3/3, N] and [6/6, N] strategies in expansive monetary policy periods. P_{W-L} portfolios are neutral relative to market risk only in stable states.

We also test the interaction between the three aforementioned regularities in estimating a time-series regression combining the previous dummy variables. While the detailed results are available upon request, we summarize the conclusions using the [9/9, 8] strategy. The worst interaction of the regularities examined for the P_{W-L} portfolios is the combination of January, down-markets, and restrictive monetary policy periods: the deviation relative to the average Jensen alpha coefficient reaches -1.91% for the [9/9, 8] strategy. For the other strategies, this bad combination represents deviation ranging from -1.51% to -3.04%. By contrast, the best combination is non-January months, up-markets,

TABLE 2: MONTHLY THREE-FACTOR RISK-ADJUSTED PERFORMANCE OF INDUSTRY MOMENTUM STRATEGIES—JANUARY 1970 - JUNE 2001

	P_{W-L}	P_L	P_W	P_{W-L}	P_L	P_W	P_{W-L}	P_L	P_W
	4 Industries			8 Industries			12 Industries		
Panel A: Strategies [3/3,N]									
Alpha	0.74%	-0.28%	0.46%	0.45%	-0.16%	0.29%	0.35%	-0.14%	0.20%
t-Statistic	3.08*	-2.01*	2.93*	2.59*	-1.76	2.77*	2.56*	-2.10*	2.72*
R_m-R_f	-0.05	1.04	0.99	-0.07	1.04	0.98	-0.06	1.03	0.97
t-Statistic[a]	-0.95	1.39	-0.24	-1.65	1.98*	-1.00	-1.93	2.18*	-1.51
SMB	-0.05	0.05	0.00	-0.05	0.03	-0.02	-0.05	0.02	-0.02
t-Statistic	-0.59	0.95	-0.07	-0.82	1.03	-0.46	-0.91	0.95	-0.79
HML	-0.28	0.10	-0.18	-0.20	0.08	-0.12	-0.14	0.06	-0.08
t-Statistic	-4.92*	3.11*	-4.77*	-4.77*	3.71*	-4.68*	-4.45*	3.94*	-4.48*
Panel B: Strategies [6/6,N]									
Alpha	0.81%	-0.38%	0.44%	0.61%	-0.28%	0.33%	0.50%	-0.23%	0.27%
t-Statistic	3.30*	-2.69*	3.00*	3.41*	-3.03*	3.28*	3.52*	-3.26*	3.54*
R_m-R_f	-0.05	1.06	1.01	-0.04	1.04	1.00	-0.04	1.03	0.99
t-Statistic[a]	-0.94	1.92	0.26	-0.96	1.78	-0.07	-1.20	1.73	-0.62
SMB	-0.15	0.06	-0.09	-0.15	0.06	-0.09	-0.14	0.06	-0.08
t-Statistic	-1.63	1.12	-1.69	-2.20*	1.68	-2.37*	-2.65*	2.35*	-2.75*
HML	-0.21	0.11	-0.11	-0.16	0.08	-0.08	-0.12	0.06	-0.06
t-Statistic	-3.64*	3.19*	-3.10*	-3.73*	3.65*	-3.29*	-3.54*	3.42*	-3.41*
Panel C: Strategies [9/9,N]									
Alpha	0.89%	-0.34%	0.55%	0.70%	-0.31%	0.39%	0.56%	-0.26%	0.30%
t-Statistic	3.51*	-2.49*	3.48*	3.74*	-3.30*	3.65*	3.72*	-3.59*	3.64*
R_m-R_f	-0.04	1.07	1.03	-0.04	1.04	1.00	-0.04	1.03	0.99
t-Statistic[a]	-0.63	2.21*	0.91	-0.87	1.69	-0.05	-1.18	1.77	-0.58
SMB	-0.15	0.10	-0.04	-0.15	0.08	-0.07	-0.14	0.06	-0.07
t-Statistic	-1.54	2.05*	-0.70	-2.12*	2.24*	-1.75	-2.45*	2.38*	-2.39*
HML	-0.27	0.13	-0.14	-0.20	0.10	-0.11	-0.16	0.08	-0.08
t-Statistic	-4.49*	3.89*	-3.84*	-4.68*	4.51*	-4.23*	-4.42*	4.65*	-3.98*
Panel D: Strategies [12/12,N]									
Alpha	0.49%	-0.18%	0.31%	0.40%	-0.16%	0.24%	0.35%	-0.15%	0.20%
t-Statistic	1.88	-1.27	1.90	2.12*	-1.72	2.18*	2.28*	-1.99*	2.40*
R_m-R_f	-0.02	1.06	1.04	-0.02	1.03	1.01	-0.02	1.02	1.00
t-Statistic[a]	-0.36	1.90	1.11	-0.44	1.31	0.38	-0.64	1.17	-0.13
SMB	-0.22	0.11	-0.11	-0.16	0.08	-0.08	-0.14	0.06	-0.08
t-Statistic	-2.31*	2.04*	-1.91	-2.24*	2.25*	-1.93	-2.44*	2.31*	-2.41*
HML	-0.29	0.13	-0.15	-0.22	0.11	-0.12	-0.16	0.08	-0.08
t-Statistic	-4.74*	3.99*	-4.08*	-5.00*	4.80*	-4.50*	-4.55*	4.70*	-4.15*

[a] The *t*-statistics associated with betas are based on the null hypothesis that the slope coefficients are equal to zero for the P_{W-L} portfolios, and equal to one for the winner or loser portfolios.
* Statistically significant at the 5% level.

TABLE 3: REGULARITIES IN INDUSTRY MOMENTUM PROFITS FOR THE P_{W-L} PORTFOLIOS— JANUARY 1970 - JUNE 2001

	[3/3]	[6/6]	[9/9]	[12/12]	[3/3]	[6/6]	[9/9]	[12/12]	[3/3]	[6/6]	[9/9]	[12/12]
	4 Industries				8 Industries				12 Industries			
Panel A: January effect												
January alpha	-0.40%	-0.35%	-0.46%	-1.45%	-0.35%	-0.27%	-0.33%	-0.93%	-0.30%	-0.24%	-0.28%	-0.59%
t-Statistic	-0.44	-0.38	-0.49	-1.53	-0.52	-0.41	-0.47	-1.32	-0.55	-0.45	-0.51	-1.03
Feb.-Dec. alpha	0.94%	0.85%	0.92%	0.56%	0.72%	0.64%	0.72%	0.44%	0.57%	0.52%	0.57%	0.38%
t-Statistic	3.55*	3.23*	3.39*	2.02*	3.67*	3.32*	3.57*	2.16*	3.60*	3.43*	3.56*	2.26*
January beta	-0.04	-0.09	-0.05	-0.09	-0.04	-0.05	-0.03	-0.06	-0.01	-0.02	0.00	-0.04
t-Statistic	-0.20	-0.48	-0.27	-0.44	-0.26	-0.40	-0.22	-0.39	-0.07	-0.17	-0.03	-0.33
Feb.-Dec. beta	0.01	-0.02	0.01	0.04	0.00	-0.01	-0.01	0.02	-0.02	-0.02	-0.02	0.01
t-Statistic	0.15	-0.26	0.11	0.56	-0.08	-0.27	-0.11	0.47	-0.49	-0.60	-0.49	0.19
Panel B: Up- and down-markets												
Up alpha	1.03%	0.88%	1.03%	0.60%	0.77%	0.73%	0.77%	0.49%	0.62%	0.59%	0.62%	0.40%
t-Statistic	3.55*	3.18*	3.55*	2.00*	3.60*	3.60*	3.60*	2.18*	3.62*	3.69*	3.62*	2.24*
Down alpha	-0.20%	-0.02%	-0.20%	-0.53%	-0.03%	-0.20%	-0.03%	-0.36%	-0.03%	-0.13%	-0.03%	-0.20%
t-Statistic	-0.38	-0.05	-0.38	-0.97	-0.08	-0.55	-0.08	-0.90	-0.11	-0.44	-0.11	-0.61
Up beta	0.19	0.23	0.19	0.16	0.14	0.18	0.14	0.12	0.10	0.13	0.10	0.09
t-Statistic	2.60*	3.27*	2.60*	2.05*	2.50*	3.44*	2.50*	2.15*	2.31*	3.25*	2.31*	2.01*
Down beta	-0.34	-0.46	-0.34	-0.23	-0.26	-0.35	-0.26	-0.18	-0.23	-0.28	-0.23	-0.16
t-Statistic	-3.60*	-5.07*	-3.60*	-2.33*	-3.79*	-5.26*	-3.79*	-2.56*	-4.05*	-5.41*	-4.05*	-2.75*
Panel C: Monetary policy												
Restrictive alpha	0.98%	0.72%	0.98%	0.62%	0.76%	0.63%	0.76%	0.39%	0.61%	0.48%	0.61%	0.34%
t-Statistic	1.61	1.21	1.59	0.98	1.68	1.45	1.67	0.83	1.68	1.38	1.67	0.89
Stable alpha	0.88%	0.81%	0.89%	0.52%	0.66%	0.62%	0.68%	0.41%	0.51%	0.52%	0.54%	0.35%
t-Statistic	2.86*	2.68*	2.82*	1.60	2.89*	2.79*	2.92*	1.70	2.78*	2.93*	2.87*	1.78
Expansive alpha	1.24%	1.38%	1.04%	0.30%	1.00%	0.93%	0.90%	0.43%	0.76%	0.74%	0.69%	0.43%
t-Statistic	1.99*	2.28*	1.62	0.45	2.18*	2.10*	1.90	0.88	2.05*	2.10*	1.81	1.10
Restrictive beta	0.50	0.50	0.50	0.44	0.38	0.39	0.38	0.31	0.27	0.28	0.27	0.25
t-Statistic	3.69*	3.84*	3.66*	3.19*	3.82*	4.07*	3.80*	3.02*	3.42*	3.67*	3.40*	2.95*
Stable beta	-0.07	-0.09	-0.07	-0.02	-0.07	-0.07	-0.06	-0.01	-0.07	-0.06	-0.07	-0.03
t-Statistic	-0.95	-1.18	-0.88	-0.29	-1.19	-1.26	-1.11	-0.25	-1.54	-1.31	-1.46	-0.59
Expansive beta	-0.27	-0.37	-0.29	-0.26	-0.22	-0.27	-0.24	-0.21	-0.16	-0.22	-0.17	-0.16
t-Statistic	-2.05*	-2.96*	-2.22*	-1.90	-2.34*	-2.93*	-2.42*	-2.06*	-2.05*	-3.00*	-2.12*	-1.96*

* Statistically significant at the 5% level.

and expansive monetary policy periods: the deviation relative to average Jensen alpha peaking to 0.45% for the [9/9, 8] strategy, and ranging from 0.26% to 0.77% for the other strategies.

Conclusion

Over the period of January 1970 to June 2001, momentum strategies based on global industries are profitable on formation and holding horizons of 3, 6, and 9 months. Strategies based on 9-month horizons dominate the other strategies. The best performance is realized by the zero-investment winner-loser (P_{W-L}) portfolio that comprises eight industries in each long and short portfolios. It posts an average monthly return of 0.56% with a standard deviation of 3.60%.

The exposure to a world version of the three Fama-French risk factors only explains a small portion of returns. The risk-adjusted performance is positive and statistically significant for every P_{W-L} portfolio, and is mainly attributable to winner portfolios. For holding horizons of six and nine months, the risk-adjusted return is still significant when we include one-way transaction costs higher than 100 basis points. Finally, P_{W-L} portfolio returns are significantly positive in non-January months, in up-markets, and generally during stable and expansive monetary policy periods.

In conclusion, momentum strategies appear worthwhile in an objective of industry allocation for an international equity portfolio. As part of the industry allocation process, portfolio managers can also benefit from the momentum of returns of global industry indexes by underweighting or overweighting the target industry weight in a global equity portfolio or by simply implementing a long-only winner portfolio. ∎

Endnotes

1. See Baca et al. (2000), Cavaglia et al. (2000), Hopkins and Miller (2001), L'Her et al. (2002), and Kritzman and Page (2003).
2. O'Neal (2000) demonstrates that a momentum strategy pertaining to the returns of American sector mutual funds is profitable. Swinkels (2002) provides evidence of industry momentum in the U.S., in Europe, but not in Japan.
3. By contrast, Lee and Swaminathan (2000) and Grundy and Martin (2001) find that company-specific effects dominate industry-specific effects, and Lewellen (2002) finds that momentum cannot be attributed to them, since well-diversified size and book-to-market portfolios exhibit momentum as strong as that in industries and in individual stocks.
4. Our price return data do not include the dividend return, which is not available for the old industry classification of MSCI indexes. MSCI discontinued these indexes in June 2001. Then, they launched the new industry indexes according to the Global Industry Classification Standard (GICS), and rebuilt them only back to January 1995.
5. The notation [12/6, 4] means that we form the portfolios based on the return of the previous 12 months (t-12 to t-1) and hold these portfolios for the subsequent 6-month period (t to t + 5); each P_L and P_W portfolio containing 4 global industries.
6. Moskowitz and Grinblatt (1999) obtain similar results for the American stock market. The profitability of industry momentum strategies is 0.43% per month on a 6-month horizon, and originates mainly from winners, not from losers.
7. Griffin (2002) forms world factors from country-specific components, and by pooling stocks in all countries. Cavaglia and Moroz (2002) also construct world risk factors with country, global industry or no country/industry stratifications. We construct world risk factors from size and book-to-market equity of each country component. The price-to-book ratio is only available from 1975. We thus use as a substitute, for the 1970-75 period, the *HML* U.S. risk factor available on Kenneth French's web site: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/. The average monthly *WSMB* and *WHML* returns are positive but not significantly different from zero (0.01% and 0.29% respectively).
8. This result is consistent with the conclusion of Scowcroft and Sefton (2005) and Moskowitz and Grinblatt (1999).
9. See Lesmond et al. (2004), Chen et al. (2002), and Korajczyk and Sadka (2004).
10. Detailed results are available upon request.
11. See Arnott et al. (2005), and Bauer and Dahlquist (2001) for the U.S. market, Capaul (1999) and Macedo (1995) on the international markets, and Visscher and Filbeck (2003) on the Canadian market for estimates of transaction costs. There is no sufficient liquidity on the few existing futures contracts or ETF on global equity industry indices. However, we could reconstitute industry indices through individual stock baskets with reasonable transaction costs.
12. Griffin et al. (2005) also find a January effect in momentum profits in 16 out of the 40 markets they examine. They report negative though non-significant returns in January, and significantly positive returns in the other months.

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