Global Tactical Sector Allocation: A Quantitative Approach

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Abstract

This study examines seven variables for Global Tactical Sector Allocation (GTSA) purposes. We construct 10 global sector indices over the extended sample period from 1970 to 2008. This enables us to test previously documented variables on a global basis and to examine whether they continued to work after their publication dates. We document significant returns for momentum (1-month and 12-1 month), earnings revisions and Sell in May seasonal, also after their publication dates. By contrast, monetary policy and valuation (mean-reversion and dividend yield) fail to predict global sector returns. Our out-of-sample tests reveal an average decay in performance of about one third. A long-short GTSA strategy that combines momentum with seasonal has an annual success ratio of 82% and delivers a compounded annual return of 9.9% after transaction costs. To the best of our knowledge, a global sector allocation study with such a long sample period and with such a broad range of variables has not been conducted before.

Key words

Global tactical sector allocation, out-of-sample predictability, momentum, earnings revisions, valuation, Fed policy, Sell in May, Halloween seasonal.

JEL classification

G11, G12, G14

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Global Tactical Sector Allocation: A Quantitative Approach

Sector allocation can be a very important determinant of portfolio returns. Tactical sector allocation had a significant portfolio return impact during volatile periods such as the TMT hype of the 1990s and the financial crises of the 2000s. In a top down global asset allocation process global sector allocation, together with regional allocation, comes after asset allocation and before picking individual investment titles. Although no liquid futures exist (yet), there is a large institutional market for sector swaps, a widespread availability of sector mutual funds and a rising number of Exchange Traded Funds (ETF). This suggests that investors use these instruments to implement active sector positions in their investment portfolios.

There are only a limited number of studies available on sector allocation and most rely on US sector data. A much cited study by Moskowitz and Grinblatt (1999) demonstrates that momentum also works on industry level and that industry momentum explains a large part of stock level momentum. For their analysis they rank twenty US industries on one-six-twelve month price momentum and use the three top and bottom industries to compose a winner and a loser portfolio. Their sample period is from 1963 to 1995. With a holding period of six months, the six month momentum strategy yields a gross annual return of 5%. Similarly, O'Neal (2000) confirms the profitability of momentum strategies for US industry mutual funds. Giannikos and Ji (2000) and Swinkels (2002) provide international evidence for industry momentum effects.

Besides momentum, valuation may predict sector returns. Capaul (1999) examines 38 global industry indexes by composing top and bottom quintile portfolios on price-to-book ratio, price-to-earnings ratio, size, six month and nine month momentum. He finds that small winner industries outperform large loser industries, but does not find that industries with low valuations outperform industries with high valuations. Still, the relatively small sample period, from 1991-1998, limits the statistical power of the employed tests.

Monetary policy shifts are also reported to predict future sector returns, see Conover e.a. (2008). Their investment strategy selects cyclical stocks during periods of Fed easing, and selects defensive stocks during periods of Fed tightening. They document an annual excess return of around 3.5% before transactions costs. Related, Beller e.a. (1998) use macro-economic variables such as term spread, default spread and expected inflation, to estimate quarterly returns for 55 US industries. Their trading strategy that is long in the upper quintile of industries and short in the bottom quintile earns close to a 7% annual return before transaction costs. Still, the quarterly success ratio is only 52% and the net return drops to 3%. Stangl e.a. (2009) examine an investment strategy that is supposed to anticipate business cycle stages perfectly and rotates 48 US sectors following popular belief. But, even with perfect business cycle foresight they conclude that sector rotation would have generated at best a 2.3% annual gross outperformance over the 1948-2007 period.

Finally, Doeswijk (2008) documents a seasonal effect in global sector returns over the period 1970-2003. The sector allocation strategy prefers cyclical stocks in the six month winter period and defensive stocks in the six month summer period. The seasonal "Sell in May" or "Halloween" investment strategy earns an annual gross return of close to 7% and is robust for transaction costs. The strategy also works for US data and cannot be explained by well-known risk factors. In addition, Jacobsen and Visaltanachoti (2009) show that liquidity changes do not explain the Sell in May effect in US sectors.

In this paper we investigate these and other variables in isolation and in combination, using a structural approach and an extensive sample size. We consider seven easy-to-implement quantitative variables for global tactical sector allocation (GTSA) purposes: two momentum variables (1-month and 12-1 month), one earnings revisions variable, two valuation variables (mean reversion and dividend yield), a Fed policy variable, and the Sell in May seasonal indicator. We use ten global monthly total return sector indices in US dollars for an extended sample period ranging from 1970-2008. We further test whether variables stop working after publication date. Several explanations would support this hypothesis, (1) a data snooping bias because researchers only publish positive

results (2) the underlying model has changed or (3) investment profits being arbitraged away. See for example Welch and Goyal (2008) for a critical assessment of the post-publication predictability of the equity premium. Finally, we examine a combined GTSA strategy based on the strongest factors and we test the profitability after controlling for transaction costs and exposure to common factors.

Our findings are as follows. We document significant returns for momentum (1-month and 12-1 month) and the Sell in May seasonal. Interestingly, the predictive power of these factors remains after their publication dates. Although not previously tested for sectors we provide evidence which shows that sectors with positive earnings revisions outperform sectors with negative earnings revisions. We confirm the US findings of Capaul (1999) that valuation, measured as mean-reversion and dividend yield, does not work for global sector allocation. Furthermore, monetary policy fails to predict global sector returns, especially after publication date. Our out-of-sample tests do not support the hypothesis that predictive variables stop working after publication. However, we report an average performance decay of about one third for the seven factors after publication.

Finally, we document a long-short GTSA strategy based on two momentum factors and season that yields an average annual compounded gross return of 12.9% in US dollars. The annual turnover is a single counted 507% which translates in a net return of 9.9%. The strategy has an annual success ratio of 82%. GTSA returns cannot be explained by exposure to global market, size or value factors.

To the best of our knowledge, a global sector allocation study with such a long sample period and with such a broad range of variables has not been conducted before. In the remainder of this study, we first discuss the design of our study. Then we present our empirical findings. We finalize with a summary and conclusions.

Study design

Data

For this study we use MSCI data to construct ten global sector indices for the period January 1970 until December 2008. The monthly sector returns are in US dollars and include dividends. Sector indices are defined according to the ten sectors from the Global Industry Classification Standard (GICS) developed by MSCI and Standard & Poor's which dates from 1999. The sectors are energy, materials, industrials, consumer discretionary, consumer staples, health care, financials, information technology, telecommunication services and utilities. Bhojraj e.a. (2003) document the superiority of the GICS classification scheme. Prior to 1999 we backfill the ten sectors with MSCI global industry indices. We refer to the appendix for all data construction details.

As table 1 shows, average monthly returns vary between 1.14% for the energy sector and 0.77% for the consumer discretionary sector. IT is the most volatile sector with a standard deviation of the monthly returns of 6.3%. The sector consumer staples has the lowest volatility with a standard deviation of 4.0%. Interestingly, the cyclical sectors materials, industrials and consumer discretionary all have returns below the market average while the reverse applies to the defensive sectors consumer staples, health care, telecommunication services and utilities, as table 1 and figure 1 illustrate. At first glance, it seems odd that cyclical sectors known for their higher volatility and beta lag the market while their defensive counterparts generate a premium to the market. However, this finding is in line with the volatility effect reported for individual stocks, see Ang e.a (2006) and Blitz and van Vliet (2007).

[PLEASE, INSERT FIGURE 1 AROUND HERE]

There is a large dispersion in average dividend yields, ranging between 5.3% for utilities and 1.8% for IT. Finally, financials are the largest sector with an average market capitalization of 18.2%, while the telecom services sector is the smallest sector with a 5.2% market capitalization.

[PLEASE, INSERT TABLE 1 AROUND HERE]

Variables

In this study we examine the seven variables listed below in a long versus short portfolio context:

1M MOM	the total return over the last month,
12-1M MOM	the total return over the eleven months prior to last month,
EARN. REV.	the earnings revisions index as calculated by taking the difference between the number of upward and downward earnings revisions by stock analysts over the last month. Subsequently we divide this difference by the total number of upward and downward earnings estimates,
5-1Y MEAN REV.	the total return over four years prior to the last year,
DY	the sector valuation as measured by the dividend yield,
FED	the direction of the Fed policy. FED selects, for the long portfolio, cyclicals during a period with an expansionary monetary policy and defensives during periods with a contractive monetary policy. The reverse applies to the short portfolio. We discuss this variable in more detail below.
SEAS	the seasonal factor. During winter, the seasonal variable selects cyclicals and during summer defensives. The reverse applies to the short portfolio.

The variables that we use have shown to be a predictor of future sector returns and/or at of individual stock returns. Based on prior academic research we expect this to be an extensive list of easy to implement global quantitative variables. Some valuation indicators (e.g. book-to-market or P/E ratio) have limited data available at a global scale and are therefore excluded. Another variable,

industry recommendations, see Boni and Womack (2005) and Kadan e.a. (2009)[1], is also excluded because the recommendations are not readily available.

Most variables are rather straightforward. Momentum, at least before transaction costs, has demonstrated to have predictive value for future sector returns as for example Moskowitz and Grinblatt (1999) have shown. The earnings revisions variable is related to momentum, but not identical, see Chan e.a. (1996). Ball and Brown (1968) already notice a post-earnings announcement drift on stock level.

As a measure of valuation we include the aggregate dividend yield, the valuation factor for which we have the most extended period of data available. Although the dividend yield factor has been extensively tested on individual stock level and individual industry level (e.g. Fama and French, 1988), we are not aware of other studies who test this factor on a global sector level. As a second valuation measure we use mean reversion as first documented on a stock level by DeBondt and Thaler (1985). Fama and French (1996) define reversal as 60-12 month price return and show this effect is highly correlated with the book-to-market effect. We follow the definition of Fama and French to test reversal on a global sector level.

We extend the monetary strategy as documented by Conover e.a. (2008) to a global basis. This indicator is objective and easy to identify and has the benefit of requiring infrequent portfolio reallocations and thereby involves low trading costs. The theory behind the indicator is that positive economic developments should systematically follow expansive policy shifts, while shifts to a restrictive policy should precede adverse events. During periods of expansive monetary policy this indicator favors materials, industrials, consumer discretionary, information technology and financials while it shortens the sectors energy, consumer staples, health care, telecommunication services and utilities. Although one could argue in favor of a more focused definition of cyclicals versus defensives by leaving some sectors out of the analysis, this categorization comes closest to Conover e.a. (2008). We refer to their table 1 for an historic overview of Fed's policy shifts from 1973 to 2006. We only add one shift in February 1971 and one shift in August 2007 as our sample extends their sample. One could argue that global sectors are less sensitive to Fed's policy shifts than US sectors. Although we agree with this point of view, the indicator still can be valuable as the US is the heavy weight in global indices and international economic conditions have usually moved in tandem.

Doeswijk (2008) shows cyclical and defensive sectors' relative performance differs significantly during a six month winter and summer period. During winter, cyclical stocks perform relatively well while defensives perform well in summer. The Sell in May sector effect is partly the result from (de)leveraging beta on the 'Sell in May' or 'Halloween' seasonal that exists in the broad equity market, see Bouman and Jacobsen (2002). Following Doeswijk (2008), we implement the seasonal factor by putting the cyclical sectors materials, industrials, and consumer discretionary in the long portfolio during winter and in the short portfolio in summer. The defensive sectors consumer staples, health care, telecommunication services, and utilities are in the short portfolio during winter and in the long portfolio during summer. We label the period November through April as winter and May through October like summer[2]. For the sectors involved in the seasonal factor we choose two six months holding periods to prevent a structural bias towards cyclicals or defensives in the long and short portfolios.

Methodology

At the end of each month we construct an equally weighted long and short portfolio for each selection variable. After each month, we rebalance the portfolios and change portfolio positions for a sector in case the selection variable indicates a portfolio change. For the momentum, mean reversion, dividend yield and earnings revisions portfolios we rank all sectors according to these

[1] The results of Boni and Womack (2006), based on their 1996-2002 US sample, do not suggest that changes in industry aggregated analyst recommendations forecast future industry returns. Kadan e.a. (2009) find for their 2002-2007 US sample that a portfolio with industries about which analysts are optimistic outperforms a portfolio with industries about which analysts are pessimistic in the month after the portfolio formation.

[2] Moving the start of the winter and summer period one month backward does not alter the results.

selection variables and select the three top and bottom ranked sectors for the portfolios. The long portfolio consists of the three top ranked sectors and the bottom portfolio consists of the three bottom ranked sectors. For the Fed and the seasonal strategy we assign sectors to the long and short portfolios as discussed above.

Especially for high frequency trading strategies, transaction costs should be taken into account. Commission costs are approaching zero for institutional investors with marginal rates falling below 10 basis points, while retail investors have access to cheap online brokers. Bid ask spreads and the costs of market impact are harder to estimate, especially if it would be true that momentum primarily derives from stocks with high trading costs as Lesmond e.a. (2002) suggest. However, as we focus on market capitalization weighted sector indices, highly liquid blue chips with their small bid ask spreads are likely the main driver of the performance of sector indices. Moreover, these stocks experience limited market impact from large trades. But, even in the case of possible market impact, our selection variables very likely allow gradual buying over several trading days, probably with the exception of one month momentum. Therefore, we agree with Jegadeesh and Titman (1993) that a one-way transaction cost of 0.5% is likely to be conservative[3]. We think in our sector strategy 0.30% is a reasonable estimate for transaction costs, commission costs and market impact costs. Therefore, we will evaluate the trading strategies against round trip transaction costs of 0.60%.

One could argue shorting would increase our estimate of transaction costs, but we do not take these costs into account as the sector allocation strategies are also available to long only all sector investors. Their benchmark also contains the short positions recommended by a sector allocation strategy. Simply not buying these sectors will result in a short position relative to their benchmark and does not increase the transactions costs by the extra costs that shorting takes.

Empirical results

Single factor GTSA strategies

Figure 2 summarizes the cumulative performance of all seven long-short global tactical sector allocation factors. At first glance, four GTSA factors seem to predict relative sector returns, 1M MOM, 12-1M MOM, EARN. REV. and SEAS. For all of these four variables, there are extended periods of time in which the strategy does not deliver. For example, between December 2000 and the end of the sample period in December 2008, 1M MOM does not perform. It neither works between July 1972 and January 1979. 12-1M MOM does not deliver in the period February 1980 through October 1987, SEAS breaks down from January 1976 through December 1980 and EARN. REV. fails from September 2001 through October 2008. Three variables hardly perform at all, 5-1Y MEAN REV., DIV.% and FED. FED has a reasonable performance from the eighties to the mid nineties, but fails afterwards. To be more precise, FED delivers an annualized return of 6.3% from 1980 through 1995, supporting Conover e.a. (2008), but does not work during the most recent monetary easing cycle. In the next section we formally test all our variables prior and after their publication dates.

[PLEASE, INSERT FIGURE 2 AROUND HERE]

Table 2 provides more details into the performance characteristics of the seven GTSA factors. The 1M MOM factor is statistically significant. Before transaction costs, it generates an average monthly performance of 0.55% and an average annual performance of 6.6%. Both t-statistics are well above three and the strategy generates a positive performance in more than half of the months and more than three-quarter of the calendar years. The information ratio, a popular performance indicator amongst practitioners which divides excess return by its tracking error, is 0.61. The annual compounded average return equals 6.0%. The 1M MOM factor requires frequently trading, the estimated annual single counted turnover is a staggering 1593%[4], which would take close to 10%-

[3] Also see Korajczyk and Sadka (2004) for a discussion of the interaction between transaction costs and momentum profits.

[4] We assume 0.30% one-way transaction costs. For ease of calculation we estimate turnover by the difference in the start weights for the sectors at the beginning of each month. As relative performance differs by sector, we underestimate the actual turnover marginally. But,

points from its annual performance. In short, after transaction costs 1-month momentum delivers negative returns. The results are stable across both sub-samples. The market beta equals an insignificant -0.02 which indicates that the performance is uncorrelated to the market's return[5]. The maximum draw down from a previous top has been 35.9%.

[PLEASE, INSERT TABLE 2 AROUND HERE]

The 12-1M MOM sector allocation strategy yields an average monthly and annual return of 0.65% and 8.1% respectively. The results are statistically significant and the annual success ratio is close to 75%. The information ratio is 0.59 and the annual compounded return of the strategy is 7.2%. As it concerns a dynamic strategy with an estimated turnover of 459%, the transaction costs account for a large part of the profit. When we subtract 2.8% transaction costs from 7.2% there is 4.4% left for investors. While the 1-month momentum strategy is stronger in the first sub period, the 12-1 month momentum strategy is stronger in the second sub period. Like for 1-month momentum, beta is close to zero and insignificant. The maximum drawdown from a previous top has been 38.9%, comparable with the 1M MOM rotation strategy.

Related to momentum, we test the earnings revisions sector strategy for the period 1988-2008. This strategy generates an average monthly performance of 0.47% and an average annual performance of 5.6%. Both t-statistics are highly significant. The annual success ratio roughly equals 67%. The information ratio is 0.51. The annual compounded average return equals 5.1%. The earnings revisions strategy generates 933% turnover, between 1-month and 12-1 month momentum, which wipes out all of the profits. Market beta is a significantly negative (-0.20), indicating a better performance of the strategy in down markets. The maximum drawdown from a previous top has been 30.1%.

The sector allocation strategies based on valuation start in 1975, due to limited data availability. Both mean reversion and dividend yield lack predictive power for global sector returns. Over their full sample period of 1975-2008 the average compounded annual return is below 2% for both indicators. Interestingly, the 5 year mean reversion strategy works better during the first sub-sample, while the dividend yield factor works better during the more recent sub-sample. The dividend yield strategy is more persistent, witness the lower turnover compared to mean reversion (100% versus 238%). This reflects the structural difference in dividend payment policy across sectors. Still, after transaction costs both valuation factors yield slightly positive returns. In line with the contrarian nature of the valuation strategies, both strategies have negative betas that are significant. The weak performance of valuation on a global sector level confirms the findings of Capaul (1999). Thus the value premium is much stronger on an individual stock level, than on an aggregated sector level. This insight could shed new light on the debate on the size[6] of the value premium and the explanations[7] for the value premium.

The sector allocation strategy based on monetary policy results in positive but insignificant returns. The Fed strategy has become weaker over time, with a compounded annual return of 2.5% in the first sub period and -0.2% in the last sub-period. The turnover is very low, even lower than for dividend yield, but results after transactions costs are hardly positive during the full sample period. The market beta is significantly positive (0.08), which indicates that the strategy tends to perform better in rising markets.

Finally, the sector allocation strategy based on seasonality generates an average monthly performance of 0.65% and an average annual performance of 8.2%, marginally better than the 12-

we also underestimate the true performance of the strategies as we rebalance monthly. As sector indices appear to be trending, rebalancing weights monthly means a marginal selling of (past and likely future) winners and a marginal buying of (past and likely future) losers. We assume these marginal effects to counterbalance each other.

[5] In a separate not reported analysis we calculate the performance of the strategy in the bottom decile of the market returns. This analysis shows that the performance of all tested strategies cannot be attributed to negative results in extremely weak market conditions.

[6] For example, Houge and Loughran (2006), show that the value premium is very weak among large cap stocks, mutual funds or value/growth style indices.

[7] The implication could be that investors overreact more on news from individual stocks than on news from sectors.

1M MOM selection variable. Both t-statistics are highly significant and the annual success ratio is 76%. The information ratio is 0.68 and the annual compounded return of the strategy is 7.6%, more than enough to compensate for the estimated transaction costs of 2.4% at the annual turnover of 400%. In both sub-periods results are significant. Beta is insignificant and close to zero, like for the momentum strategies. The maximum draw down from a previous top has been 29.6%.

GTSA out-of-sample

We perform an out-of-sample check on the seven tested variables. We will test the predictive power of the GTSA strategies prior to the publication date (which we label here as 'in sample') and after the publication date (which we label here as 'out of sample'). We will use the end date of the sample period used in the study which documented the effect first. Hence, we compare the results of the momentum, valuation, seasonal and monetary policy factors prior to the publication of the results and after the publication of the results. We leave the earnings revisions factor out, because this variable has not been reported before in the literature. This test further helps us to critically asses the predictability on an out-of-sample basis. Hereby, we gain insight of which results are due to data mining and/or which profits have been arbitraged away. Still, because the sample periods are relatively short, weak returns could also be the result of sampling error.

For the momentum strategies we take the end of the sample of Moskowitz and Grinblatt (1999) as a cut of point, which is 1995. For the valuation strategies we use 1998 as reported in Capaul (1999). For the seasonal strategy we take the end of the sample of Doeswijk (2008) as a cut of point, which is 2003. For the Fed policy we use 2005 as used in Conover e.a. (2008). Table 3 shows the results.

[PLEASE, INSERT TABLE 3 AROUND HERE]

Interestingly, the momentum strategies have not become much weaker after their publication date. The compounded annual return of the faster 1-month momentum strategy weakens from 7.1% to 4.0%, but the 12-1 month momentum strategy goes up from 6.4% to 8.7% after publication. Valuation as measured by mean reversion is weak before and after publication. However, the dividend yield valuation factor was negative during the in-sample period, but becomes positive thereafter. For dividend yield, the out-of-sample period starts in 1999 which almost coincides with the peak in the TMT hype of the nineties. During the burst that followed the hype, sectors with high dividend yields (e.g. utilities) strongly outperformed sectors which hardly paid any dividends (e.g. IT). The Fed-based strategy fails after its publication date as witnessed by its -10.7% performance versus 2.1% before publication. Although strongly negative, this is based on only three years of observations. Finally, the seasonal strategy remains positive and goes from 8.0% to 5.1%.

We acknowledge that the post-publication period is too short to determine whether the predictive power of the combined variables is statistically significant. Still, for the six variables in the out-of-sample analysis, the average return in the out-of-sample period weakens from 4.1% to 2.8%. With the full sample average standard deviation of 12.1% this translates into an information ratio close to 0.25 (with an average of 9.0 years this results in a t-value of 0.7). Further, we find that the strongest factors remain their predictive power on average. The average in-sample performance of 1-month momentum, 12-1 month momentum and the seasonal weakens from 7.2% to 5.9% out-of-sample. With the full sample average standard deviation of 12.2% this translates into an information ratio close to 0.50 (with an average of 10.3 years this results in a t-value of 1.5).

We observe that the strongest factors remain most of their predictive power out-of-sample. Or, put differently, the strongest factors on average weaken somewhat after publication date. This weaker out-of-sample performance could be due to data-mining, arbitrage, or regime change. Some quant practitioners therefore use a decay factor applied to historical returns as a rule of thumb to indicate the expected weakening of future returns. This factor could vary between 10% (optimistic) to 80% (conservative). Our GTSA results suggest a performance decay factor of about one third 33% for gross returns. Our results confirm the notion that investors should treat back tested strategies with caution.

Multiple factor GTSA

From the seven variables that we have tested, four seem to be interesting. These are 1M MOM, 12-1M MOM, EARN. REV. and SEAS. However, transaction costs erode the profits for the 1M MOM and the EARN. REV. sector rotation strategies. As investors can combine several indicators in a sector rotation strategy, this does not necessarily mean that these two indicators are worthless. As table 4 shows, the correlation among the four above mentioned variables is limited. Therefore, combining these selection variables might improve performance and possibly reduce turnover. Therefore, we will now discuss a sector rotation strategy that combines several factors.

[PLEASE, INSERT TABLE 4 AROUND HERE]

We focus on the strategy that combines 1M MOM, 12-1M MOM and SEAS as we lack data for the whole sample period for the EARN. REV. variable. We test for a basic sector rotation strategy that determines the attractiveness of a sector on the total score on three variables. For 1M MOM and 12-1M MOM the two sectors in the lowest quintile get a score of 0 points, the second ranked quintile gets a score of 1 till we arrive at the highest quintile which gets a score of 4. For SEAS we do not have quintile rankings available so we have a slightly different methodology which assigns 0 points to the sectors in the short SEAS portfolio, 4 points to sectors in the long SEAS portfolio and all other sectors get a neutral score of 2 points. This way, the maximum total score of a sector is twelve points, the minimum score is 0. At the end of each month we rank all sectors on their total score.

To allocate a sector to the long or the short portfolio we use two decision rules. First, to become a long or a short position a sector has to surpass the threshold score of above 9 for a long position or below 3 for a short position. Second, to limit turnover, a long or a short position will finish when the total score surpasses the threshold score of 6 for both long and short positions. Using these two decision rules, 23.3% of all monthly recommendations is long, 24.1% is short while the remaining 52.5% of all recommendations is neutral. So, usually there are two or three sectors in the long and short positions of the combined GTSA strategy.

The results for the three factor sector rotation strategy are shown in figure 3 and table 5 below. Combining several factors into one strategy obviously adds value. It enhances the performance which, as illustrated in the chart, arises gradually over time to an annual average return of 14.1%. Results are highly significant as indicated by the t-statistic. The information ratio is between 0.8 and 0.9 in both sub-samples. The compounded annual return is 12.9%, 5%-point above the best single factor sector rotation strategy. Turnover is high with 507%, nevertheless we estimate the net performance at 9.9% a year. Using a one third decay factor, future gross performance would be 8.6% while net performance would still be 5.6%.

The beta of -0.07 is insignificant. Further, the strategy outperforms in the bottom decile of the monthly market returns which also indicates that it cannot be explained by systematic downside risk. Finally, the maximum drawdown is 29.9%. This equals around three years of average net performance, which shows that this is not a riskless strategy. For many active managers, three years of negative performance could mean that they lose their job.

[PLEASE, INSERT FIGURE 3 AROUND HERE]

For those who are skeptical about the suggested decay factor or our estimation of transaction costs, we note that there might very well be room to improve performance. One could focus on reducing turnover at the cost of some performance, for example by implementing more sophisticated portfolio selection rules. Moreover, in this study we use only ten sector indices to construct two quintile portfolios to select our long and short positions. Long-short portfolios from a high number of industry groups would provide the investor more breadth which is likely to result in even higher risk-adjusted returns[8]. Finally, although not included due to lack of long-term historical data, inclusion of the earnings revisions factor could improve results further.

[8] We use ten sector indices instead of more industry group indices as it is much more difficult to construct consistent long term global industry group indices than to construct ten global indices. With a shorter sample period one could use global industry group indices which are available from several data sources.

[PLEASE, INSERT TABLE 5 AROUND HERE]

GTSA related to SMB, HML factors

We regress the three factor long-short sector rotation strategy on the three well known Fama and French (1993) three factors: market, size and value. For this analysis we use the performance of the MSCI World Index as market factor, the performance of the MSCI World Small Cap Index versus the MSCI World Index as size factor[9] and the performance of the MSCI World Value Index versus the MSCI World Growth Index as value factor. We exclude the momentum factor as suggested by Carhart (1997) from our analysis because there is no global momentum factor readily available. We limit this analysis to the period July 1989 to December 2008 as we have no size factor available before this period.

Table 6 shows the outcome of the regression analysis. It appears that alpha is highly significant with 1.49% a month. This alpha is even higher than the average monthly return of the sector rotation strategy over this period of 1.33% a month. The combined GTSA strategy has a significant negative beta to the market of -0.16 which means that the profitability of the strategy cannot be explained by market exposure. The strategy does not load significantly on the size factor. The strategy does have significant negative exposure to the global value factor. The factor loading is -0.49 which suggests that the GTSA strategy on average has exposure to growth stocks, outperforming during periods when growth stocks outperform. In short, the Fama and French analysis suggests that systematic exposure to market, size and value factors can not explain the positive returns of the GTSA strategy.

[PLEASE, INSERT TABLE 6 AROUND HERE]

[9] Before 2001 we use the S&P Citigroup Small Cap Index in our analysis, as prior to 2001 there are no total return data available for the MSCI World Small Cap Index.

Summary and conclusions

In this study we consider seven easy-to-implement quantitative variables for global tactical sector allocation (GTSA) purposes: two momentum variables (1-month and 12-1 month), one earnings revisions variable, two valuation variables (mean reversion and dividend yield), a Fed policy variable, and the Sell in May seasonal indicator. We use ten global monthly total return sector indices in US dollars for the period 1970-2008. At the end of each month we construct an equally weighted long and short portfolio for each selection variable. Each month, we rebalance the portfolios and change portfolio positions for a sector in case the selection variable indicates a portfolio change. We document significant returns for momentum (1-month and 12-1 month), earnings revisions and the Sell in May seasonal, also after their publication dates. By contrast, monetary policy and valuation (mean-reversion and dividend yield) fail to predict global sector returns.

Our out-of-sample tests do not seem to support the hypothesis that predictive variables completely stop working after publication. For the six variables in the out-of-sample analysis, the average return in the out-of-sample period weakens from 4.1% to 2.8% and for the three strongest variables these numbers are 7.2% and 5.9% respectively. Some quant practitioners use a certain decay factor for returns as a rule of thumb to indicate the expected weakening future returns. Our GTSA results suggest a decay factor of about one third for gross returns, but more data is needed to test for significance.

A long-short sector rotation strategy based on both momentum variables and the seasonal factor yields an annual compounded return of 12.9%. Turnover is 507% which reduces the net return by 3.0% to 9.9%. Using a one third decay factor expected net future return is about 5.6%. This return is certainly not riskless but comes with about 17% volatility and severe draw downs. The strategy has a monthly success ratio of 63% and an annual success ratio of 82%. A Fama and French analysis suggests that systematic exposure to market, size and value factors can not explain the positive returns of the GTSA strategy.

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Appendix: data description

For this study we construct ten global market capitalization weighted total return sector indices in US dollars with a monthly frequency. From 1995 we use the MSCI total return data for the ten sectors from the Global Industry Classification Standard (GICS) developed by MSCI and Standard & Poor's. Prior to 1995, we develop ten similar indices which we derive from the 38 old MSCI industries. We use the following methodology in constructing these indices. First, we assign each old industry to one out of the ten sectors, as table A.1 illustrates.

TABLE A.1
CONVERSION OF OLD MSCI DATA SERIES INTO GICS CLASSIFICATION SCHEME

OLD MSCI SECTOR	OLD MSCI INDUSTRY	GICS SECTOR
ENERGY		
	ENERGY SOURCES	10 ENERGY
	UTILITIES - ELECTRICAL & GAS	55 UTILITIES
MATERIALS		
	BUILDING MATERIALS & COMPONENTS	15 MATERIALS
	CHEMICALS	15 MATERIALS
	METALS - NON FERROUS	15 MATERIALS
	METALS - STEEL	15 MATERIALS
	FOREST PRODUCTS & PAPER	15 MATERIALS
	MISC. MATERIALS & COMMODITIES	15 MATERIALS
CAPITAL EQUIPMENT		
	AEROSPACE & MILITARY TECHNOLOGY	20 INDUSTRIALS
	CONSTRUCTION AND HOUSING	20 INDUSTRIALS
	DATA PROCESSING & REPRODUCTION	45 INFORMATION TECHNOLOGY
	ELECTRICAL & ELECTRONICS	45 INFORMATION TECHNOLOGY
	ELECTRONIC COMPONENTS INSTRUMENTS	45 INFORMATION TECHNOLOGY
	ENERGY EQUIPMENT & SERVICES	10 ENERGY
	INDUSTRIAL COMPONENTS	20 INDUSTRIALS
	MACHINERY & ENGINEERING	20 INDUSTRIALS
CONSUMER GOODS		
	APPLIANCES & HOUSEHOLD DURABLES	25 CONSUMER DISCRETIONARY
	AUTOMOBILES	25 CONSUMER DISCRETIONARY
	BEVERAGES & TOBACCO	30 CONSUMER STAPLES
	FOOD & HOUSEHOLD PRODUCTS	30 CONSUMER STAPLES
	HEALTH & PERSONAL CARE	35 HEALTH CARE
	RECREATION, OTHER CONSUMER GOODS	25 CONSUMER DISCRETIONARY
	TEXTILES & APPAREL	25 CONSUMER DISCRETIONARY
SERVICES		
	BROADCASTING & PUBLISHING	25 CONSUMER DISCRETIONARY
	BUSINESS & PUBLIC SERVICES	20 INDUSTRIALS
	LEISURE & TOURISM	25 CONSUMER DISCRETIONARY
	MERCHANDISING	20 INDUSTRIALS
	TELECOMMUNICATIONS	50 TELECOMMUNICATION SERVICES
	TRANSPORTATION - AIRLINES	20 INDUSTRIALS
	TRANSPORTATION - ROAD & RAIL	20 INDUSTRIALS
	TRANSPORTATION - SHIPPING	20 INDUSTRIALS
	WHOLESALE & INTERNATIONAL TRADE	20 INDUSTRIALS
FINANCE		
	BANKING	40 FINANCIALS
	FINANCIAL SERVICES	40 FINANCIALS
	INSURANCE	40 FINANCIALS
	REAL ESTATE	40 FINANCIALS
MULTI-INDUSTRY		
	MULTI-INDUSTRY	20 INDUSTRIALS
GOLD MINES		
	GOLD MINES	15 MATERIALS

Second, as market capitalization data before 1986 is missing, we estimate market capitalizations for all industries by discounting the market capitalization with the monthly price returns. Hereby, we introduce a bias within the sector indices as we might use incorrect weighting factors for the industries to arrive at their sector performance. Initial public offerings, secondary offerings and debt-for-equity swaps for example are not taken into account. However, a priori we believe there is no reason to assume this will significantly impact our final results as it seems unlikely that within a

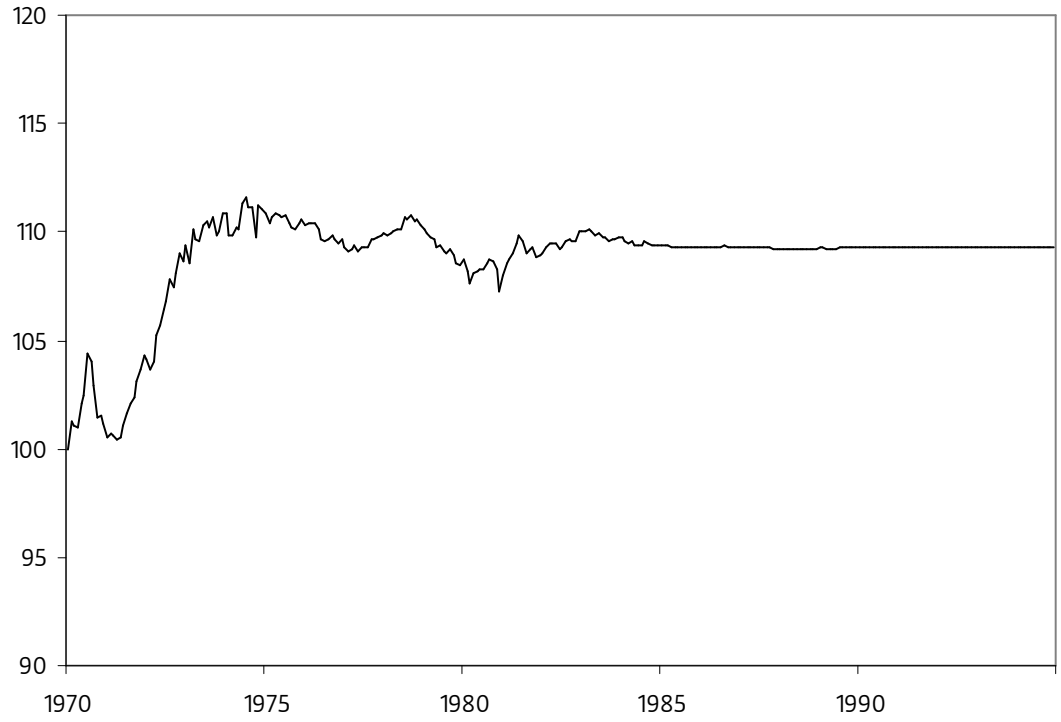
sector changes in floatation differ a lot between industries. Notice that differences in floatation dynamics between sectors do not matter as we will examine relative sector performances in this study. So, when in a specific sector our estimates for the industries' market capitalizations are biased due to heavy equity offerings, this does not matter for a sector for which there are hardly equity offerings in the industries.

Third, for the period December 1974 to February 1980 we lack dividend yield data for 18 out of the 38 industries. These 18 industries represent 37.9% of the estimated combined market capitalization in 1974. For these 18 industries we estimate the dividend yield prior to February 1980 by assuming that the change in dividend yield equals the average change in dividend yield for the other industries in their sector. If there is no other industry which has dividend yields available, we assume it to change like for the MSCI World index for which dividend yields are available since its inception in 1970. Prior to December 1974 we assume changes in dividend yields for all industries to equal changes in the dividend yield for the MSCI World index. Obviously, our estimated dividend yields prior to 1980 are not completely like they actually have been. Although we agree that especially in the beginning of the seventies there might be some more severe biases in our dividend yield estimates, we argue that this probably will not affect our results as we focus on differences in monthly returns. These are mainly driven by price swings instead of different dividend yields.

Fourth, for all industries we assume that during the year the dividend yield is distributed to stock holders as it is for the MSCI World index. As we have dividend yields and a total return index available for the MSCI World index, we can estimate the monthly distribution of dividend yields. Again, this probably will not affect our results significantly as monthly returns are mainly driven by price swings instead of dividends. By combining our total return sector indices over the period 1970 to 1994 with the MSCI series from 1995 we arrive at ten global total return sector indices in US dollars from 1970 to 2008.

To check whether we have serious distortions in our aggregated sector returns, we have calculated a total return index for the world by multiplying the estimated total returns for each sector by the estimated relative weights of the market capitalization at the end of the prior month. Our index comes rather close to the official MSCI World index as figure A.1 illustrates. Here, we have calculated

FIGURE A.1
RELATIVE PERFORMANCE OF CONSTRUCTED WORLD INDEX VS MSCI WORLD INDEX



the relative performance of our constructed world index (we divide our index by the MSCI World index; afterwards we have rebased this new series to 100). Only in 1972 and 1973 we overestimate the return for the world index by roughly a cumulative 10%. As the bias is centered around two years, it is likely to be the result of an incorrect estimate for the market weights of sectors. In case of seriously biased dividend estimates we would expect to see gradual deviations from the MSCI World index for all years. In other words, this check suggests that there is no serious bias in our total return series for the sectors. The estimated market capitalizations might have a bias. As we compare sector returns in this study, it seems unlikely that our results are affected by any serious data distortions.

From the end of 1987 we also construct series of the number of upward and downward earnings revisions for each of these sectors, based on IBES data which are available from the end of 1987. We calculate the earnings revisions index in this study as the difference in the number of upward and downward earnings revisions, divided by the total number of earnings revisions.

TABLE 1
DESCRIPTIVE STATISTICS OF THE TEN GLOBAL SECTOR INDICES

	AVERAGE MONTHLY RETURN	ST.DEV.	DIVIDEND YIELD	MARKET CAP
ENERGY	1.14%	5.3%	3.9%	8.1%
MATERIALS	0.82%	5.3%	3.2%	10.1%
INDUSTRIALS	0.79%	4.6%	2.6%	17.1%
CONSUMER DISCRETIONARY	0.77%	4.9%	2.3%	10.3%
CONSUMER STAPLES	1.04%	4.0%	3.0%	7.2%
HEALTH CARE	0.97%	4.5%	2.3%	7.6%
FINANCIALS	0.91%	5.3%	2.8%	18.2%
IT	0.81%	6.3%	1.8%	10.3%
TELECOM SERVICES	0.87%	4.6%	4.9%	5.2%
UTILITIES	0.95%	4.1%	5.3%	6.0%
AVERAGE	0.91%	4.9%	3.2%	10.0%

TABLE 2
PERFORMANCE CHARACTERISTICS OF SEVEN SINGLE VARIABLE LONG-SHORT GLOBAL SECTOR ROTATION STRATEGIES (1971-2008)

	1971/1975*-2008		1971/1975*-1987		1988-2008	
	MONTHLY	CALENDAR YR.	MONTHLY	CALENDAR YR.	MONTHLY	CALENDAR YR.
ONE MONTH MOMENTUM						
AVERAGE	0.55%	6.6%	0.61%	7.5%	0.49%	5.9%
MEAN	0.41%	6.6%	0.45%	6.5%	0.30%	6.7%
STDEV	3.4%	10.8%	3.0%	10.4%	3.7%	11.3%
T-VALUE	3.45	3.75	2.92	2.96	2.11	2.38
INFORMATION RATIO	0.16	0.61	0.20	0.72	0.13	0.52
MAXIMUM RETURN	13.3%	30.1%	10.7%	30.1%	13.3%	27.3%
MINIMUM RETURN	-17.4%	-25.8%	-9.1%	-10.0%	-17.4%	-25.8%
SUCCESS RATIO	55.5%	76.3%	59.3%	76.5%	52.4%	76.2%
TURNOVER (SINGLE COUNTED)	133%	1593%	129%	1553%	135%	1625%
COMPOUNDED AVERAGE RETURN		6.0%		7.0%		5.2%
COMPOUNDED AVERAGE NET RET.		-3.5%		-2.3%		-4.5%
BETA	-0.02		0.06		-0.08	
MAX. DRAW DOWN FROM TOP	-35.9%		-18.7%		-35.9%	
MAX. DRAW DOWN IN 12 MTH.	-30.2%		-18.7%		-30.2%	
TWELVE MINUS ONE MONTH MOMENTUM						
AVERAGE	0.65%	8.1%	0.38%	4.7%	0.87%	10.8%
MEAN	0.58%	8.7%	0.55%	8.0%	0.63%	9.4%
STDEV	3.8%	13.7%	3.1%	11.4%	4.2%	15.3%
T-VALUE	3.70	3.64	1.74	1.68	3.27	3.24
INFORMATION RATIO	0.17	0.59	0.12	0.41	0.21	0.71
MAXIMUM RETURN	21.0%	41.4%	9.8%	20.8%	21.0%	41.4%
MINIMUM RETURN	-16.2%	-24.5%	-10.2%	-10.9%	-16.2%	-24.5%
SUCCESS RATIO	59.4%	73.7%	58.8%	58.8%	59.9%	85.7%
TURNOVER (SINGLE COUNTED)	38%	459%	38%	459%	38%	459%
COMPOUNDED AVERAGE RETURN		7.2%		4.1%		9.8%
COMPOUNDED AVERAGE NET RET.		4.5%		1.3%		7.1%
BETA	-0.05		0.07		-0.13	
MAX. DRAW DOWN FROM TOP	-38.9%		-22.2%		-38.9%	
MAX. DRAW DOWN IN 12 MTH.	-38.9%		-22.2%		-38.9%	
EARNINGS REVISIONS INDEX						
AVERAGE	N.A.	N.A.	N.A.	N.A.	0.47%	5.6%
MEAN	N.A.	N.A.	N.A.	N.A.	0.42%	6.1%
STDEV	N.A.	N.A.	N.A.	N.A.	3.4%	11.1%
T-VALUE	N.A.	N.A.	N.A.	N.A.	2.23	2.33
INFORMATION RATIO	N.A.	N.A.	N.A.	N.A.	0.14	0.51
MAXIMUM RETURN	N.A.	N.A.	N.A.	N.A.	14.3%	37.1%
MINIMUM RETURN	N.A.	N.A.	N.A.	N.A.	-10.5%	-10.5%
SUCCESS RATIO	N.A.	N.A.	N.A.	N.A.	56.0%	66.7%
TURNOVER (SINGLE COUNTED)	N.A.	N.A.	N.A.	N.A.	78%	933%
COMPOUNDED AVERAGE RETURN		N.A.		N.A.		5.1%
COMPOUNDED AVERAGE NET RET.		N.A.		N.A.		-0.5%
BETA					-0.20	
MAX. DRAW DOWN FROM TOP	N.A.		N.A.		-30.1%	
MAX. DRAW DOWN IN 12 MTH.	N.A.		N.A.		-23.7%	
FIVE YEAR MINUS ONE YEAR MEAN REVERSION*						
AVERAGE	0.20%	2.4%	0.36%	4.3%	0.09%	1.2%
MEAN	-0.08%	0.3%	0.23%	3.2%	-0.33%	-2.0%
STDEV	3.3%	12.1%	2.8%	9.1%	3.6%	13.3%
T-VALUE	1.21	1.16	1.63	1.71	0.41	0.41
INFORMATION RATIO	0.06	0.20	0.13	0.47	0.03	0.09
MAXIMUM RETURN	16.2%	30.9%	7.5%	25.2%	16.2%	30.9%
MINIMUM RETURN	-12.8%	-18.4%	-8.4%	-5.5%	-12.8%	-18.4%
SUCCESS RATIO	48.8%	52.9%	53.2%	69.2%	46.0%	42.9%
TURNOVER (SINGLE COUNTED)	20%	238%	19%	231%	20%	243%
COMPOUNDED AVERAGE RETURN		1.7%		4.0%		0.4%
COMPOUNDED AVERAGE NET RET.		0.3%		2.6%		-1.1%
BETA	-0.11		-0.02		-0.18	
MAX. DRAW DOWN FROM TOP	-49.6%		-17.0%		-49.6%	
MAX. DRAW DOWN IN 12 MTH.	-20.8%		-17.0%		-20.8%	

TABLE 2 (CONTINUED)
PERFORMANCE CHARACTERISTICS OF SEVEN SINGLE VARIABLE LONG-SHORT GLOBAL SECTOR ROTATION STRATEGIES (1971-2008)

	1971/1975*-2008		1971/1975*-1987		1988-2008	
	MONTHLY	CALENDAR YR.	MONTHLY	CALENDAR YR.	MONTHLY	CALENDAR YR.
DIVIDEND YIELD*						
AVERAGE	0.21%	2.8%	0.09%	-3.8%	0.28%	3.7%
MEAN	0.07%	-0.5%	0.01%	-3.6%	0.10%	0.3%
STDEV	3.2%	14.1%	2.9%	3.0%	3.4%	14.6%
T-VALUE	1.34	0.97	0.41	-2.21	1.33	1.17
INFORMATION RATIO	0.07	0.20	0.03	-1.28	0.08	0.25
MAXIMUM RETURN	12.7%	42.0%	10.4%	-0.9%	12.7%	42.0%
MINIMUM RETURN	-9.7%	-23.3%	-7.8%	-6.8%	-9.7%	-23.3%
SUCCESS RATIO	51.0%	45.8%	50.0%	0.0%	51.6%	52.4%
TURNOVER (SINGLE COUNTED)	8%	100%	9%	110%	8%	94%
COMPOUNDED AVERAGE RETURN		1.9%		0.6%		2.7%
COMPOUNDED AVERAGE NET RET.		1.3%		0.0%		2.2%
BETA	-0.33		-0.37		-0.31	
MAX. DRAW DOWN FROM TOP	-53.6%		-22.9%		-53.6%	
MAX. DRAW DOWN IN 12 MTH.	-26.8%		-21.0%		-26.8%	
FED POLICY						
AVERAGE	0.12%	1.5%	0.23%	2.7%	0.03%	0.6%
MEAN	0.01%	-0.2%	0.04%	2.3%	0.00%	-3.3%
STDEV	2.7%	10.6%	2.3%	7.5%	3.0%	12.6%
T-VALUE	0.95	0.90	1.43	1.51	0.16	0.21
INFORMATION RATIO	0.04	0.15	0.10	0.37	0.01	0.05
MAXIMUM RETURN	10.3%	23.5%	9.0%	14.0%	10.3%	23.5%
MINIMUM RETURN	-11.4%	-24.8%	-6.6%	-9.9%	-11.4%	-24.8%
SUCCESS RATIO	50.9%	50.0%	51.5%	58.8%	50.4%	42.9%
TURNOVER (SINGLE COUNTED)	7%	83%	9%	107%	6%	67%
COMPOUNDED AVERAGE RETURN		1.0%		2.5%		-0.2%
COMPOUNDED AVERAGE NET RET.		0.5%		1.8%		-0.6%
BETA	0.08		-0.04		0.17	
MAX. DRAW DOWN FROM TOP	-43.8%		-20.9%		-43.8%	
MAX. DRAW DOWN IN 12 MTH.	-27.0%		-16.0%		-27.0%	
SEASONALITY						
AVERAGE	0.65%	8.2%	0.60%	7.7%	0.69%	8.7%
MEAN	0.54%	9.8%	0.56%	11.0%	0.52%	9.7%
STDEV	2.9%	12.1%	2.6%	12.0%	3.1%	12.3%
T-VALUE	4.83	4.19	3.36	2.65	3.47	3.22
INFORMATION RATIO	0.23	0.68	0.24	0.64	0.22	0.70
MAXIMUM RETURN	13.5%	33.4%	12.2%	22.8%	13.5%	33.4%
MINIMUM RETURN	-6.9%	-13.8%	-6.9%	-13.8%	-6.7%	-12.9%
SUCCESS RATIO	60.7%	76.3%	58.8%	76.5%	62.3%	76.2%
TURNOVER (SINGLE COUNTED)	33%	400%	33%	400%	33%	400%
COMPOUNDED AVERAGE RETURN		7.6%		7.1%		8.0%
COMPOUNDED AVERAGE NET RET.		5.2%		4.7%		5.6%
BETA	-0.03		0.04		-0.07	
MAX. DRAW DOWN FROM TOP	-29.6%		-23.1%		-29.6%	
MAX. DRAW DOWN IN 12 MTH.	-23.1%		-23.1%		-19.3%	

TABLE 3
PERFORMANCE OF A SELECTION VARIABLE BEFORE AND AFTER ITS DOCUMENTATION IN THE ACADEMIC LITERATURE

	PRIOR TO PUBLICATION/IN-SAMPLE		POST PUBLICATION/OUT-OF-SAMPLE	
1M MOMENTUM	1971-1995	7.1%	1996-2008	4.0%
12-1M MOMENTUM	1971-1995	6.4%	1996-2008	8.7%
5Y-1Y MEAN REV.	1975-1998	1.5%	1999-2008	2.3%
DY	1975-1998	-0.3%	1999-2008	7.6%
SEASONAL	1971-2003	8.0%	2004-2008	5.1%
FED	1971-2005	2.1%	2006-2008	-10.7%
AVERAGE		4.1%		2.8%
AVERAGE 1M MOM, 12-1M MOM, SEAS		7.2%		5.9%

TABLE 4
CORRELATIONS BETWEEN SEVEN SINGLE VARIABLE GLOBAL SECTOR ROTATION STRATEGIES

	1M MOM	12-1M MOM	EARN. REV.	5-1Y MEAN REV.	DIV%	SEASON	FED
1M MOM	1.00						
12-1M MOM	0.19	1.00					
EARN. REV.	0.16	0.53	1.00				
5-1Y MEAN REV.	-0.02	-0.05	0.07	1.00			
DIV%	-0.12	-0.10	0.27	0.03	1.00		
FED	0.07	-0.25	0.08	-0.07	-0.25	1.00	
SEASON	0.11	-0.04	0.00	0.00	-0.02	-0.02	1.00

TABLE 5
PERFORMANCE CHARACTERISTICS OF A THREE FACTOR (1M MOM, 12-1M MOM AND SEAS) LONG-SHORT GLOBAL SECTOR ROTATION STRATEGY

	1971-2008		1970-1987		1988-2008	
	MONTHLY	CALENDAR YR.	MONTHLY	CALENDAR YR.	MONTHLY	CALENDAR YR.
AVERAGE	1.10%	14.1%	0.88%	10.8%	1.28%	16.8%
MEDIAN	1.01%	12.1%	0.89%	10.4%	1.10%	15.0%
STDEV	4.1%	17.2%	3.8%	12.2%	4.4%	20.7%
T-VALUE	5.71	5.07	3.34	3.64	4.57	3.72
INFORMATION RATIO	0.27	0.82	0.23	0.88	0.29	0.81
MAXIMUM RETURN	23.1%	66.2%	15.5%	29.9%	23.1%	66.2%
MINIMUM RETURN	-11.5%	-18.4%	-10.5%	-13.1%	-11.5%	-18.4%
SUCCESS RATIO	62.5%	81.6%	61.8%	82.4%	63.1%	81.0%
TURNOVER (SINGLE COUNTED)	42%	507%	39%	473%	43%	517%
COMPOUNDED AVERAGE		12.9%		10.2%		15.2%
COMPOUNDED AVERAGE NET RET.		9.9%		7.3%		12.1%
BETA	-0.07		0.00		-0.12	
MAX. DRAW DOWN FROM TOP	-29.9%		-23.1%		-29.9%	
MAX. DRAW DOWN IN 12 MTH.	-26.3%		-23.1%		-26.3%	

TABLE 6
FAMA AND FRENCH REGRESSION ANALYSIS OF THREE FACTOR LONG-SHORT SECTOR ROTATION STRATEGY OVER THE PERIOD JULY 1989 TO DECEMBER 2008 (T-VALUES BETWEEN BRACKETS)

ALPHA	MARKET	SIZE	VALUE
0.01493	-0.16	0.11	-0.49
(5.20)	(-2.42)	1.08	(-3.63)

FIGURE 1
RELATIVE TOTAL PERFORMANCE OF TEN GLOBAL SECTOR INDICES (1970-2008)

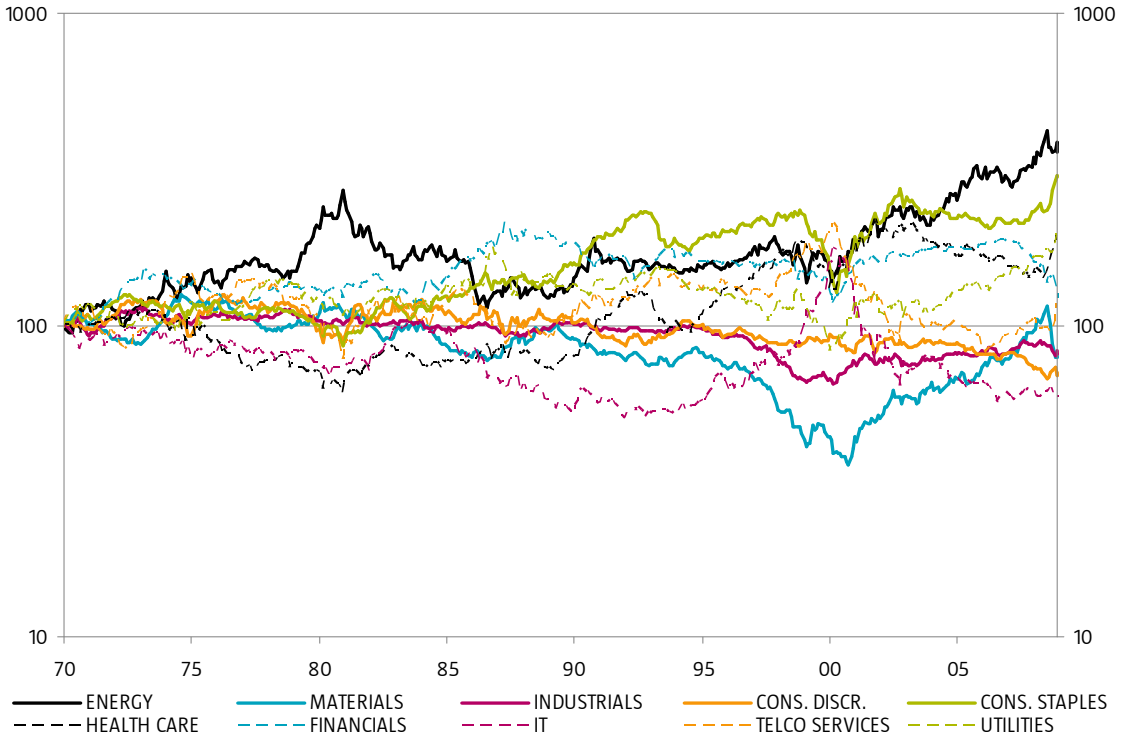


FIGURE 2
CUMULATIVE PERFORMANCE OF SEVEN SINGLE VARIABLE LONG-SHORT GLOBAL SECTOR ROTATION STRATEGIES (1971-2008)

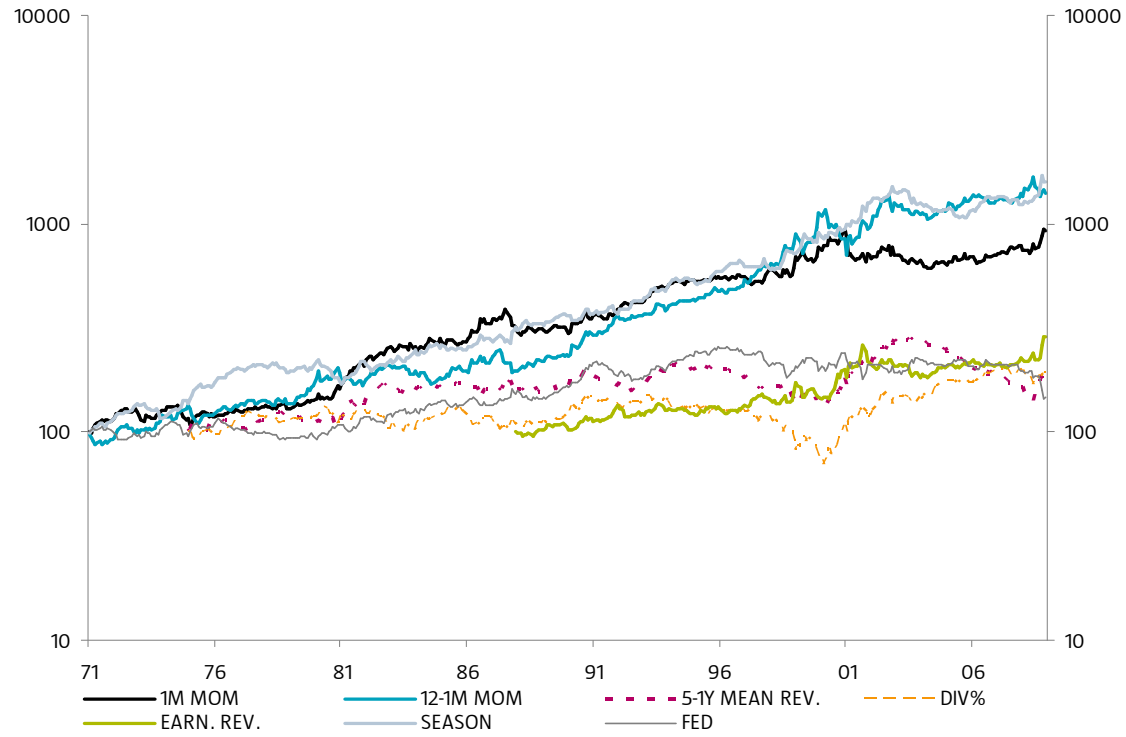


FIGURE 3

CUMULATIVE PERFORMANCE OF THREE SINGLE VARIABLE LONG-SHORT GLOBAL SECTOR ROTATION STRATEGIES AND A THREE FACTOR LONG-SHORT GLOBAL SECTOR ROTATION STRATEGY (1971-2008)