# The Profitability of Style Rotation for Value and Growth Stocks Along Their Earnings and Momentum Life Cycle

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Abstract: This paper analyses the extent of the excess returns that can be generated by rotating our portfolio between value and growth stocks in the European markets. Academic and professional attention has been devoted in the past to the analysis of the potential value-enhancement generated by strategies based on macroeconomic models and applied to portfolios or indexes of style classes. In this paper, we extend the results obtained by Bird and Casavecchia (2006) and document that the macroeconomic factors convey information that is not already impounded in the earnings and momentum life cycle of a stock, as proposed by Lee and Swaminathan (2000). The overperformance obtained by the rotation strategy is likely generated by the intertemporal sensitivities of value and growth stocks to the current macroeconomic scenarios, and is consistent, monotonic, significant, and expected in its direction.

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## 1. **Introduction**

There is ample academic literature on the notion of equity classes. According to the common definition, an equity class is a group of stocks that share similar characteristics, represented among others by market-based ratios, capitalization, and price continuation. Many articles have devoted their attention to the analysis of the relation existing between firm's characteristics and their future (excess) returns, evidencing empirical regularities such as the overperformance of stocks with high market-based ratio (value stocks) on those with low market-based ratio (growth stocks). Many theories have been proposed in order to try to explain this overperformance and can be classified in three groups. First, one explanation proposal put forward by Fama and French (1993), Lewellen (1999) is that the value premium is simply a compensation for risk that is not captured by the standard CAPM; hence, a modification of the CAPM to include factors that account for this extra-risk components would wipe out all the extra returns of value stocks on growth stocks. A second explanation is that the value premium does not exist but is rather the result of data snooping (Lo and MacKynlay, 1990, Black, 1993) or data selection bias (Kothari *et al.*, 1995). The third theory acknowledges the existence of the value premium but instead of imputing it to a lack of risk accountability, it draws upon the psychology theories of Kahneman and Tversky (1982) to suggest the possibility that the value premium is the result of incorrect extrapolation of past stock performance (Lakonishok et al, 1994). It is not the primary purpose of this paper to solve this debate but we believe that our findings and implications are more in line with behavioural explanations for the predictability of long-term excess returns of value stocks rather than risk factors affecting them.

Though lots of attention has been concentrated for many years on the phenomenon of the value premium at the portfolio level, only recently the focus has been shifted at the stock level. The first

author to recommend an analysis of the distribution of returns of value stocks over different holding periods was Piotroski (2000), who documented that, although value stocks overperform the market as a whole, most of them actually underperform the market over all reasonable holding periods, with the percentage of overperformance reaching less than 43% on the US sample. The same result was obtained for both value and growth stocks by Bird and Casavecchia (2005), where they highlighted that a typical value stock underperform the market, and they evidenced that the value premium is determined by just a small number of stellar stocks that "drag" the overall performance of the style considered. Asness (1997) was one of the first to put forward an explanation for this underperformance. In his paper, he suggested that the normal valuation metrics such as sales-to-price, cash-flow-to-price, earnings-yield, and book-to-market used to identify value and growth stocks are "raw" measures in establishing when a reversion in these stocks could take place. Indeed, the value of the market-based ratio provides an indication of the level of the market expectations in relation to the company's future performance but it does not signal if and when the value (growth) stock will benefit (suffer) from a reversion in these expectations in the future.

The previous *excursus* underlines the importance of better understanding whether a stock is able to live up to the market forecasts. There are two different possible solutions to solve this problem: market sentiment and fundamental indicators. Being able to both avoid entry into growth stocks for which there are clear signs of an imminent reversal in their earnings growth rate or delay entry into value stocks that will never mean revert from the bottom of their neglected and out-of-favour phase, seems crucial. Bird and Whitaker (2004) demonstrated that the use of a (price and/or earnings) momentum indicator in combination with a market-based criterion provides us with a better picture of the time and dynamics of a stock in its earnings and momentum life cycle, as proposed by Lee and Swaminathan (2000). A second solution, not in contrast with momentum but rather additional to it, is to scrutinize the fundamentals of a stock in order to extrapolate information that could be useful in establishing the probability that the stock will experience a (positive or negative) reversion not already indicated by either the current valuation metrics or market sentiment. Ou and Penman

(1989) were among the first authors to develop a model strongly grounded on accounting variables to predict the direction of the next-year earnings per share, although they did not consider explicitly the value and growth stocks. Piotroski (2000, 2005) built a financial score as the sum of nine accounting measures of the financial strength of a stock for the US sample. Bird and Casavecchia (2006) formulated a model that filtered 24 accounting variables and transformed them in a parsimonious number by using principal components that fed a dichotomous regression model aimed at forecasting the direction and related probability of an earnings change for each stock. The result is a financial health indicator that in combination with market sentiment permitted them to identify more precisely when (and if) a particular stocks will experience a market correction.

In this paper, we draw upon the results proposed by Bird and Casavecchia (2006) and extend them to the analysis of the sensitivity of both value and growth stocks to the particular economic cycle. There is widespread empirical evidence that value and growth stocks perform differently according to the different macroeconomic scenario. The literature on the rotation between different asset classes (equity and cash) started with Sharpe (1975), but only recently the rotation looked at styles rather than generic asset classes, with Kester (1990) on small firms, and then with Case and Cusimano (1995) on value and growth indices. Chan et al (1999) suggested that the relative instability of the value premium to economic conditions may play a key role in regulating the shift from one style to the other, with profitable opportunities that are additional to those simply related to market sentiment and fundamental analysis (Oertmann, 1999). Levis and Liodakis (1999) suggested that style consistency is "not necessarily an optimal strategy" to follow. They built a model based on economic and fundamental variables to obtain a signal for style timing, documenting a very high probability of correct forecast of the value premium, though their forecast seems to be driven by the unbalanced proportion of the number of times when value overperform growth. In this paper, we select various macroeconomic variables that have previously been found to affect the direction of the value premium.

This paper adds to the previous literature in that it provides a composite analysis of the excess returns of a strategy that rotates between being value and growth oriented before timing the cycle of each stock in our sample by its market sentiment and financial health. In other words, we propose to evaluate for all stocks the pattern of pricing behaviour represented by their market sentiment and intrinsic financial health, within the European area with reference to the economic cycle within that area, with the view of identifying the impact (if any) that macroeconomic factors have on this pricing behaviour of value and growth stocks. Our main result is that a style rotation strategy regulated by macroeconomic information, provides large spaces of improvement of the performance of value and growth portfolios that are additional to those generated by simply timing the cycle of the stocks and/or selecting those with the highest probability of a change in the EPS in the next year.

## 2. **Data and Method**

### 2.1 *The Data*

The original sample consists of almost 8000 firms from fifteen European countries: France, Italy, The Netherlands, Germany, Spain, United Kingdom, Belgium, Portugal, Ireland, Austria, Greece, Norway, Sweden, Denmark, and Finland. The analysis was conducted over almost fifteen years, from 1990 to 2004. The dataset is obtained from different sources: the accounting data is provided by Compustat Global Vantage, compiled by Standard and Poor's Inc[i]. Data for stock indices, other financial variables and macro variables, are obtained from DataStream and GMO UK[ii] whereas data on the average monthly yield-to-maturity of corporate bonds with different ratings are obtained by Moody's Investor Services. In order to avoid any exchange rate effects, all of the data are expressed in local currencies. Consistent with previous studies, all stocks in the financial sectore are excluded. In addition, we eliminate all the observations where we have negative book values and those where

the stock price is less than one pound (or the equivalent in other currencies)[iii]. The introduction of these filters reduces any potential problems associated with bid-ask bounce and the inclusion in our portfolios of small and illiquid stocks. The result is a sample constituted by approximately 1,800 stocks in each year.

We consider different proxies for the economic risks that could influence the stock returns. The choice is supported by numerous studies investigating the relation between security prices and macroeconomic information (Ferson and Harvey, 1991, 1999). Because they are a proxy, there might be other variables affecting our cross-section of returns, but we believe that those we selected for inclusion are fairly representative of most of the relevant economic factors for our European sample. The variables used are:

- **UI**: indicating the monthly unexpected inflation, computed as in Fama and Gibbons (1984). The data for the European Consumer Price Index (CPI) is provided by Datastream Thompson Financial;
- **BaaAaa**: the average monthly yield to maturity of corporate bonds rated Baa less the Aaa average corporate bond yield (see Keim and Stambaugh, 1986, and Fama, 1990), provided by Moody's Investor Services;
- **EuroDY**: the monthly dividend yield on European markets ex-Financials (see Fama and French, 1988), provided by Datastream Thompson Financial;
- **YTM**: the monthly change in the spread between the yields of the 10-year Government Bond and that of the 3-month Treasury Bill, provided by Datastream Thompson Financial;
- **RTB**: the 3-month Treasury Bills returns less the monthly rate of inflation, provided by Datastream Thompson Financial (see Campbell, 1987, and Ferson and Harvey, 1991)**.**

In addition to the macroeconomic variables we also consider as independent variable in our regression the monthly variation in the value premium. The reason for this inclusion is that the

variation in the value premium is particularly autocorrelated and it conveys information not impounded by the economic variables, hence it constitutes a relevant factor in signaling the switches between the two styles (value and growth).

An *excursus* on the calculation of the unanticipated inflation (UI) is necessary: we followed the procedure proposed by Fama and Gibbons (1984) and the back-forecasting method of Box and Jenkins (1976)[iv]. The UI is the residual of a moving average model of the change from month *t-1* to month *t* in the natural log of the European CPI. The analysis of the autocorrelation coefficients of the monthly change in the inflation rate, significant in the first period and noisy thereafter, suggests, as in the case of the US sample, a first-order moving average method of the inflation, where:

$$I_t - I_{t-1} = \hat{\alpha}_t - \vartheta\hat{\alpha}_{t-1} \qquad (1)$$

The estimation of the MA model returned the following values for the moving average parameter θ:

$$I_t - I_{t-1} = \hat{\alpha}_t - 05588\hat{\alpha}_{t-1} \qquad s(\vartheta) = 0.0029$$

On the US sample, Fama and Gibbons obtained a value of the parameter θ equal to -0.8027 and suggested that only 20% of the unexpected inflation is impounded in the expected inflation rate in each month. In our European sample this percentage raises to 45%.

In Table I, we document the main descriptive statistics (left table) and the correlation (right table) among the macroeconomic variables. The values of the statistics and correlation (obtained with a bootstrap over 10000 draws) are in line with the results obtained in previous studies.

**Insert Table I here**

*2.2 The Methodology*

Since the goal of our style rotation model is to select the best performing style (value or growth) each month, a statistical technique able to generate a forecast of a group rather than a stock is most appropriate. Traditional econometric models, suitable to predict the sign (direction) of value or growth returns and so provide a recommendation for trading, include: linear regression analysis, probit and logit model (Arshanapalli et al, 2005), Markov-chain Monte Carlo (MCMC) and probabilistic neural networks. Our paper differs from the existing literature in that we use an Welsch Weighted Least Square model[v] in the in-sample period (over 36 months) in order to compute the regression coefficients to be then used to forecast the preferred style (value or growth) in which to rotate. The main reasons why we choose this technique are:

1. *Unbalanced sample*: the time series of the value premium over the in-sample period can be heavily unbalanced which generates problems in the logit/probit model in terms of spuriously driving the high (low) probability of correct forecasts as a result of different proportions of the 0's or 1's rather than due to a real efficacy of the model (see also Maddala). Therefore, if the time series is strongly auto correlated through time, we would achieve a high probability of correct forecast irrespective of the fit of the model;
2. *Weighting scheme*: it permits us to take into account of both the existence of autocorrelation in the value premium and the decreasing influence of the independent macroeconomic variables over the in-sample estimation period.

We document the results of our in-sample estimations in Table II. We reported the regression coefficients, the t-statistics and the R-squared, as a general check of the fit of the model[vi] for two cases: univariate and multivariate regression. In the multivariate regression, the dependent variable (value premium) is regressed against all the independent variables listed in the tables. On the left, we illustrate the results (univariate and multivariate) of an OLS model (corrected for the heteroschedasticity with the method proposed by White (1980). In the univariate OLS the variable with the highest R-squared is the Dividend Yiled, followed by the YTM and the ReatlTB. For all

the variables the variance of the residual is close to zero and for four of them the t-stat is significant. The tables in the centre document the regression coefficients obtained with a weighted least square regression with the Welsch model, where the observation are exponentially weighted in the in-sample period. Because we adopted a 36-month in-sample estimation period, the Welsch model attributes a lower weight to the more distant observations. The multivariate WLS-exponential findings evidence a result similar to what is documented in the literature. Indeed, the positive coefficient of the YTM suggests that in periods of small YTM (expansionary periods), stocks with growing characteristics should show higher returns because of better market expectations, or simply because a decrease in the long term rates relative to the short term rates increases future cash flows or reduce the discount factors at which these cash flows are capitalized. At the same time, the positive and significant beta of the previous-month value premium is generated by the autocorrelation that last for almost 3 months and it helps predicting the direction of the value-growth spread.

On the right side of Table II, instead, we show the minimum change in the regression coefficient when we applied a WLS where the residual of the regression are used in the next iteration in order to scale the observations. The results vary only slightly among the three different approaches, with the WLS-exponential evidencing a better fit and a lower MSE.

**Insert Table II here**

We decided to use sales-to-price as the valuation metric for building both value and growth portfolios as we have previously found it to be the best multiple for differentiating between such stocks in the European sample[vii]. The construction of the two style portfolios consists in ranking all the stocks in our sample at the end of August[viii] each year based on the sales-to-price ratio. We then form equally-weighted value portfolios (top ¼) and growth portfolios (bottom ¼) and their performance is computed as a geometric return over different holding periods. After calculating the

portfolio returns, we scaled them by the geometric returns of an equally-weighted benchmark constructed on all the stocks included in our sample each month, and we computed these excess returns over 3, 6, 12, and 24 months. The returns we document are holding period (not annualized) returns.

Once we determined the value and growth portfolios, we developed a second screen based on the price momentum calculated over the previous 6 months. In this way, we obtain an indicator of the market sentiment that provides useful insights in differentiating between the stocks in accordance with where they are placed in the pricing cycle. Therefore, we rank all the stocks also on their six-month price momentum each month and then we designate the top ⅓ as being winners, and the bottom ⅓ as being losers. We subsequently combine these momentum portfolios with those obtained by ranking the sales-to-price and we compute the excess returns of the value/growth winners and losers over holding periods extending from 3 to 24 months.

We also develop a financial health indicator following the methodology applied by Bird and Casavecchia (2006) and then test the ability of this indicator to distinguish between the value and growth stocks with high probability of either a positive or a negative future EPS. The construction of this indicator is based on the application of a principal component anaysis to reduce the large number of accounting variables and extract the latent factors behind them that explain the largest portion of the variation in the original variables. The principal components are then used to feed a probit regression model which aims at predicting the probability of the variation in the next year EPS for the stocks, with the assumption being that the (positive or negative) change in the *EPS* can be used to predict the next year returns across all firms.

An important point to consider is that we chose not to include the fundamental variables in the same regression model for the macroeconomic rotation. The reasons for this are:

- we want to apply the rotation signals to the portfolios of good or poor financial health and hence treat the two different information and contributions separately;
- we decided to apply different models in the construction of the financial health scores and in the creation of a rotation signal.

## 3. **Results**

### 3.1 *Market-based Indicator and Macro Rotation*

At the end of August each year from 1993 to 2004, we rank the stocks according to their sales-to-price ratio and then we split the stocks into quintiles to form four equally weighted portfolios and among them, we select the extreme top and bottom ¼, which will then constitute the value and growth portfolios. We also use our macroeconomic regression to forecast which of value and growth will perform best over the next 12 months. We form the "rotation right" ("rotation wrong") portfolio by investing that month in what we expect to be the best (worst) performing of value and growth over the subsequent 12 months. We calculate the average excess return on these four portfolios over different holding periods (3, 6, 12, and 24 months) against our benchmark portfolio, which is an equally weighted portfolio of all of the stocks in our universe. In Table III, we report these excess returns and their associated Newey-West p-values for all portfolios and holding periods considered. As already highlight by Piotroski (2000, 2005) the results confirm the findings from previous studies that value portfolios clearly outperform growth portfolio, though this outperformance requires some patience as it is 6 to 12 months before any premium is realized.[ix]. It is evident from our findings that a "crude" multiple such as sales-to-price, permits to separate the performance of value and growth stocks over different cumulating periods, with value portfolio returning the largest excess return over the universe. Our results also indicate that a model based on macroeconomic variables is able to both highlight the sensitivity of the value and growth stocks to changes in economic sentiment and profit from rotating in and out of the two different styles. The

excess returns generated by the rotation (right or wrong) are particularly interesting because they seem to constitute the bounds of the performance of value and growth stocks. Over 12-month holding period, the right style rotation is able to generate a return in excess of 22% which is almost double that realised by the value portfolio. On the other hand the wrong style rotation generates a return less than -14% which is more than double the negative return realised by growth stocks. It is evident that the style rotation model has enabled us to realise performance well above that which could be achieved if we restricted ourselves to simply investing in the value (or growth) portfolios each month. If we extend to a 24-month holding period, the rotation signal appears to lose efficacy as a result of becoming stale, given that our model is built to predict the value premium over the next 12 months, and not well beyond then.

### *3.2 Market and Macroeconomic Sentiment Indicators*

Commencing with Bernstein (1993), a vast literature on the interaction between value and momentum phenomena has been produced through time. These led also to the formulation of an earnings and momentum life cycle of a stock as proposed by Lee and Swaminathan (2000) which suggests that the price of stocks oscillates between being under- and over-valued. Bird and Casavecchia (2006) showed that a blending of value and momentum indicators might prove useful in predicting the future return behaviour of a stock. We enhance both the value and growth portfolios discussed above by only including in each portfolio stocks that rank in the top-third by price momentum. We then overlay these enhance value and growth portfolios by our style timing indicator in the same way that we did previously when dealing with the value and growth portfolios We report in Table IV-a the excess returns for the following four portfolios: enhanced value (top ¼ by sales-to-price and top ⅓ by momentum), enhanced growth (bottom ¼ by sales-to-price and top ⅓ by price momentum) and the portfolios (right and wrong rotations) resulting from switching between these two portfolio, based on our style rotation signal..

**(Insert Table IV-a here)**

In the particular case of the value portfolios, the excess returns of value winners peaks at more than 32% over a 12-month holding period well beyond the 11% of table III of the value-only portfolios over the same holding period. As we already mentioned, one of the peculiar requirements of a value management is patience, given the overperformance reaching a stellar cumulated excess return of in excess of 70% over 24 months (versus a 38% of the unscreened value portfolio in table III). In the case of the growth stocks, the imposition of a timing on their performance allows to not only lengthen but also improve the performance of these stocks with an 11.5% over a 12-month holding period and a -2% over 24 months, which is many folders more than the -17% of the unscreened growth portfolio. All these findings seem to be statistically significant at 95% confidence.

If we move our attention to the returns of the two extreme scenarios generated by the rotations before the economic binary signal becomes stale (beyond 12 months), the ability to better identify the phases when a style (e.g. value) might overperform the other (e.g. growth) after being enhanced by momentum, seems to be very remunerative. The regression coefficients give the impression of being able to quantify the sensitivities of the portfolios to the economic changes and exploit the degree of autocorrelation intrinsic in the month-by-month variation in the value premium, used as one of the independent variables. The result is a framework where not only we better time entry into value and growth stocks with the help of the market sentiment, but we are also able to link this cycle of market corrections to the particular macroeconomic phase we are circling in. Therefore, it is similar to tilting the portfolio between turning points of value and growth stocks according to the indication offered by our independent variables in the WLS regression, regardless of whether these corrections are the results of changes in the intertemporal economic risk of the stocks (Fama and French, 1992) or the product of changes in investor's mindset (Lakonishok *et al.,* 1994).

We repeat the same analysis but this time only including in our value and growth portfolios those stocks that rank in the bottom third by price momentum. Our results are reported in Table IV-b. The momentum indicator provides very impressive insights into those stocks that are most likely to

experience a torpedo effect in the earnings and market expectations. Indeed, the correction for the growth stocks appears particularly severe, with a 12-month underperformance of almost -33%, well below the -6% of the unscreened growth portfolio of table III. The analysis of the profitability of the *right* rotation indicates an added value over a 12-month holding period of 6% (bottom of table IV-b) in excess of the value-loser portfolio whereas the wrong rotation seems not to monotonically lower the performance of the growth-loser portfolio over the same period.

**(Insert Table IV-b here)**

In summary, the results of table IV-a and IV-b propose a very interesting picture where not only does the momentum measure perform well in separating out the value and growth stocks but the style rotation indicator does an equally good job in determining when to invest in the value portfolio and when to invest in the growth portfolio. This result highlights the possibility that the macroeconomic factors convey information that is not included in the market sentiment. The consequence is a monotonic increase in the excess returns when moving from the wrong rotation to the right rotation passing through the enhanced value and enhanced growth portfolio. The implications of these findings suggest that:

(i) it is possible to augment the performances of value and growth portfolios by a sentiment/momentum indicator, and that this performance behaviour is clearly consistent with an earnings and momentum life cycle, as already proposed in the literature;

(ii) Cheap stocks that are at the bottom of their cycle seem to trend upwards for an extended period once they have experienced their turning point;

(iii) the upward potential of the expensive stocks is limited and they typically fall fairly rapidly from their peak price, and

(iv) The application of a switching regime between enhanced value and enhanced growth portfolios permits to link the life cycle of a stock to a change not only in the market sentiment but also in the intertemporal sensitivities of value and growth stocks to the current level of the economic scenario.

### *3.3 Financial Health Indicators to improve the style picking*

As evidenced by Bird and Casavecchia (2006), a financial health indicator seems successful in further differentiating between value and growth stocks. They analysed the single contributions of the financial health and momentum indicators and arrived at the same conclusions obtained by Chordia and Shivakumar (2006) that the two measures independently introduce information and by so doing, complement each other in enabling the choice of the better (worse) performing value and growth portfolios. They also identifies that the effect of the momentum indicator is predominant to that of the financial health indicator, which is consistent with the results obtained by Piotroski (2005) on the US sample. The most important result by Bird and Casavecchia is that financial health has a much stronger influence when applied to a growth portfolio than to a value portfolio. This findings is not surprising because it simply reflect the greater concern of the investors for the potentially large losses that can be generated in case of a drastic turnaround in the performance of growth stocks after they reached the peak of their cycle. Consequently, the investor community becomes more sensible to any possible sign of a reversion in the fundamentals of a growth company in comparison with a value company, considering that the latter has been consistently underestimated.

In this paragraph, we build upon their result and illustrate the contribution of a style rotation in conjunction with the stock selection signals provided by a market sentiment and a financial strength measure. We document our results in table V-a in relation to those stocks with strong past market sentiment and high probability of a future positive earnings release (top ⅓ by momentum and probit

or “good” stocks) whereas in table V-b we illustrate the findings obtained for those stocks with poor market sentiment and high probability of a negative earnings release (bottom ⅓ by momentum and probit or “bad” stocks).

Starting with table V-a, the combination of sentiment and financial health measures generates results similar to those by Bird and Casavecchia, with the “good” value portfolio realising a 37% excess return and the good growth portfolio overperforming the universe with a 19% return over a 12-month holding period.

Because our aim is to quantify the style rotation contribution, we prefer to focus our attention on the improvement generated by our economic model on the previous two portfolios. Over a 12-month holding period, a strategy consisting of both switching between value and growth stocks, in a way that is consistent with our macroeconomic signal (right rotation), and filtering them by their market sentiment and financial health, would have realised a return in excess of 44% over the out-of-sample period. Moreover, the difference between right rotation and good value is always positive before the economic signal becomes stale (24-month holding period). On the other side, a strategy consisting in switching between value and growth stocks in a way that is conflicting with the macroeconomic signal (wrong rotation), generates excess returns which are always lower than those realised by a good growth portfolio over holding periods of up to 14 months and a reversion thereafter. Therefore, a long-short strategy based on style rotation and augmented by market sentiment and financial health, produced an excess return of 27% pa, approximately 9.5% larger than the potential returns obtainable by going long of a good value portfolio and short of a good growth portfolio.

The results holds also in relation to what we can call bad value and bad growth stocks, which are stocks with degraded past market sentiment and high probability of a future poor financial health. As illustrated in table V-b, a bad value stocks suffer from an underperformance ranging between -

5% and -8% over holding periods of 3, 6 and 12 months. The consequent reversion over 24 months is simply due to the market correction in the sentiment and the stagnation of the yearly financial health indicator. As we mentioned before, the greatest contribution of the composition of momentum and financial health indicators is evidenced by its ability to isolate the strong reversal of almost -36%pa. In relation to the benefits of a macroeconomic rotation for bad value and bad growth stocks, we did not find anywhere the same improvements in separating out the performance of bad value and bad growth stocks as in the case of table V-a. Indeed, the switching process between value and growth stocks combined with market and financial enhancement generate excess returns (-10%pa for bad value portfolios and -28.5% for bad growth portfolios) that lie in between the performances of bad value and bad growth stocks (respectively, -5% and -36%). There are two explanations for this to happen:

1. Contrary to the excess returns obtained in table V-a based on portfolios constituted by and average number of stocks equal to 63, the returns illustrated in table V-b refer to portfolios composed of an average of 20 stocks and this is particularly the case for the bad growth portfolios. The implication is that there are no such spaces for the rotation when this is combined with the additional two screens constituted by the sentiment and financial health indicators;
2. the variance of the Newey-West estimators is relatively high for the findings in table V-b, reducing the level of significance for almost all the results reported in the table.

## 4. **Conclusions**

In this paper, we demonstrated that during the period 1993-2004, a number of macroeconomic and market factors seemed to be able to predict the direction of the next month value premium. The relation between the business cycles and the value-growth spread adds another dimension to the well-known value and momentum anomaly, given the size and robustness of the returns over

different holding periods. The profitability generated by a naïve rotation between value and growth styles produced returns, in excess of the benchmark, suggesting the possibility that the price adjustment of these stocks is a dynamic phenomenon not only across the market sentiment dimension, as already documented in the academic and professional literature, but also across business cycles. These findings evidence the existence, at least in the short run, of a real and quantitative important effect of monetary policy on value and growth stocks. The overperformance of the rotation strategy between portfolios constructed on either single valuation metrics or their enhancement by market sentiment and company's financial strength is consistent, monotonic, significant, and expected in its direction. This highlights the possibility that the macroeconomic factors convey information that is not already included in the market sentiment and it permits to link the earnings and momentum life cycle of a stock, proposed by Lee and Swaminathan (2000) to the intertemporal sensitivities of value and growth stocks to the current level of the economic scenarios. Moreover, the predictability of the returns of the style rotation in combination with that of the momentum and financial health indicators conform to the underreaction explanation of the behavioural-based models developed by Barberis *et al.* (1998) and Hong and Stein (1999), where a the market initially underreact to information, then trends and eventually overshot the fair value of a stock. Obviously the pricing of all stocks do not behave in such a fashion but what we have established using the metrics and the style rotation model employed in this study is that sufficient stocks behave in this way to generate large and consistent investment returns. These results, hence, question the efficient price adjustment of European stocks, in particular if consideration is given to the fact that the evidence cannot be completely explained by transaction costs considering their declining trend in European markets and the large diffusion of the style-oriented ETF's in the last years.

[i] This is the most complete generally-available and accepted database with all the necessary accounting information for the European stocks. The international COMPUSTAT dataset, contrary to the US dataset is less likely to be affect by survivorship bias, because it contains relatively large firms. Thus, it is unlikely that our results are driven by this bias.

[ii] The authors would like to thank GMO UK for providing all the necessary data on European stocks.

[iii] Conrad and Kaul (1993) documented that much of the evidence on the long horizon mean reversion are generated by low-priced stocks and that these stocks also exhibit a strong return reversal in January.

[iv] For a detailed description of the implementation of the back-forecasting procedure of Box and Jenkins, see Hamilton (1985).

[v] We also applied a linear least square and a weighted-least square where the vector of residuals from the previous iteration is used to weight the observation of the regression (WLS residuals) in order to downweight large residuals more severely. We compared these results with those obtained with the exponential WLS in table II. The latter returned a higher efficacy of the predictions.

[vi] The results of the regressions do not seem to be particularly sensitive to the tuning constant of the Welsch model used in our in-sample period.

[vii] We obtained very similar findings when we conducted the analysis by using book-to-market. An extract of the result can be obtained on request from the corresponding author.

[viii] We form portfolios in August to allow sufficient time for the accounting information, used in our analysis, to be publicly released. This is consistent with previous studies conducted on the European area.

[ix] It should be noted that the excess returns reported are the average accumulated excess returns over each particular holding period (i.e the returns for the three-month holding period are the average accumulated excess returns over the considered 3 months while those for 12 months are the average accumulated excess returns over the considered 12 months. If the excess return was 5% over a three-month holding period and 5% over a twelve-month holding period, this would indicate that the excess returns over month four to 12 was basically zero.

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**Table I**

In the table we document the main statistics of the macroeconomic variables as well as the coefficient of correlation obtained by applying the bootstrap methodology over 10000 draws. The values are related to the entire holding period between 1990 and 2004.

| | $dvp_{t-1}$ | UI | BaaAaa | EuroDY | YTM | RTB |
|---|---|---|---|---|---|---|
| Mean | 0.0% | 0.0% | 0.8% | 2.6% | 0.8% | 5.3% |
| Median | 0.0% | 0.0% | 0.7% | 2.6% | 0.9% | 5.5% |
| Std Dev | 0.5% | 0.0% | 0.2% | 0.5% | 1.0% | 1.1% |
| Min | -1.8% | -0.1% | 0.6% | 1.6% | -1.4% | 3.3% |
| Max | 2.6% | 0.2% | 1.4% | 3.6% | 2.9% | 7.4% |

| | $dvp_{t-1}$ | UI | BaaAaa | EuroDY | YTM | RTB |
|---|---|---|---|---|---|---|
| $dvp_{t-1}$ | 1 | -0.016 | -0.012 | -0.033 | 0.057 | 0.045 |
| UI | | 1 | 0.006 | 0.081 | 0.120 | -0.037 |
| BaaAaa | | | 1 | 0.059 | 0.045 | -0.229 |
| EuroDY | | | | 1 | 0.206 | -0.223 |
| YTM | | | | | 1 | -0.336 |
| RTB | | | | | | 1 |

# Table II

In this table we document the results obtained from three univariate and multivariate regressions following the approach by Fama and MacBeth. The regressions are: an ordinary-least square (OLS) a weighted-least square (WLS exponential) and a weighted-least square where the vector of residuals from the previous iteration is used to weight the observation of the regression (WLS residuals) in order to downweight large residuals more severely. The results vary slightly from one another, with the WLS-exponential showing a better fit and a lower minimum squared error (MSE). The regression is computed over 36 months in each month of the sample period.

Univariate Regression Model

| Value Premium 12m | OLS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | α | t(α) | β | t(β) | $R^2$ | F-test | p-value | $\sigma^2(\varepsilon)$ |
| Vpremium 12m (t-1) | -0.016 | -14.948 | 0.693 | 1.673 | 7% | 2.80 | 0.104 | 0.000 |
| Unexpected Inflation | -0.016 | -14.945 | -0.587 | -0.352 | 0% | 0.12 | 0.727 | 0.000 |
| Baa - Aaa | -0.019 | -10.900 | 0.041 | 1.498 | 6% | 2.24 | 0.143 | 0.000 |
| Euro DivYield | -0.009 | -7.267 | 0.465 | 4.049 | 32% | 16.40 | 0.000 | 0.000 |
| YTM | -0.013 | -6.691 | 0.161 | 1.840 | 8% | 3.39 | 0.074 | 0.000 |
| Real TB | -0.018 | -14.830 | -0.127 | -1.818 | 8% | 3.30 | 0.078 | 0.000 |

Univariate Regression Model

| Value Premium 12m | WLS-exponential | | | | |
|---|---|---|---|---|---|
| | α | t(α) | β | t(β) | MSE |
| Vpremium 12m (t-1) | -0.018 | -19.830 | 0.770 | 2.282 | 0.0000 |
| Unexpected Inflation | -0.018 | -19.411 | -0.752 | -0.728 | 0.0000 |
| Baa - Aaa | -0.019 | -16.483 | 0.045 | 1.330 | 0.0000 |
| Euro DivYield | -0.008 | -8.892 | 0.496 | 4.556 | 0.0000 |
| YTM | -0.013 | -7.307 | 0.083 | 2.079 | 0.0000 |
| Real TB | -0.018 | -15.077 | -0.128 | -2.515 | 0.0000 |

Univariate Regression Model

| Value Premium 12m | WLS-residuals | | | | |
|---|---|---|---|---|---|
| | α | t(α) | β | t(β) | Model Fit |
| Vpremium 12m (t-1) | -0.016 | -14.564 | 0.629 | 1.588 | 0.0052 |
| Unexpected Inflation | -0.016 | -14.094 | -0.313 | -0.401 | 0.0054 |
| Baa - Aaa | -0.019 | -10.945 | -0.027 | -1.487 | 0.0049 |
| Euro DivYield | -0.009 | -7.488 | 0.386 | 3.867 | 0.0045 |
| YTM | -0.013 | -6.579 | 0.110 | 1.734 | 0.0051 |
| Real TB | -0.018 | -15.503 | -0.110 | -1.918 | 0.0042 |

Multivariate Regression Model

| Value Premium 12m | OLS | |
|---|---|---|
| | β | t-stat |
| Vpremium 12m (t-1) | 0.431 | 1.828 |
| Unexpected Inflation | -0.676 | -1.751 |
| Baa - Aaa | -0.882 | -1.506 |
| Euro DivYield | 0.492 | 2.398 |
| YTM | 0.079 | 1.275 |
| Real TB | 0.057 | 1.619 |
| α | -0.006 | -5.510 |
| $R^2$ | 70% | |
| F-test | 11.93 | |
| p-value | 0% | |
| $\sigma^2(\varepsilon)$ | 0.0008% | |

Multivariate Regression Model

| Value Premium 12m | WLS-exponential | |
|---|---|---|
| | β | t-stat |
| Vpremium 12m (t-1) | 0.362 | 1.939 |
| Unexpected Inflation | -0.394 | -1.698 |
| Baa - Aaa | -0.246 | -0.857 |
| Euro DivYield | 0.337 | 1.814 |
| YTM | 0.070 | 1.211 |
| Real TB | 0.039 | 1.292 |
| α | -0.006 | -6.016 |
| MSE | 0.0000 | |

Multivariate Regression Model

| Value Premium 12m | WLS-residuals | |
|---|---|---|
| | β | t-stat |
| Vpremium 12m (t-1) | 0.412 | 1.491 |
| Unexpected Inflation | -0.618 | -0.646 |
| Baa - Aaa | -0.820 | -1.368 |
| Euro DivYield | 0.566 | 2.336 |
| YTM | 0.039 | 1.259 |
| Real TB | 0.027 | 1.733 |
| α | -0.006 | -5.408 |
| Model Fit | 0.0029 | |

## Table III

| | Rotation Right | | | |
|---|---|---|---|---|
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 8.13% | 13.81% | 22.44% | 35.99% |
| p-value | 0.000 | 0.000 | 0.000 | 0.000 |
| | Value - Top ¼ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -0.53% | 1.61% | 11.26% | 38.81% |
| p-value | 0.000 | 0.000 | 0.000 | 0.000 |
| | Growth - Bottom ¼ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 1.38% | 0.15% | -5.88% | -17.12% |
| p-value | 0.361 | 0.000 | 0.000 | 0.000 |
| | Rotation Wrong | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -6.83% | -10.74% | -14.69% | -16.01% |
| p-value | 0.000 | 0.000 | 0.000 | 0.148 |
| Right-Wrong | 14.96% | 24.56% | 37.14% | 51.99% |
| Value-Growth | -1.91% | 1.46% | 17.14% | 55.93% |

Each August from 1993 to 2004, all available stocks are sorted based on their Sales-to-Price with those in the top ¼ being assigned to the value portfolio and those in the bottom ¼ being assigned to the growth portfolio. We also report the portfolio generated by macroeconomic rotation where rotation right (wrong) refers to a portfolio constructed by switching between value and growth stocks according (opposite) to the signal generated by the regression model. The accumulated excess returns are measured over different holding periods from 3 months to 24 months and are not annualized. The average of the accumulated excess returns is documented as well as the Newey-West p-value corrected for the *autocorrelation* and *heteroskedasticity* to test the significance of the excess returns.

**Table IV-a**

| | Rotation Right - Momentum Top ⅓ | | | |
|---|---|---|---|---|
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 25.60% | 34.56% | 44.04% | 49.65% |
| p-value | 0.000 | 0.000 | 0.000 | 0.010 |
| | Value Top ¼ - Momentum Top ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 11.45% | 17.00% | 32.09% | 70.18% |
| p-value | 0.000 | 0.000 | 0.000 | 0.000 |
| | Growth Bottom ¼ - Momentum Top ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 15.10% | 17.76% | 11.59% | -1.94% |
| p-value | 0.000 | 0.852 | 0.001 | 0.000 |
| | Rotation Wrong - Momentum Top ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 3.59% | 3.41% | -1.03% | -3.07% |
| p-value | 0.255 | 0.034 | 0.041 | 0.007 |
| Right-Wrong | 22.01% | 31.14% | 45.07% | 52.73% |
| Value-Growth | -3.65% | -0.76% | 20.50% | 72.12% |

Each August from 1993 to 2004, all available stocks are sorted based on their sales-to-price with those in the top ¼ being designated as value stocks and those in the bottom ¼ being designated as growth stocks. The stocks are also attributed to portfolio generated by macroeconomic rotation, where rotation right (wrong) refers to a portfolio constructed by switching between value and growth according (opposite) to the signal generated by the regression model. The same stocks area also sorted by their price momentum over the previous six months with this top ⅓ being the winner portfolios. Value/growth and rotation right/wrong portfolios are then combined with the top ⅓ of sentiment portfolios. The accumulated excess returns are measured over different holding periods from 3 months to 24 months and are not annualized. The average of the accumulated excess returns is documented as well as the Newey-West p-value corrected for the *autocorrelation* and *heteroskedasticity* to test the significance of these excess returns.

**Table IV-b**

| | Rotation Right - Momentum Bottom ⅓ | | | |
|---|---|---|---|---|
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -4.55% | -2.10% | 3.54% | 14.10% |
| p-value | 0.052 | 0.001 | 0.000 | 0.002 |
| | Value Top ¼ - Momentum Bottom ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -8.70% | -8.93% | -2.70% | 15.36% |
| p-value | 0.060 | 0.123 | 0.000 | 0.000 |
| | Growth Bottom ¼ - Momentum Bottom ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -16.17% | -23.53% | -32.56% | -45.31% |
| p-value | 0.000 | 0.000 | 0.000 | 0.086 |
| | Rotation Wrong - Momentum Bottom ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -18.36% | -26.28% | -32.06% | -37.15% |
| p-value | 0.000 | 0.000 | 0.000 | 0.252 |
| Right-Wrong | 13.80% | 24.17% | 35.60% | 51.25% |
| Wrong-Growth | 7.48% | 14.60% | 29.86% | 60.67% |

Each August from 1993 to 2004, all available stocks are sorted based on their sales-to-price with those in the top ¼ being designated as value stocks and those in the bottom ¼ being designated as growth stocks. The stocks are also attributed to portfolio generated by macroeconomic rotation, where rotation right (wrong) refers to a portfolio constructed by switching between value and growth according (opposite) to the signal generated by the regression model. The same stocks area also sorted by their price momentum over the previous six months with this bottom ⅓ being the loser portfolios. Value/growth and rotation right/wrong portfolios are then combined with the bottom ⅓ of sentiment portfolios. The accumulated excess returns are measured over different holding periods from 3 months to 24 months and are not annualized. The average of the accumulated excess returns is documented as well as the Newey-West p-value corrected for the *autocorrelation* and *heteroskedasticity* to test the significance of these excess returns.

**Table V-a**

| | Rotation Right -Mom Top ⅓ - Probit Top ⅓ | | | |
|---|---|---|---|---|
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 22.26% | 30.08% | 44.32% | 78.92% |
| p-value | 0.000 | 0.000 | 0.000 | 0.252 |
| | Value Top ¼ - Mom Top ⅓ - Probit Top ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 16.70% | 25.08% | 37.19% | 81.01% |
| p-value | 0.000 | 0.000 | 0.000 | 0.000 |
| | Growth Bottom ¼ - Mom Top ⅓ - Probit Top ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 13.18% | 14.67% | 18.98% | 16.09% |
| p-value | 0.300 | 0.315 | 0.218 | 0.627 |
| | Rotation Wrong - Mom Top ⅓ - Probit Top ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | 8.37% | 9.23% | 16.63% | 22.64% |
| p-value | 0.235 | 0.248 | 0.110 | 0.079 |
| Right-Wrong | 13.89% | 20.85% | 27.69% | 56.29% |
| Value-Growth | 3.52% | 10.41% | 18.22% | 64.92% |

Each August from 1993 to 2004, all available stocks are sorted based on their sales-to-price with those in the top ¼ being designated as value stocks and those in the bottom ¼ being designated as growth stocks. The stocks are also attributed to portfolio generated by macroeconomic rotation, where rotation right (wrong) refers to a portfolio constructed by switching between value and growth according (opposite) to the signal generated by the regression model. The same stocks area also sorted by their price momentum and financial health over the previous six months with the top ⅓ of both indicators being the winner portfolios with good financial health. Value/growth and rotation right/wrong portfolios are then combined with these top ⅓ by sentiment and financial health indicators. The accumulated excess returns are measured over different holding periods from 3 months to 24 months and are not annualized. The average of the accumulated excess returns is documented as well as the Newey-West p-value corrected for the *autocorrelation* and *heteroskedasticity* to test the significance of these excess returns.

**Table V-b**

| | Rotation Right - Mom Bottom ⅓ - Probit Bottom ⅓ | | | |
|---|---|---|---|---|
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -6.75% | -11.34% | -9.79% | 5.25% |
| p-value | 0.682 | 0.545 | 0.288 | 0.531 |
| | Value Top ¼ - Mom Bottom ⅓ - Probit Bottom ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -7.12% | -8.69% | -5.26% | 12.00% |
| p-value | 0.649 | 0.890 | 0.249 | 0.279 |
| | Growth Bottom ¼ - Mom Bottom ⅓ - Probit Bottom ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -15.05% | -24.86% | -35.82% | -24.43% |
| p-value | 0.001 | 0.065 | 0.851 | 0.883 |
| | Rotation Wrong - Mom Bottom ⅓ - Probit Bottom ⅓ | | | |
| | 3 months | 6 months | 12 months | 24 months |
| Mean Return | -13.71% | -20.27% | -28.44% | -22.44% |
| p-value | 0.069 | 0.354 | 0.855 | 0.642 |
| Right-Wrong | 6.97% | 8.93% | 18.65% | 27.69% |
| Value-Growth | 7.93% | 16.17% | 30.56% | 36.43% |

Each August from 1993 to 2004, all available stocks are sorted based on their sales-to-price with those in the top ¼ being designated as value stocks and those in the bottom ¼ being designated as growth stocks. The stocks are also attributed to portfolio generated by macroeconomic rotation, where rotation right (wrong) refers to a portfolio constructed by switching between value and growth according (opposite) to the signal generated by the regression model. The same stocks area also sorted by their price momentum and financial health over the previous six months with the bottom ⅓ of both indicators being the loser portfolios with poor financial health. Value/growth and rotation right/wrong portfolios are then combined with these bottom ⅓ by sentiment and financial health indicators. The accumulated excess returns are measured over different holding periods from 3 months to 24 months and are not annualized. The average of the accumulated excess returns is documented as well as the Newey-West p-value corrected for the *autocorrelation* and *heteroskedasticity* to test the significance of these excess returns.