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The Performance of Value and Momentum Investment Portfolios: Recent Experience in the Major European Markets Part 2

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Introduction

Numerous writers over the last 25 years have documented the success of value and momentum investment strategies when applied over a wide selection of markets. In a paper in the December 2003 issue of this Journal, it was established that a number of simple implementations of

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these strategies performed particularly well across the major European markets during the period from January 1990 to June 2002. The purpose of this paper is to extend the previous analysis and examine strategies which combine value and momentum strategies within one portfolio. Indeed, there are reasons to think that such a combination will produce very attractive portfolios, and it is the intention in this paper to evaluate alternative ways of exploiting this investment opportunity.

The next section of this paper briefly introduces value and momentum investing and their performance history. The third section provides a broad outline of the methods and data employed in this study. The fourth section outlines the findings, which confirm the potential of combining value and momentum criteria when selecting investment portfolios and, in particular, illustrates how this might best be done. The paper concludes with some summary comments.

Value and momentum investing

As indicated above, the focus of this paper is on the opportunities presented by building portfolios using combinations of value and momentum portfolios within the major European markets over the period from January 1990 to June 2002. Before the empirical findings are discussed, however, a brief introduction is provided to both approaches to investing, including a review of the findings in the previous paper based on the same European data (Bird and Whitaker, 2003).

Value investing

It was Graham and Dodd (1934) who first suggested that analysts extrapolate past earnings growth too far out into the future and, by so doing, drive the price of the stock of the better-performing firms to too high a level and that of the poorly performing stocks to too low a level. A number of valuation criteria (price-to-book, price-to-earnings, price-to-sales and so on) have been used to identify mispriced stocks and so form the basis for choosing portfolios designed to exploit the resulting investment opportunities. This approach to investing became known as either value investing, because of its focus on investing in 'cheap' stocks and avoiding 'expensive' stocks, or contrarian investing, as it meant forming portfolios which are atypical of those being held more generally by investors at a particular time.

Numerous authors have found that strategies based on value criteria are capable of adding value (eg Rosenberg *et al.,* 1985; Chan *et al.,* 1991; Arshanapalli *et al.,* 1998; Rouwenhorst, 1999; Lakonishok *et al.,* 1994).

The previous paper evaluated several value criteria for choosing stocks and came to the following conclusion:

> 'a value strategy based on either book-to-market or sales-to-price performed well if executed over the major European markets during the period from January 1990 to June 2002. This is a particularly interesting period as it contains a 10-year period when there was a boom in stock prices followed by a 2+ year correction period. Indeed, an analysis of the returns on the value portfolios confirms the authors' expectations that the value strategy struggled during the former period but strongly came into its own during the correction period.'

Momentum investing

Momentum investing basically involves choosing stocks on the basis of a past trend typically in stock prices or some precursor of movement in prices such as earnings. As will be seen, momentum stocks tend to display a number of the characteristics of 'growth' stocks (high valuation ratios, immediate past and expected future earnings growth and so on), and so momentum investing can be regarded as a simple implementation of growth investing. This (and the previous) paper considers two types of momentum: price momentum and earnings momentum.

Price momentum

Price momentum investing involves favouring stocks that have performed relatively well in the more recent past while avoiding those that have performed relatively poorly. The usual justification for such a strategy being that the performance of both markets and individual stocks is largely driven by market sentiment which itself follows trends.

A number of studies in the last decade have identified strong continuation in performance based upon a stock's performance over the prior three to 12 months (Jegadeesh and Titman, 1993, 2001; Rouwenhorst, 1998). The previous paper came to the following conclusion relating to the performance of a price momentum strategy over the sample period:

> 'The six-month (price) momentum strategy continues to maintain good performance for holding periods of up to 9 months ... In the 12-month strategy the optimal holding period is less than 6 months ... Consistent with the findings in the combined markets, a combination of 6-month price momentum with a 9-month holding period perform very well in all but the French and Spanish markets.'

Earnings momentum

A second form of momentum that has been evaluated is earnings momentum, with the many writers evaluating the relationship between the information provided by reported earnings or analyst's earnings forecast and future investment returns. A very early study in this area was conducted by Ball and Brown (1968), who substantiated that prices do react to the announcement of unexpected earnings and also provided early evidence of a post-announcement earnings drift. Subsequently, writers identified a correlation between many aspects of the information provided by analysts with future stock returns, thus confirming the importance to the market of information relating to earnings (see, for example, Givoly and Lakonishok, 1979; Chan *et al.,* 1991; Womack, 1996). These forecasts have the advantage over reported earnings of occurring earlier in the information cycle and being updated more frequently and so are more in tune with an investment strategy that is rebalanced on a regular basis.

The previous paper came to the following conclusion with respect to the use of earnings momentum as an investment signal over the sample period:

> 'The results for portfolios formed using agreement as the criterion proved to be particularly strong, especially for (holding) periods of up to 12 months ... portfolios based on the magnitude of the earnings revision are much weaker and less consistent ...'

Interplay between value and momentum

The previous paper concluded that there were a number of individual implementations of both value and momentum investing which performed very successfully in the major European markets over the period from January 1990 to June 2002. This paper turns attention to the possibility of realising even better returns by combining value and momentum within a single investment strategy. In response to a perceived cyclicality in stock performance, a number of studies have attempted to identify factors which predict periods of outperformance by growth stocks and by value stocks (see, for example, Asness *et al.,* 2000). In general, the authors of these studies would claim a fair degree of success, with macroeconomic factors (eg yield spreads) and valuation factors (eg value spreads relative to growth spreads) seemingly having predicted power. It is proposed that the findings in these studies and those of others suggest that there are many stocks which go through a value/momentum cycle

and that this cycle is closely tied to the economic cycle, with the rewards to momentum investing being largely pro-cyclical and those to value investing being largely counter-cyclical. The fact that the present sample encompasses sustained periods of both positive and negative market performance enables this proposition to be evaluated.

There has been much reference in the finance literature to the apparent conundrum where some stocks underreact to information whereas others overreact. Momentum and value investing are very much part of this phenomenon, with underreaction to individual pieces of information being an important characteristic of trends in price behaviour that lead to momentum profits, while an overreaction to a series of similar announcements (eg good news) is an important contributor to the excesses in pricing which eventually give rise to the conditions for value investing to succeed. It can be expected that the value and momentum criteria are well placed to capture the cyclical nature of stock performance, as suggested in the papers by Barberis *et al.* (1998) and Hong and Stein (1999). This paper first confirms these expectations by examining the correlation between the returns from value and momentum strategies and then evaluates alternative means of exploiting the resulting investment opportunities.

Data and method

Data

The following section presents the findings on the combination of both value and price momentum investing when practised across the following European markets both individually and in combination: France, Germany, Italy, the Netherlands, Spain, Switzerland and the UK. The analysis was conducted over the period from January 1990 to June 2002 using accounting data obtained from the Worldscope database, return data provided by GMO Woolley and data on analyst's earnings forecasts provided by I/B/E/S. The only companies excluded from the sample were financial sector stocks and stocks with a negative book value. The average number of companies included in the database for each country is reported in Table 6.2.1.

Criteria for ranking stocks

Under both value and momentum investing, the stocks are ranked on the basis of some criterion with these rankings being used as the basis for forming investment portfolios. This paper restricts the analysis to

Table 6.2.1 Sample size by country

	Average	Maximum	Minimum
United Kingdom	1,043	1,235	654
France	366	495	219
Germany	375	597	207
Italy	165	155	93
Switzerland	135	151	113
Netherlands	118	146	83
Spain	82	109	48
Combined	2,284	2,682	1,448

those criteria which performed best in the previous study of the same markets. The criteria used are as follows:

Value criterion:	Book-to-market (bm)
Price momentum criterion:	6-month (return) momentum (pm)
Earnings momentum:	Agreement (agree)[1]

For each criterion, the lowest ranked stocks are the ones expected to perform worst and the highest ranked stocks are those expected to perform best.

In this paper, a second earnings momentum measure not previously considered is introduced: dispersion in the analysts' forecasts (dis), as measured by the standard deviation of the forecasts at any point in time. Dispersion provides no information on the direction of the signal, and so it is not used as a standalone criterion for forming portfolios but rather used in combination with other criteria. It is felt that low dispersion is an indication of the strength of the signal from the other criteria, which suggests that stocks with low dispersion will do much better than those with high dispersion, other factors being held constant.

Forming portfolios

The focus of this paper is on forming portfolios using a combination of criteria, and this is achieved in two different ways:

1. The stocks are ranked separately on the basis of two criteria, and then portfolios are formed on the basis of the intersections of the two sets of rankings. For example, one portfolio could be composed of the stocks from the bottom quartile (quartile one) of book-to-market and the bottom quartile from sales-to-price, another portfolio would be composed of stocks from quartile one of book-to-market and quartile

two of sales-to-price and so on. In this case, 16 portfolios are formed which again are rebalanced monthly with holding periods for stocks of between one month and 48 months.

2. Again, the stocks are ranked on the basis of two separate criteria, but in this case separate portfolios are formed using each criterion and then half the funds are effectively invested in one portfolio and half in the other. Assume the two criteria are book-to-market and sales-to-price, and two sets of portfolios are produced formed into deciles. Ten portfolios are then formed by combining the bottom decile book-to-market portfolio with the bottom decile sales-to-price portfolio, the next lowest book-to-market portfolio with the next lowest sales-to price portfolio, and so on.

In addition, following the procedures described above to build portfolios within countries, all the stocks are also pooled and a combined portfolio is built, incorporating all the available stocks across the seven markets. When all the stocks are ranked in accordance with the procedures described above, there will be a tendency for the portfolios to reflect the relative valuations across the seven markets. For example, if French stocks appear relatively cheap to those in the other markets when measured by book-to-market, they are likely to have a disproportionate weighting in the cheap portfolio, and this will be reflected in the returns on that portfolio. In order to minimise the impact of any country bias on the combined portfolios, these portfolios are also formed on a country corrected basis by ranking stocks using the country corrected value for the particular criterion being used (eg book-to-market) for each stock, which involves, each month, deducting the average value for the criterion across all the stocks in the country from the actual value for that criterion for each stock. For example, country corrected book-to-market for all French stocks in a particular month is determined by deducting from each stock's book-to-market the average book-to-market for all French stocks for that month. Each stock from the seven countries is then ranked in accordance with these country corrected values and country corrected portfolios formed, which are then used as the basis for calculating the country corrected returns.

Determining the returns on the portfolios

The end objective is to measure the performance of the portfolios formed following one of the approaches described above. Several returns are calculated, each of which is described below:[2]

1. Equally weighted returns – these are obtained by equally weighting each stock within each portfolio.

2. Market weighted returns – these are obtained by weighting each stock in each portfolio on the basis of its contribution to the market capitalisation of the portfolio.
3. Size-adjusted equally weighted returns – in this case each stock is equally weighted within each portfolio but the returns used to calculate the portfolio returns are not the actual stock returns for each month but rather the size-adjusted returns obtained by subtracting from the stock's actual return, the mean return of all the stocks that fall in the same size-quintile portfolio.[3]
4. Size-adjusted market weighted returns – each stock is held in each portfolio in proportion to its market capitalisation with portfolio returns being calculated using the size-adjusted returns calculated using the method described above.

As well as calculating the monthly returns for each portfolio, the study also calculates a *p* value as a test of the significance of those returns. These *p* values are calculated using the Newey-West measure of variance that corrects for serial correlation.

Finally, the following characteristics were collected for each portfolio:

1. The portfolio's average book-to-market value as a measure of its valuation level
2. The portfolio's six-month price momentum as a measure of its recent market performance
3. The relative trading volume of the stocks in the portfolio over the previous month as a measure of its liquidity
4. The decile ranking of the market capitalisation of the stocks in the portfolio.

Findings

The previous paper examined the performance of 12 criteria for forming value or momentum portfolios in the major European markets over the period from January 1990 to June 2002 (Bird and Whitaker, 2003). The overall finding was that value, price momentum and earnings momentum all performed particularly well over this sample period. More disturbing evidence in relation to the value portfolios was also found, however, which suggests that (i) the criteria used often have low discriminatory power in that they select many stocks that underperform, and (ii) they are effectively devoid of any market timing resulting in extended periods of underperformance. The focus of this paper is on determining the extent to which these deficiencies can be overcome

and so performance can be improved by simply using a combination of value and momentum criteria, rather than a single criterion, to form portfolios. As will be seen, investment strategies benefit not only from encompassing criteria which add value in their own right but also from combining criteria which produce the best performance at different times in the market cycle.

Combining value and price momentum strategies

Perhaps the most interesting option to consider is just how value and momentum investing will work in combination. The key consideration when combining different investment streams is to identify strategies which both contribute added value in their own right but also deliver added value that has a low correlation with the added value from other well-performing strategies. The correlations were evaluated between the added value from the best value strategy (book-to-market), the two best momentum strategies (six-month and agreement) and dispersion assuming a 12-month holding period. The findings are reported in Table 6.2.2 for the bottom and top quintiles under each criterion.[4]

The observed correlations reported in Table 6.2.2 are very pleasing from an investment perspective, as they suggest that the added value from the winning stocks by price momentum (pm5) are negatively correlated with the added value from investing in the cheap stocks under the value strategy (bm5). Similarly, the returns of the losing stocks by price momentum are negatively correlated with the returns of the expensive stocks by the value measures. These findings provide a strong *a priori* case for assuming that an investment strategy where portfolios are built using some combination of book-to-market with price momentum will perform very well.[5]

Table 6.2.3 presents the returns on equally weighted portfolios formed using both book-to-market and six-month price momentum assuming various holding periods. The returns reported in this table provide a myriad of interesting findings, including the suggestion that the best strategy would have been to go short expensive losers and long cheap losers (rather than cheap winners). This is consistent with the work of Lee and Swaminathan (2000) and Swaminathan and Lee (2000), who suggest that expensive losing stocks are early into their negative momentum cycle, while cheap losing stocks are late into this stage of the cycle, to the extent that they will soon turn around and start generating good returns. It is also consistent with the findings of Asness (1997), who found that book-to-market was especially good at

Table 6.2.2 Correlations between the monthly market weighted excess returns of portfolios formed using value and price momentum criterion and holding for 12 months (combined markets, January 1990 to June 2002)

	pm1	**pm5**	**agree1**	**agree5**	**dis1**	**dis5**	**bm1**	**bm5**
pm1	1	−0.73701	−0.41301	−0.8825	−0.02466	0.09150	−0.24349	0.80151
pm5	−0.73701	1	0.40676	0.69092	0.25292	−0.12509	0.65354	−0.74022
agree1	−0.41301	0.40676	1	0.44396	−0.14646	0.09046	0.31575	−0.67301
agree5	−0.8825	0.69092	0.44396	1	0.17799	−0.20843	0.43272	−0.88088
dis1	−0.02466	0.25292	−0.14646	0.17799	1	−0.78249	0.65065	−0.28675
dis5	0.09150	−0.12509	0.09046	−0.20843	−0.78249	1	−0.48822	0.32585
bm1	−0.24349	0.65354	0.31575	0.43272	0.65065	−0.48822	1	−0.6540
bm5	0.80151	−0.74022	−0.67301	−0.88088	−0.28675	0.32585	−0.6540	1

Table 6.2.3 Equally weighted returns (per cent per month) across portfolios created using the intersection of book-to-market and 6-month price momentum (combined markets, January 1990 to June 2002)

	Losers	pm2	pm3	Winners	Winners – Losers
Panel 1: Book-to-market and 6-month price momentum over 6-month holding period					
Expensive	−0.623	0.129	0.652	1.429	2.052
	0.346	0.777	0.124	0.016	0
bm2	−0.321	0.317	0.817	1.465	1.786
	0.570	0.351	0.006	0	0
bm3	−0.057	0.521	0.855	1.296	1.354
	0.915	0.121	0.005	0	0
Cheap	1.625	0.947	1.148	1.169	−0.456
	0.107	0.009	0	0.001	0.617
Cheap–Expensive	2.249	0.818	0.495	–0.260	1.792
	0.010	0.017	0.198	0.632	0.001
Panel 2: Book-to-market and 6-month price momentum over 12-month holding period					
Expensive	−0.218	0.392	0.773	1.291	1.509
	0.728	0.376	0.063	0.024	0
bm2	0.138	0.597	0.928	1.449	1.311
	0.789	0.060	0.001	0	0
bm3	0.374	0.791	1.053	1.424	1.050
	0.428	0.014	0	0	0
Cheap	2.174	1.315	1.409	1.571	−0.603
	0.052	0	0	0	0.567
Cheap–Expensive	2.393	0.922	0.636	0.281	1.790
	0.014	0.007	0.079	0.604	0.001
Panel 3: Book-to-market and 6-month price momentum over 24-month holding period					
Expensive	0.281	0.552	0.730	0.906	0.624
	0.637	0.202	0.084	0.121	0.007
bm2	0.399	0.689	0.840	1.046	0.646
	0.407	0.036	0.010	0.007	0.001
bm3	0.718	0.880	1.016	1.192	0.474
	0.117	0.009	0.002	0.001	0.025
Cheap	2.423	1.511	1.448	1.484	−0.939
	0.040	0.001	0	0	0.383
Cheap–Expensive	2.142	0.959	0.718	0.578	1.203
	0.043	0.008	0.024	0.220	0.008

differentiating between winning stocks, and price momentum was particularly good at differentiating between expensive stocks.

Table 6.2.4 replicates the analysis reported in Table 6.2.3, but agreement is used as the momentum measure in place of price momentum. Unlike the case with price momentum, agreement does a good job of

Table 6.2.4 Equally weighted returns (per cent per month) across portfolios created using both book-to-market and agreement (combined markets, January 1990 to June 2002)

	Losers	**agree2**	**agree3**	**Winners**	**Winners – Losers**
Panel 1: Book-to-market and agreement over 6-month holding period					
Expensive	−0.177	0.290	0.506	0.957	1.134
	0.763	0.611	0.360	0.066	0
bm2	0.062	0.432	0.681	0.860	0.798
	0.880	0.221	0.110	0.012	0
bm3	0.175	0.437	0.728	0.961	0.786
	0.656	0.231	0.047	0.004	0
Cheap	0.535	0.748	1.268	1.213	0.678
	0.243	0.119	0.012	0.002	0
Cheap–Expensive	0.712	0.458	0.762	0.256	1.390
	0.182	0.381	0.117	0.599	0.009
Panel 2: Book-to-market and agreement over 12-month holding period					
Expensive	0.114	0.411	0.697	0.955	0.841
	0.843	0.438	0.211	0.062	0
bm2	0.447	0.626	0.777	0.975	0.529
	0.255	0.071	0.058	0.004	0
bm3	0.537	0.700	0.899	1.146	0.609
	0.151	0.036	0.010	0	0
Cheap	0.968	1.002	2.266	1.459	0.490
	0.025	0.023	0.041	0	0
Cheap–Expensive	0.854	0.591	1.569	0.503	1.344
	0.098	0.197	0.132	0.274	0.009
Panel 3: Book-to-market and agreement over 24-month holding period					
Expensive	0.283	0.422	0.642	0.774	0.491
	0.622	0.423	0.259	0.129	0
bm2	0.478	0.667	0.630	0.881	0.403
	0.245	0.062	0.125	0.013	0.001
bm3	0.661	0.856	0.846	1.078	0.417
	0.089	0.016	0.020	0.002	0
Cheap	1.121	1.220	1.977	1.472	0.351
	0.011	0.004	0.026	0	0.006
Cheap–Expensive	0.838	0.798	1.335	0.698	1.189
	0.077	0.042	0.101	0.103	0.015

differentiating across the whole range of value including the cheap stocks. In this case, the best performing portfolio is composed of cheap winners that outperform the worst performing portfolio (expensive losers) by almost 1.4 per cent per month over holding periods of up to 12 months. Although this added value is somewhat lower than that added by the combination of book-to-market with price momentum (see Table 6.2.3), there is evidence to suggest that the potential added value from the book-to-market/agreement combination extends over a longer holding period than is the case from the book-to-market/price momentum combination.

Table 6.2.5 presents the characteristics of the portfolios that are formed using the intersection of book-to-market with both price momentum and agreement. In both cases, the better-performing portfolios are composed of much smaller stocks than are the poorly performing portfolios. In order to investigate the possibility that the findings simply reflect a small capitalisation bias, Table 6.2.6 reports the size-adjusted, market weighted returns for the book-to-market/price momentum combination and Table 6.2.7 the size-adjusted, market weighted returns for the book-to-market/agreement combination. The success of these strategies are slightly diminished but far from removed by calculating returns in this way. Further, the previous somewhat unexpected finding that the cheap portfolio of losers produced the best performance is no longer the case, which suggests that it was largely a size-driven phenomenon. On the basis of market weighted and size-adjusted returns, the best portfolio outperforms the worst portfolio by about 1.2 per cent per month over holding periods of up to 12 months where price momentum is used as the momentum criterion and by about 0.9 per cent per month where agreement is used as the momentum criterion. As was previously the case when independent price momentum portfolios and independent agreement portfolios were analysed, it is found that price momentum works better than agreement when used in combination with a value criterion.

The combined strategies discussed above involve forming portfolios based on the intersection of a value and a momentum criterion. As discussed in the third section, however, another way of drawing on the strengths of both strategies would be to form separate value and momentum portfolios and then allocate a portions of one's investment funds to each. Table 6.2.8 reports the performance of just such an investment strategy where half the funds are allocated to the value portfolio and half to the momentum portfolio (based on price momentum in

Table 6.2.5 Characteristics of combinations of book-to-market with 6-month price momentum and agreement (combined markets, January 1990 to June 2002)

Portfolio	Book-to-market	6-month price momentum (% p.a.)	Trading volume (% of total)	Size (ave. decile rank)	Average no. of stocks in portfolio
Book-to-market with 6-month price momentum					
Exp., losers	0.1159	−4.5176	0.0493	5.6745	83.1007
bm1, pm2	0.1199	−0.4866	0.0406	6.9362	100.5436
bm1, pm3	0.1209	1.9751	0.0569	7.3389	114.8591
bm1, pm4	0.1141	7.4745	0.0763	6.8624	154.5436
bm2, pm1	0.3066	−4.5829	0.0459	5.2987	90.3557
bm2, pm2	0.3068	−0.5397	0.0465	6.5671	114.1946
bm2, pm3	0.3028	1.8789	0.0689	6.8691	125.0470
bm2, pm4	0.2950	6.2202	0.1004	6.4161	123.5034
bm3, pm1	0.5707	−4.7769	0.0509	4.4732	113.1141
bm3, pm2	0.5548	−0.5584	0.0592	5.5134	121.9128
bm3, pm3	0.5497	1.8674	0.0858	5.9664	117.3826
bm3, pm4	0.5494	6.1860	0.1086	5.4094	100.6309
Cheap, losers	1.3516	−5.7600	0.0492	2.5034	166.5705
bm4, pm2	1.1729	−0.4909	0.0354	3.5302	116.3893
bm4, pm3	1.1356	1.9493	0.0421	3.6980	95.7517
Cheap, winners	1.1132	6.7611	0.0841	3.5638	74.3423
Book-to-market with agreement					
Exp., losers	0.1183	0.5319	0.0499	6.5503	74.9664
bm1, agree2	0.1149	1.4791	0.0268	6.9664	97.8054
bm1, agree3	0.1123	2.5012	0.0603	5.5235	81.1879
bm1, agree4	0.1129	3.1729	0.0615	7.2919	110.5436
bm2, agree1	0.2905	−0.3661	0.0792	6.0638	84.4295
bm2, agree2	0.2886	0.7492	0.0386	6.7919	93.3154
bm2, agree3	0.2880	1.5692	0.0514	4.7718	86.1208
bm2, agree4	0.2849	2.3136	0.0667	6.8389	100.7315
bm3, agree1	0.5237	−0.9087	0.1224	5.4228	98.1074
bm3, agree2	0.5097	0.2113	0.0475	6.0168	90.9262
bm3, agree3	0.5199	0.9436	0.0564	3.6779	88.1745
bm3, agree4	0.5105	1.7083	0.0791	6.2013	87.3758
bm4, agree1	1.0861	−2.0790	0.0927	3.5772	107.0336
bm4, agree2	1.1001	−0.8844	0.0386	4.3121	82.5705
bm4, agree3	1.1495	−0.3720	0.0645	2.2483	109.1074
Cheap, winners	1.0271	0.8211	0.0642	4.6275	65.9060

Table 6.2.6 Size-adjusted and market weighted returns (per cent per month) across portfolios created using both book-to-market and 6-month price momentum (combined markets, January 1990 to June 2002)

	Losers	pm2	pm3	Winners	Winners – Losers
Panel 1: Book-to-market and 6-month price momentum over 6-month holding period					
Expensive	−0.786	−0.103	0.241	0.399	1.185
	0.009	0.580	0.204	0.147	0.008
bm2	−0.614	0.038	0.285	0.521	1.136
	0.043	0.844	0.161	0.006	0.003
bm3	−0.379	0.202	0.412	0.200	0.578
	0.263	0.374	0.063	0.399	0.182
Cheap	−0.166	0.130	0.577	0.448	0.614
	0.676	0.632	0.043	0.171	0.222
Cheap–Expensive	0.620	0.233	0.336	0.049	1.234
	0.109	0.446	0.335	0.915	0.019
Panel 2: Book-to-market and 6-month price momentum over 12-month holding period					
Expensive	−0.668	−0.042	0.203	0.261	0.929
	0.019	0.798	0.257	0.305	0.009
bm2	−0.503	0.066	0.271	0.461	0.964
	0.069	0.718	0.181	0.011	0.007
bm3	−0.385	0.146	0.373	0.249	0.634
	0.212	0.503	0.103	0.271	0.078
Cheap	0.044	0.143	0.517	0.477	0.433
	0.907	0.583	0.037	0.080	0.347
Cheap–Expensive	0.712	0.185	0.313	0.216	1.145
	0.084	0.501	0.277	0.592	0.019
Panel 3: Book-to-market and 6-month price momentum over 24-month holding period					
Expensive	−0.374	0.016	0.080	−0.014	0.359
	0.125	0.922	0.648	0.953	0.163
bm2	−0.305	0.110	0.187	0.168	0.473
	0.071	0.464	0.278	0.269	0.051
bm3	−0.084	0.176	0.331	0.259	0.343
	0.711	0.368	0.137	0.224	0.216
Cheap	0.340	0.275	0.427	0.428	0.088
	0.277	0.225	0.077	0.100	0.822
Cheap–Expensive	0.714	0.259	0.348	0.442	0.802
	0.056	0.296	0.221	0.282	0.068

Table 6.2.7 Size-adjusted and market weighted returns (per cent per month) across portfolios created using both book-to-market earnings momentum (agree) (combined markets, January 1990 to June 2002)

	Losers	agree2	agree3	Winners	Winners – Losers
Panel 1: Book-to-market and earnings momentum (agree) over 6-month holding period					
Expensive	−0.282	−0.125	−0.041	0.437	0.719
	0.175	0.502	0.840	0.042	0.002
bm2	−0.117	0.160	0.141	0.182	0.299
	0.541	0.336	0.350	0.432	0.279
bm3	0.089	0.140	0.095	0.280	0.191
	0.648	0.485	0.717	0.248	0.343
Cheap	0.070	0.519	0.536	0.559	0.488
	0.808	0.053	0.035	0.069	0.084
Cheap–Expensive	0.352	0.644	0.577	0.121	0.840
	0.382	0.107	0.133	0.780	0.063
Panel 2: Book-to-market and earnings momentum (agree) over 12-month holding period					
Expensive	−0.272	−0.033	−0.078	0.323	0.594
	0.155	0.863	0.703	0.108	0.001
bm2	−0.030	0.229	0.101	0.231	0.260
	0.869	0.130	0.469	0.246	0.242
bm3	0.021	0.148	0.217	0.325	0.304
	0.917	0.488	0.362	0.181	0.054
Cheap	0.157	0.374	0.466	0.659	0.502
	0.543	0.124	0.048	0.027	0.025
Cheap–Expensive	0.428	0.407	0.544	0.336	0.930
	0.252	0.281	0.162	0.425	0.029
Panel 3: Book-to-market and earnings momentum (agree) over 24-month holding period					
Expensive	−0.231	−0.091	−0.241	0.158	0.389
	0.218	0.631	0.259	0.432	0.008
bm2	−0.134	0.141	0.003	0.171	0.305
	0.261	0.315	0.981	0.297	0.036
bm3	0.071	0.189	0.214	0.397	0.326
	0.696	0.342	0.314	0.089	0.012
Cheap	0.179	0.380	0.431	0.632	0.452
	0.478	0.097	0.062	0.015	0.033
Cheap–Expensive	0.411	0.471	0.673	0.473	0.863
	0.231	0.175	0.084	0.229	0.016

Table 6.2.8 Size-adjusted and market weighted returns (per cent per month) across portfolios created by combining both book-to-market (50 per cent) and agreement (50 per cent) (combined markets, January 1990 to June 2002)

Panel 1: Book-to-market with price momentum

Holding period	Exp. losers	bm2, pm2	bm3, pm3	bm4, pm4	bm5, pm5	bm6, pm6	bm7, pm7	bm8, pm8	bm9, pm9	Cheap winners	Exp. losers – Cheap winners
6 mth	−0.751	−0.213	−0.027	0	0.101	0.140	0.216	0.154	0.335	0.529	1.281
	0.018	0.168	0.806	0.998	0.512	0.293	0.154	0.134	0.042	0	0.001
12 mth	−0.566	−0.192	−0.023	0.014	0.098	0.141	0.217	0.136	0.338	0.453	1.019
	0.048	0.179	0.828	0.910	0.507	0.301	0.180	0.213	0.015	0	0.001
24 mth	−0.320	−0.096	0.012	0.033	0.098	0.148	0.211	0.059	0.274	0.324	0.644
	0.181	0.452	0.899	0.751	0.448	0.262	0.160	0.569	0.010	0.009	0.010

Panel 2: Book-to-market with agreement

Holding period	Exp. losers	bm2, ag2	bm3, ag3	bm4, ag4	bm5, ag5	bm6, ag6	bm7, ag7	bm8, ag8	bm9, ag9	Cheap winners	Exp. losers – Cheap winners
6 mth	−0.240	−0.091	0.046	0.074	−0.052	0.021	0.128	0.111	0.313	0.416	0.656
	0.163	0.361	0.519	0.486	0.676	0.808	0.259	0.368	0.084	0.018	0.022
12 mth	−0.280	−0.069	0.075	0.094	−0.048	−0.067	0.130	0.145	0.317	0.412	0.692
	0.082	0.450	0.291	0.308	0.659	0.505	0.284	0.210	0.057	0.010	0.009
24 mth	−0.240	−0.101	0.031	0.041	−0.036	−0.088	0.095	0.087	0.319	0.394	0.634
	0.117	0.282	0.702	0.606	0.711	0.460	0.406	0.438	0.021	0.005	0.010

Panel 1 and on agreement in Panel 2). Again, such a way of implementing a combined strategy produces good investment returns, especially for holding periods of up to 12 months. In order to facilitate a comparison of the various combined strategies, Table 6.2.9 presents the difference in the performance of the best and worst portfolio in each case over various holding periods. It can be seen that enhancing a book-to-market strategy with an agreement strategy results in only a small improvement over using book-to-market as the sole criterion for forming portfolios. When price momentum is used as the momentum criterion, however, it can be seen that it enhances the performance of a book-to-market strategy by between 0.3 per cent and 0.5 per cent per month for holding periods of up to 12 months. There is little to choose between the option of forming portfolios using the intersection of the value with price momentum criteria or allocating an equal amount of funds to separate value and momentum portfolios – the former generating slightly higher returns over longer holding periods but the latter producing slightly less volatile returns.[6]

Although the potential of combining a value and a momentum investment strategy has been established, and book-to-market and six-month price momentum have been identified as the best criteria for implementing such a strategy over the sample period, the question remains as to whether further improvements can be gained from introducing additional criteria into the analysis. Undoubtedly, the most interesting potential inclusion into a strategy is dispersion, which was found in unreported results to add significantly to the performance of strategies based on either price momentum or earnings momentum (see Ackert and Athananassakos, 1997; Dische, 2002; Ciconne, 2003). With this in mind, the previous analysis is extended to build portfolios based on three criteria: book-to-market, six-month price momentum and dispersion. Table 6.2.7 reported on the performance of 16 portfolios created when splitting stocks into quintiles based on the first two of these of criteria. The stocks included in each of these 16 portfolios are now further divided on the basis of whether each stock falls into the top or bottom 50 per cent of stocks when ranked on the basis of dispersion. For example, one might have (say) 150 stocks in the portfolio consisting of cheap winners, and each of these 150 stocks will be further divided into a portfolio of cheap winners with high dispersion and cheap winners with low dispersion. The end result is that 32 separate portfolios will now be formed, and so it can be judged whether the addition of the new criterion adds to the performance of the strategies as reported in Table 6.2.7.

Table 6.2.9 Comparing the performance calculated using market weighted and size-adjusted returns between the best and worst ranking portfolios formed by book-to-market and price momentum with those formed by book-to-market and agreement (per cent per month) (combined markets, January 1990 to June 2002)

Holding period	Book-to-market alone (top and bottom deciles)	Book-to-market with price momentum		Book-to-market with agreement	
		Intersection (top and bottom quintiles	50/50 (top and bottom deciles)	Intersection (top and bottom quintiles	50/50 (top and bottom deciles)
6 mths	0.736	1.234	1.281	0.840	0.656
	0.166	0.019	0.001	0.063	0.022
12 mths	0.836	1.145	1.019	0.930	0.692
	0.112	0.019	0.001	0.029	0.009
24 mths	0.898	0.802	0.644	0.863	0.634
	0.077	0.068	0.010	0.016	0.010

The findings reported in Table 6.2.10 highlight the added performance attributable to supplementing book-to-market and price momentum with dispersion. The ability of dispersion to differentiate between the cheap winning stocks and expensive losing stocks results in an increase in the returns on a long/short portfolio of around 0.9 per cent per month over a six-month holding period and 0.8 per cent per month over a 12-month holding period when compared with the same strategies implemented in the absence of dispersion (see Table 6.2.7). In the case of both holding periods, the entire incremental added value resulting by adding the dispersion criterion comes from the ability of dispersion to differentiate between the expensive winning stocks. It also seems that the majority of the added value from running a long/short portfolio based on value and momentum is due to the difference in the performance of the cheap winning portfolio and the expensive losing portfolio incorporating those stocks, where there is relatively large disagreement between the analysts as to the future earnings prospects of the company (ie high dispersion). Information on the characteristics of these portfolios is reported in Table 6.2.11. The separation of the expensive losing portfolios on the basis of their dispersion produces two portfolios which have similar characteristics with the exception that the low dispersion portfolio is slightly less liquid than the high dispersion portfolio. The two cheap winning portfolios separated by dispersion also are fairly similar with the low dispersion portfolio again being slightly less liquid but also composed of smaller capitalisation stocks. The other point worth noting is that there is high level of consensus in the analysts' earnings forecasts in the majority of cases (almost two-thirds) for the expensive losing stocks. The reverse is the case, however, with respect to the cheap winning stocks, which suggests that the analyst community in general have yet to come to terms with the future prospects of companies which have most likely experienced a relatively recent turnaround in performance.

In order to determine whether the performance was sourced by stock selection or the country bets created as a consequence of the stock selection process, the results reported in Table 6.2.10 are also repeated but with the returns calculated on a country corrected basis. A reduction in added value of between 25 per cent and 30 per cent was found as a result of correcting for the country bets, which confirms that the majority of the added value is attributable to stock selection, which is examined in closer detail in the next sub-section of the paper.

Table 6.2.10 Size-adjusted and market weighted returns (per cent per month) across selected portfolios created by combining value, earnings momentum and dispersion (combined markets, January 1990 to June 2002)

	Expensive losers (1)	Cheap winners (2)	(2)–(1)
Holding period: 6 months			
High dispersion (1)	−1.311	0.319	1.630
	0.006	0.351	0.016
Low dispersion (2)	−0.597	0.328	0.925
	0.042	0.280	0.047
(2)–(1)	0.714	0.009	1.639
	0.050	0.979	0.012
Holding period: 12 months			
High dispersion (1)	−1.309	0.376	1.685
	0.004	0.168	0.006
Low dispersion (2)	−0.422	0.322	0.744
	0.109	0.241	0.104
(2)–(1)	0.887	−0.054	1.632
	0.018	0.877	0.011
Holding period: 24 months			
High dispersion (1)	−0.999	0.374	1.373
	0.006	0.198	0.012
Low dispersion (2)	−0.042	0.081	0.122
	0.856	0.748	0.734
(2)–(1)	0.957	−0.293	1.079
	0.003	0.396	0.028

Table 6.2.11 Characteristics of combinations of selected book-to-market with 6-month price momentum portfolios further differentiated by dispersion (combined markets, January 1990 to June 2002)

Portfolio	Book-to-market	6-month price momentum (% p.a.)	Trading volume (% of total)	Size (ave. decile rank)	Average no. of stocks in portfolio
Expensive losers with high dispersion	0.1141	−4.2633	0.0345	5.4295	20.0671
Expensive losers with low dispersion	0.1109	−4.1234	0.0118	5.5772	32.7785
Cheap winners with high dispersion	0.9724	5.9145	0.0539	4.7987	32.7919
Cheap winners with low dispersion	0.9383	5.5418	0.0208	3.3716	16.0268

Combining value and price momentum at the country level

The discussion to date has identified that a strategy of creating portfolios by combining value (using book-to-market as the criterion) and momentum (using six-month price momentum as the criterion) and then applying dispersion as a third criterion produced very good performance at the aggregate level during the period of this study. The same strategy was applied to the seven individual markets, and the findings are reported in Table 6.2.12.[7]

It proves that the strategy has worked well in all seven markets, but particularly in the UK, Germany, the Netherlands and Switzerland, with Spain being the only market where the added value could be regarded as marginal. In the case of the Netherlands and France, the use of dispersion has turned a marginal value/momentum strategy into a very profitable strategy, while the use of dispersion has made a positive contribution to performance in all the markets, with the exception of Germany. The source of the added value attributable to dispersion is sometimes mixed owing to its ability to differentiate expensive losing stocks (the UK and Spain), in other cases it is able to differentiate cheap winning stocks (France and Italy) while, in the case of the Netherlands, dispersion proves effective in differentiating between both types of stocks.

Summary and concluding comments

The previous paper reported that both value and price momentum investment portfolios, when formed on the basis of a single criterion (eg book-to-market, six-month price momentum), performed well in the major European markets over the period from January 1990 to June 2002. The focus of this paper is on extending the analysis to evaluating portfolios that have been formed on the basis of combinations of value and momentum criteria. A major motivation is to extend existing knowledge of the performance of such strategies across a wider range of markets and time periods and thus contribute to a better understanding of market behaviour and potential anomalies, which can then give rise to superior investment management strategies.

The two major findings from the analysis covering the major European markets during the 1990s and early 2000s are summarised below:

– Value portfolio based on book-to-market could be significantly improved by combining it with a momentum strategy, particularly price momentum.

Table 6.2.12 Size-adjusted and market weighted returns (per cent per month) across selected portfolios created by combining value, earnings momentum and dispersion (individual markets, January 1990 to June 2002)

	Expensive losers (1)	Cheap winners (2)	(2)–(1)
UK: 12-month holding period			
High dispersion (1)	−1.686	0.592	2.279
	0.001	0.056	0.001
Low dispersion (2)	−0.828	0.595	1.423
	0.020	0.059	0.011
(2)–(1)	0.858	0.002	2.281
	0.016	0.993	0.001
Germany: 12-month holding period			
High dispersion (1)	−1.604	0.833	2.436
	0.002	0.072	0.001
Low dispersion (2)	−1.912	0.699	2.611
	0.015	0.055	0.013
(2)–(1)	−0.309	−0.134	2.303
	0.566	0.865	0.001
France: 12-month holding period			
High dispersion (1)	−0.701	−0.022	0.679
	0.062	0.946	0.182
Low dispersion (2)	−0.601	0.840	1.441
	0.246	0.236	0.280
(2)–(1)	0.100	0.862	1.541
	0.877	0.100	0.122
Italy: 12-month holding period			
High dispersion (1)	0.110	−0.381	−0.490
	0.788	0.254	0.457
Low dispersion (2)	−0.203	1.098	1.301
	0.373	0.043	0.041
(2)–(1)	−0.313	0.720	0.989
	0.445	0.286	0.110
Netherlands: 12-month holding period			
High dispersion (1)	−1.065	−0.080	0.985
	0.050	0.795	0.099
Low dispersion (2)	−0.479	0.557	1.036
	0.097	0.125	0.053
(2)–(1)	0.586	0.637	1.622
	0.355	0.099	0.034
Spain: 12-month holding period			
High dispersion (1)	−0.630	0.197	0.827
	0.037	0.564	0.105
Low dispersion (2)	−0.368	0.031	0.399
	0.212	0.929	0.449
(2)–(1)	0.262	−0.166	0.661
	0.619	0.771	0.253
Switzerland: 12-month holding period			
High dispersion (1)	−0.184	0.291	0.475
	0.498	0.296	0.210
Low dispersion (2)	−0.345	0.799	1.144
	0.160	0.015	0.012
(2)–(1)	−0.161	0.508	0.983
	0.649	0.291	0.025

– The addition of dispersion to a value/momentum strategy resulted in further enhancements to performance at the level of the individual markets and the aggregate of these markets.

Perhaps the most interesting findings come from the analysis of the combined value/momentum portfolios. It has been identified that the added value from a value strategy tends to be negatively correlated with the added value from price momentum and that both tend to be related to the market (and economic) cycle. This all suggests that many stocks also go through a cycle not dissimilar to that proposed by Lee and Swaminathan, where the price of a typical stock will first trend in one direction beyond its fair value and then reverse and trend in the opposite direction, again overshooting fair value. Of course, not all stocks behave in this way, nor does a particular stock always behave in this way. A profitable strategy, however, will be feasible, provided sufficient stocks are behaving in this way at any point in time and the criteria used are able to identify enough of these stocks at an appropriate point in their cycle.

The better-performing value strategies tended to produce portfolios composed of relatively small and less traded stocks. The performances of these portfolios, however, were only slightly eroded when stocks were held in proportion to their market capitalisations and returns calculated on a size-adjusted basis. In contrast, the better-performing enhanced momentum portfolios (eg price momentum with dispersion) are composed of relatively large and highly liquid stocks, and their performance actually improved when calculated on a market weighted basis. As a consequence, when value and momentum are combined within the one strategy, the resulting portfolios are composed of stocks that are quite liquid, although still slightly below average in terms of market capitalisation. Further, the annual turnover of the better-performing strategies tends to fall between 50 per cent and 75 per cent, which suggests that transactions costs will only erode a small proportion of the potential added value when implementing these strategies.

Of course, most studies open up as many questions as they can answer. In the case of this paper, one obvious question is whether one can obtain even better performance by forming portfolios using even more convoluted combinations of criteria. Some strategies based on two, or even three, criteria work particularly well as the basis for forming portfolios, as each strategy not only adds value in its own right but also complements the other through the market cycle. The best of all the one-by-one combinations evaluated for forming portfolios across

all the major European markets would appear to be book-to-market with price momentum. Dispersion also provides a good basis for further enhancing such a one-by-one strategy. Many fund managers use more than three criteria within their investment strategy, and it is not surprising that there are good reasons, both conceptual and empirical, to consider more criteria in the portfolio construction process.

As discussed above, the challenge for any criteria is to provide the basis for identifying the correct stocks at the appropriate time in their cycle. This has always been a particular problem in forming value portfolios, as the majority of stocks chosen by the commonly used criteria underperform the market over reasonable holding periods, such as 12 months (Bird and Gerlach, 2003). The use of other criteria such as price momentum and dispersion are likely to have gone some way towards solving these problems by, for example, keeping a 'cheap' stock out of the portfolio until a more appropriate time. Indeed, price momentum would seem to offer some promise in timing the entry of a stock into a value portfolio. Further, recent studies have found that a combination of some quality measure with the value criteria has the potential of improving the proportion of value stock that outperforms, which translates into a significant increase in added value.

Finally, there is the complex issue as to why do value and momentum strategies continue to add value, especially as they are well known and easy to implement. As suggested earlier, the success of value strategies is possibly easier to understand, as it may just be a premium to compensate for the discomfort associated with holding value stocks. The success of momentum is a bit more difficult to understand as it seems just another outworking of the market underreacting to new information, which is one aspect of market behaviour for which an explanation is still being sought.

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Notes

1. With agreement stocks are ranked on the basis of earnings revisions by analysts over the previous two-month period – upward revisions minus

downward revisions divided by the total number of revisions – with a low (high) ranking indicative of a large number of negative (positive) revisions.

2. When forming portfolios within one country, the returns on the portfolio are calculated in local currency. Where the portfolios are formed across all seven countries, the returns are all calculated in British pounds.
3. For a detailed discussion of the calculation of size-adjusted returns, see La Porta *et al*. (1997)
4. Combinations of value were evaluated with the three measures of momentum (price momentum, agreement and dispersion), but findings are reported only for the first two of these momentum criteria. It was proved that dispersion does a great job in differentiating expensive stocks, with low dispersion expensive stocks performing quite well, and value also performs well differentiating high dispersion stocks with cheap high dispersion stocks performing quite well. While the use of dispersion was found to enhance a value strategy, however, it did less well than either price momentum or dispersion.
5. These expectations are also supported by the present findings when the timing of outperformance of the value and momentum strategies was evaluated. The value portfolio did little better than break even during the 1990s, with all the added value coming during the post-January 2000 period. In the case of the momentum strategies, all their added value came during the 1990s, with this strategy actually underperforming the market in the period since January 2000. These finds are consistent with the findings of studies on style timing, which found that momentum investing performed best in periods of strong economic growth, while value performed best during periods of economic weakness.
6. Although the findings are not reported in this paper, the performance of this strategy actually increased to about 1.25 per cent per month when the portfolios were formed on a country corrected basis, suggesting that the country bias introduced without the correction actually detracts from performance.
7. For the three larger markets (UK, Germany and France), the results reported are for a 4 (book-to-market) × 4 (six-month price momentum) × 2 (dispersion), which results in 32 portfolios being formed. However, the sample size was too small to apply this to the other markets, where a 3 × 2 × 2 analysis was used.

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