INVESTOR SENTIMENT EFFECT IN STOCK MARKETS: STOCK CHARACTERISTICS OR COUNTRY-SPECIFIC FACTORS?

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ABSTRACT

This paper analyzes the investor sentiment effect in four key European stock markets: France, Germany, Spain and the UK. The findings show that sentiment has a significant influence on returns, varying in intensity across markets. The variation appears to involve both stock characteristics and cross-country cultural or institutional differences. The results also show sensitivity to the choice of sentiment proxy, suggesting the need for further investigation.

1. INTRODUCTION

Investor sentiment can be defined as investor opinion, usually influenced by emotion, about future cash flows and investment risk (Chang, *et al*. 2009a). Some researchers also explain it as the propensity to speculate or the optimism or pessimism about a given asset (Baker and Wurgler, 2006).

The suggested causes are diverse. Baker and Wurgler (2006) argue that the effect is not uniform across all stocks and is more likely to be associated with certain types of stock, particularly those that are hard to value or to arbitrage. Their results in fact prove that when sentiment is high/low this type of stock suffers from over/under pricing, which later reverts.

Schmeling (2009) offers arguments centered on country-specific factors, suggesting that the results depend decisively on the level of institutional quality and country-specific cultural factors. Chang, *et al*. (2009a) propose alternative explanations including market integrity, the availability of information media or the degree of collective behavior. Chang, *et al*. (2009b) also focus on country-specific factors, attributing importance to differences in information quality, legal systems or corporate governance. These last works therefore appear to suggest that country-specific factors, such as the level of market integration and certain cultural factors, hold the key to explaining the effect of investor sentiment on future stock returns.

It is in this context that this paper aims to analyze the role played by stock characteristics linked with the subjectivity of their pricing or the difficulty of arbitrage, in explaining the effect of sentiment on future stock returns. The arguments put forward in the above-mentioned literature, however, suggest the need to analyze whether the sentiment effect depends on stock characteristics, country-specific factors, or a combination of the two. If we obtain different results and we assume that stock characteristics are the

same across countries, it seems reasonable to consider the country, proxying for different institutional market factors and cultural traits, as the key variable. It is important to note, however, that if stock characteristics differ from one country to another, any observed discrepancies between markets might relate simply to stock-type differences and be independent of country-specific factors. Obviously, it is also possible that the effect is the result of the combination of both stock *and* country characteristics.

This paper contributes to the financial literature in various ways. Firstly, it uses country-neutral strategies in order to determine whether stock characteristics, country-specific factors, or a combination of the two can explain the intensity of the investor sentiment effect on future stock returns. As far as we are aware, this matter has not been addressed previously, since the literature has approached the problem by analyzing the two possible causes separately. Secondly, it performs separate analyses of four key European markets, France, Germany, Spain and the United Kingdom. The majority of previous studies have presented overall results for a set of countries, but none for individual countries, apart from the United States. Finally, another contribution of this paper is that it analyses the role of the overall US and European investor sentiment and includes a robustness test of the importance of the choice of the sentiment indicators in the construction of the investor sentiment proxy.

The remainder of the paper proceeds as follows. Section 2 presents the theoretical framework. Section 3 describes the database and the basic structure of the investor sentiment proxy. Section 4 presents a parametric discussion of the results for the individual markets. Section 5 analyses whether the investor sentiment effect depends on the stocks or country being analyzed. Section 6 contains a discussion of the various issues involved in the choice of proxies for investor sentiment, and comments on the influence on results. Finally, section 7 outlines the main conclusions of the study.

2. THEORETICAL FRAMEWORK

According to classic finance theory, prices in equilibrium only reflect the discounted value of expected cash flows. Thus, any possible variations will depend only on systematic risk. Within this context, investor sentiment does not constitute a relevant factor, since the presence of irrational investors trading on sentiment is soon offset by the remainder of rational investors in the market trying to bring prices into equilibrium.

The behavioral finance literature suggests that sentiment affects trading decisions. The influence of investors' future expectations can bring about the over- or under- pricing of stocks, and thus affect pricing models.

Early empirical evidence centered on demonstrating how sentiment predicts future returns in the US stock market (Kothari and Shanken, 1997; Neal and Wheatley, 1998; Shiller, 1981, 2000; Baker and Wurgler, 2000; and Brown and Cliff, 2005) and estimating

the effect of sentiment on small-stock premiums (Lee *et al.,* 1991; Swaminathan, 1996; Neal and Wheatley, 1998; Brown and Cliff, 2004; and Lemmon and Portniaguina, 2006).

Another set of studies examine the possibility of a causal relationship between index returns and changes in investor sentiment, failing to find any sentiment effect on short-run returns (Otoo, 1999; Jansen and Nahuis, 2003; Brown and Cliff, 2004; and Wang *et al.,* 2006).

Focusing on other financial markets, Wang (2001, 2003) analyze the sentiment effect in the futures market, Han (2008), and Lemmon and Ni (2008) in the options market, Ahn, *et al.* (2002) in the currency market and Burghardt, *et al.* (2008) and Schmitz, *et al.* (2009) in the warrants market.

The two main channels through which sentiment can affect pricing are investor sentiment and arbitrage. Under the first of these channels, sentimental demand shocks vary across stocks while arbitrage limits are constant. Interpreting sentiment as the propensity to speculate, sentiment increases the relative demand for stocks that are vulnerable to speculation, whose valuations are subjective and difficult to determine, and whose contemporaneous returns are higher than is justifiable. Specifically, small stocks, high volatility stocks, extreme growth stocks, distressed stocks, young stocks and non dividend-paying stocks, should be the most difficult to price and, therefore, the most vulnerable to investor sentiment.

Under the second, interpreting sentiment as optimism or pessimism about stocks in general, the effect of changes in sentiment will be uniform but the difficulty of arbitrage differs among stocks. In fact, the literature has shown that arbitrage is particularly costly and risky with certain stock types (young stocks, small stocks, unprofitable stocks, extreme growth stocks or distressed stocks).

These two channels appear to affect the same type of stocks, or, put another way, the most speculative stocks are also the hardest to arbitrage and this profile of characteristics will therefore be the most influenced by investor sentiment. Lemmon and Portniaguina (2006) find this effect to be present particularly in small stocks and with less institutional ownership. Baker and Wurgler (2006, 2007) find that small stocks, young stocks, high volatility stocks, unprofitable stocks, non-dividend-paying stocks, extreme growth stocks and distressed stocks are the most heavily affected by periods of pessimism, and likely to suffer from over- or under-pricing, depending on investor sentiment.

Chui, *et al.* (2008), for their part, argue that cultural differences between countries may be an element of behavioral bias. In fact, the herding tendency among uninformed investors or collectivism may intensify the relationship between stock returns and investor sentiment with changes in sentiment. Pursuing this issue, a number of studies that have analyzed a range of international markets have reported findings pointing towards differences between the countries analyzed. Schmeling (2009) shows that sentiment has an effect on return in 9 of the 18 countries analyzed. His results, which point towards country-specific

characteristics, appear to suggest a stronger effect in countries marked by herd-like trading behavior, investor overreaction and lower market integrity (institutional development and information quality). Chang, *et al.* (2009a and b) show that the sentiment effect has more impact in developed than developing countries. The earlier of these two papers highlights the greater intensity of the effect in countries characterized by a higher level of collectivism and greater access to information media, in partial contradiction to Schmeling (2009). The latter suggests that higher quality in the legal and corporate governance environments intensifies the sentiment effect.

Baker, *et al.* (2009) analyzes several aspects of (global and local) sentiment, observing their impact on stock returns. They also explore the effects on other countries' stock markets, given that the effect of the US investor sentiment is contagious across markets.

The empirical evidence reveals two complementary strands of research. One set of studies investigates the effect of investor sentiment on the returns of the most sentiment-sensitive stock (Baker and Wurgler, 2006 and 2007; Baker, *et al.,* 2009). The other analyses the effect of sentiment on stock returns in various countries, focusing on cross-country structural differences as the key source of variation in the intensity of the effect (Schmeling, 2009; Chang, *et al.*, 2009a and b). This study aims to interlink both ideas.

Another key issue is the actual measurement of the sentiment variable. This varies from one study to another, with researchers drawing on numerous indicators including investor survey findings (Otoo, 1999; Jansen and Nahuis, 2003; Brown and Cliff, 2005; Lemmon and Portniaguina, 2006; Qiu and Welch, 2006 and Schmeling, 2009), investor mood (Kamstra, *et al.,* 2003), retail investor trades (Barber *et al.,* 2006; Greenwood and Nagel, 2006 and Kumar and Lee, 2006), mutual fund flows (Brown, *et al.*, 2003; Frazzini and Lamont, 2008), the dividend premium (Baker and Wurgler, 2004a and b), the closed-end fund discount (Zweig, 1973; Lee, *et al.,* 1991; Swaminathan, 1996 and Neal and Wheatley, 1998), option implied volatility (Whaley, 2000), the number of IPOs and average first-day IPO returns (Ritter, 2003 and Ljungqvist, *et al.,* 2006), turnover or trading volume (Jones, 2001; Sheinkman and Xiong, 2003 and Baker and Stein, 2004), the share of equity issues in total equity and debt issues (Baker and Wurgler, 2000), insider trading (Seyhun, 1998) or composite sentiment indexes (Brown and Cliff, 2004; Baker and Wurgler, 2006, 2007; Chang, *et al.,* 2009a and b and Baker, *et al.,* 2009) among others.

The theory does not seem to have developed any clear criteria for assessing the validity of one variable in relation to others or even for the breakdown of a variable into its constituent parts (Chang, *et al.,* 2009a and b or Baker, *et al.,* 2009). This study aims to explore this issue by analyzing the robustness of the results to different composite measures and observing the effect of including or excluding certain variables in the construction of the different sentiment proxies.

3. DATABASE: STOCK CHARACTERISTICS AND SENTIMENT

3.1. STOCK CHARACTERISTICS

The data, taken from the Datastream database (Thomson Financial), refer to all stock currently or formerly listed in four of the key European markets: France (FR), Germany (GR), Spain (SP) and the United Kingdom (UK), thus avoiding survivorship bias. All the data are expressed in Euros. The sample period runs from January 1990 to December 2007. The stock characteristics considered are the book-to-market ratio (BTM), size (SIZ) measured as the stock market capitalization of each firm in thousands of Euros, volatility (VOL) measured as the last twelve months' standard deviation, and the dividend per share ratio (DIV). The descriptive statistics of the stock characteristics of each country, shown in Table I, include the data for the overall period and for two sub-periods in order to illustrate changes in the variables through time.

The analysis requires the construction of long-short portfolios based on each of the above-mentioned firm characteristics, using different time horizons. To address the possibility of problems of autocorrelation, this study follows the proposal given in Chang, *et al.* (2009b), which is to adopt the calendar-time approach used by Jegadeesh and Titman (2001) to study the momentum effect. Thus, each month, we sort the stocks by the corresponding characteristic j and group the returns into quintiles. We then compute the average returns in each of the following t+k months, where k denotes the selected time horizon. From the resulting data, we compute the differences between the extreme portfolios in every month of the horizon k. These are denoted as the differential portfolios. Finally, the return of the portfolio assigned to a given month is calculated from the average of the k returns of that month's differential portfolios according to the classifications for each of the preceding k months[1].

Thus, over/underpricing due to high/low investor sentiment will be greatest in the quintiles that are hardest to arbitrage or value (the first size and dividend quintiles and the fifth volatility quintile). Presumably, therefore, the current returns in these portfolios will be higher/lower than at the opposite end of the quintile distribution. The sentiment effect on the BTM ratio may be the result of two dimensions potentially interacting with it, one being high growth stocks (first quintile), the other, the most distressed stocks (fifth

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[1] The differential portfolio is the difference in returns between the top and bottom 20% of the stock classification. Baker and Wurgler (2006), Baker, *et al.* (2009), Chang, *et al.* (2009a and b) use the top and bottom 30%. The use of a smaller percentage in this paper enables the classification of more extreme, and thus clearly differentiated, stocks which can be expected to show a stronger sentiment effect. When the analysis was repeated using the top and bottom 30%, the sentiment effect on the stocks in question was, as predicted, less intense than for the top and bottom 20%.

quintile)[2]. To avoid this multidimensional effect, high-medium (H-M) and medium-low (M-L) portfolios were also constructed.

3.2.   INVESTOR SENTIMENT

The literature has used several different measures of investor sentiment, as described in the theoretical framework. Baker and Wurgler (2006) use principal components analysis to construct an index aggregating a series of sentiment indicator variables: the closed-end fund discount, stock turnover, number of IPOs and average IPO first-day returns, the equity share in new issues and the dividend premium. This index (to be referred to henceforth as the BW index) has been used in several recent studies including Baker and Wurgler (2006, 2007), Baker *et al.* (2009), Chang, *et al.* (2009a and b), where it is accepted as an appropriate measure of sentiment. It is one of measures used to analyze the sentiment effect in this study. Details of the BW index are available on Wurgler's web site[3].

Given that countries that concern us are European and the BW index was constructed for the US market, this study also includes a composite index for all four of the countries of interest, France (SENT FR), Germany (SENT GE), Spain (SENT SP) and the UK (SENT UK), as suggested in Baker, *et al.* (2009). As far as possible with the available data for these countries, the variables representing the country-specific factors are[4]: turnover, the volatility premium and the consumer confidence index. Turnover (TURN) is measured as the natural log of the raw turnover ratio, detrended by the five- year moving average. The volatility premium (PV) is calculated by taking the log of the average BTM ratio of high volatility stocks (the top 30%) and low volatility stocks (the bottom 30%). Finally, the consumer confidence index (CC) is as published by the European Commission every working day of each month for each member state[5]. The first two variables are the same as those used in the BW index; the aim of the third is to compensate the lack of IPO data[6].

The reason for the consideration of these variables is their relationship with the level of investor sentiment. In fact, Baker and Stein (2004) consider turnover as a sentiment indicator because in a market with short-selling constraints, high liquidity is a symptom of the fact that the market is dominated by a class of irrational investors, who underreact to the information contained in the order flow, and hence is overvalued. High turnover is also

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[2] The studies reported in Baker and Wurlger (2006) and Chang, *et al.* (2009a and b) include another series of stock characteristics representing profitablity or tangibility and variables such as age, sales growth, R&D investment or external finance. These variables could not be included in this study because the necessary data were not available for the markets under analysis.

[3] http://www.stern.nyu.edu/~jwurgler

[4] Th**e** availability of data determines the sample period for the analysis including SENT EU as July 1992 to December 2007.

[5] The consumer confidence index data were obtained from the European Commission web site: http://ec.europa.eu/economy_finance/db_indicators/surveys/index_en.htm

[6] The last section of the paper describes a robustness test on the construction of the sentiment index. Some of the data required (number of IPOs and IPO first day returns for Spain and number of IPOs for the UK) for this test were not available for all of the markets considered.

a sign of positive investor sentiment, and thus relatively low expected returns. Jones (2001) also shows an association between liquidity shifts and low future returns in the aggregate market.

Baker, *et al.* (2009) used the volatility premium, which is a proxy for relative investor demand between high and low periods of volatility. Conceptually, it is similar to that of the dividend premium, which is a proxy for relative investor demand between dividend-paying and non-paying stocks. These two variables are negatively correlated. High volatility stocks tend to be small stocks with low growth potential and dividend non-paying stocks, the demand for which increases with investor sentiment. For a set of countries including three of the four markets analyzed in this study, together with Canada and Japan, Baker, *et al.* (2009) use the volatility premium to replace the dividend premium, which is inappropriate in countries where dividends are uncommon[7]. Finally, the consumer confidence index captures household spending and savings data and investors' perceptions of the economic factors involved. The main advantage of this measure is that extended sets of data are available for practically all countries, enabling cross-country comparison. Another positive feature is its independence of market trading.

From the three above variables, we derive a sentiment index for each country using the same mechanism as Baker and Wurgler (2006). We start by estimating the first principal components of three proxies and their lags. This gives a first-stage index with six loadings and the variable is included in t or t-1, depending on which is most highly correlated with the first stage-index. The first principal component for France explains 52.677% of the total variance, that of Germany 53.045%, that of Spain 70.111% and that of the UK 39.467% of the variance explained, enabling the conclusion that the first factors explain a high proportion of the common variance between the three measures. The sentiment index coefficients for each country are as follows:

$$\text{SENT FR}_t = 0.487\ \text{CC}_t - 0.355\ \text{ROT}_{t\text{-}1} + 0.519\ \text{PV}_{t\text{-}1}$$
$$\text{SENT GE}_t = 0.484\ \text{CC}_t + 0.557\ \text{ROT}_{t\text{-}1} + 0.290\ \text{PV}_{t\text{-}1}$$
$$\text{SENT SP}_t = 0.424\ \text{CC}_{t\text{-}1} - 0.386\ \text{ROT}_t + 0.382\ \text{PV}_{t\text{-}1}$$
$$\text{SENT UK}_t = 0.602\ \text{CC}_t + 0.575\ \text{ROT}_{t\text{-}1} + 0.390\ \text{PV}_{t\text{-}1}$$

The descriptive statistics of the sentiment indicators of each country are summarized in Table II together with their correlations with the three sentiment proxies used to construct them. The results show that consumer confidence has a positive influence on the four sentiment indicators, as does the volatility premium. The most unevenly distributed

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[7] To enable comparison with the results of their 2009 study, the authors use the volatility premium to replace the dividend premium used in their 2006 study.

variable is turnover, which shows positive correlation for the UK and Germany and negative for France and Spain[8].

Since the analysis also requires an overall European sentiment indicator, the same principal component analysis approach is used to create a new aggregate index for all four countries, denoted by SENT EU[9]. The index scores by country are:

$$\text{SENT EU}_t = 0.270 \text{ SENT UK}_t + 0.367 \text{ SENT GE}_t + 0.387 \text{ SENT FR}_t + 0.410 \text{ SENT SP}_t$$

All four countries show significant positive correlation. Table III shows the correlations between the country-specific indexes and the aggregate index and between the country-specific indexes and the BW index. All the European sentiment indicators used in the analysis show positive and significant relationships except the coefficient of correlation between the UK and Germany, where the relationship lacks significance. The BW index shows significant positive correlation with the European sentiment index and with all the country-specific sentiment indexes, the lowest correlation is with SENT UK.

Figure 1 is a graph of investor sentiment over the sample period. The overall trend is an increase in the sentiment effect until 2001, declining afterwards until 2003. It is worth noting the UK results for the final period, which include the greatest fluctuations in investor sentiment.

4. RESULTS ANALYSIS: RETURN FORECASTS

To analyze the sentiment effect, we test its predictive capacity on a set of self-financed stock portfolios, each exposed to one of the four characteristics discussed earlier: size (small-large), volatility (high-low) and dividends (high-low). Since the potential growth and distressed stock portfolios tend to be classified into opposing quintiles, which are presumably the two most affected by sentiment, we construct three portfolios in order to detect possible differences between the extremes: high-medium for distressed stocks and medium-low for potentially high growth stocks.

As already stated, to overcome potential self-correlation problems arising from the construction of event-time portfolios over multi-period horizons we have used calendar-time portfolios for the different time horizons using the average monthly return over the previous k months of the k differential portfolios estimated for that month, in line with the procedure described in Jegadeesh and Titman (2001).

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[8]The exception is turnover in France and Spain, which is not positively correlated with the rest of the components used to construct these indices. For France, it has a correlation of -0.16 with CC and -0.25 with PV. The correlations for Spain are -0.62 with CC and -0.43 with PV. Baker *et. al*, (2009) also find contrary to the expected sign of correlation with PV for France, attributing it to the negative correlations observed with the rest of the measures used to construct their composite indicator for France.

[9] This index captures 47.654% of the variance explained.

The correlation between the resulting portfolios is summarized in Table IV[10]. The small-large size portfolio shows significant positive correlation with the volatility portfolio and significant negative correlation with the dividend portfolio. The volatility portfolio also has significant negative correlation with the dividend portfolio. These results hold for all four of the markets considered. The two extreme BTM portfolios show significant negative correlation for Spain, but positive correlation for France, Germany and the UK.

Taking the four country portfolios (i= FR, GE, SP and UK) based on the above-mentioned characteristics (j=BTM, SIZ, VOL and DIV) and the three time horizons (k=6, 12 and 24 months), the system of equations to be estimated for each characteristic j and time period k takes the following form:

$$R^{i,j}_{high,t+k} - R^{i,j}_{low,t+k} = \alpha^{i,j}_k + \beta^{i,j}_k Sent_t + \sum_{s=1}^{4} \gamma^{i,j}_{k,l} M_{s,t} + u^{i,j}_{k,t} ; \ i=1,4$$

where $R^{i,j}_{high,t+k} - R^{i,j}_{low,t+k}$ is the return to the self-financed portfolio for country i and characteristic j, over the holding period k. Sentiment (Sent), measured alternately by the BW index and the European Union (SENT EU), are the independent variables. Following Baker and Wurgler (2006) and Schmeling (2009), we include four macroeconomic variables (M_s) (industrial output index, durable goods consumption, consumer goods consumption, and the unemployment index) to protect the results from the effect of possible changes in the economic cycle.

The model is estimated by means of the SUR (Seemingly Unrelated Regressions) method in order to deal with the high level of contemporaneous correlation[11] that exists between the individual regression errors, possibly resulting from the presence of common structural factors, or unknown variables affecting the dependent variable. The use of this method also makes it possible to assign to each country its own beta coefficient and thus check whether the sentiment effect varies significantly across the three time horizons (6, 12 and 24 months) in each country.

Under the hypothesis that investor behavior has no effect on stock prices, the sentiment effect should not be significant. The alternative hypothesis says that over/underpricing due to high/low investor sentiment drives current prices above/below equilibrium and therefore, that returns will be lower/higher in the future when prices revert to equilibrium. Thus, we expect a positive β for the medium-low BTM portfolios reflecting potential growth and for the high-low dividend portfolio, and a negative β for the distressed stock portfolio (high-medium BTM ratio), the small-big size portfolio and the high-low volatility portfolio.

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[10] The data are for the 12-month portfolios. The correlations between the 6- and 24-month portfolios (not shown) are similar. They are available from the authors upon request.

[11] The average residual correlation between Spain and the UK and between Spain and Germany obtained via the SUR methodology for the BW and SENT EU indices is 0.33. The mean correlation coefficients are 0.39 between Spain and France, 0.49 between the UK and Germany, 0.64 between the UK and France and 0.52 between Germany and France.

Table V gives the results of the estimation for the two indices analyzed. Overall, the results based on the BW index are in line with expectations, except the size portfolios, where the only significant coefficient is for the UK. More specifically, the coefficient for the high-low BTM portfolio is positive and significant for France, Germany and the UK, but lacks significance for Spain. The same applies to the medium-low BTM portfolio. A similar sentiment effect appears in the volatility and dividend portfolios, with the expected signs: negative for volatility and positive for dividends. The only exception is the volatility portfolio for Spain where the sentiment effect lacks significance. Finally, the sign of the sentiment effect in the high-medium BTM portfolio is contrary to expectations for the UK and Germany.

The results are less significant when the BW index is replaced with the EU index, however. While the same results hold for size and volatility, the statistical significance of the sentiment effect in both the high-low and medium-low BTM portfolios is lost for the UK and France[12]. The statistical significance of the sentiment effect on the dividend portfolio observed for Spain and France when using the BW index also disappears. This shows that, overall, the SENT EU proxy captures much less investor sentiment than the BW proxy does[13].

Given that the above results could be due to significant exposure of the portfolios to classic risk factors, a re-estimation was performed including variables to capture the Fama-French risk factors (Fama and French, 1993), resulting in an equation of the following form[14]:

$$R^{i,j}_{high,t+k} - R^{i,j}_{low,t+k} = \alpha^{i,j} + \beta^{i,j}_k Sent_t + \sum_{s=1}^{4} \gamma^{i,j}_{k,l} M_{s,t} + \delta^{i,j}_k RMRF_t + \varphi^{i,j}_k SMB_t + \lambda^{i,j}_k HML_t + u^{i,j}_{k,t}$$

The results for both indices are given in Table VI. The BW index coefficients can be seen to have remained practically unaltered. The portfolios that were significant previously retain their significance, except the medium-low BTM portfolio for Germany. When the European index is applied, the results also fall in line with those obtained without the Fama-French factors, except for the effect on the dividend portfolio for the UK and Germany, where the incorporation of the factors causes the effect to lose significance. The results are largely identical, both with and without the factors being included, which means

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[12] Although the sign is significant and negative for France in the 6-month horizon, the significance disappears in the other time horizons.

[13] In addition, Baker and Wurgler (2006) use different means to isolate the sentiment effect from changes in the macroeconomic variables, which is to construct the index to be orthogonal to these variables. The analyses were repeated using the orthogonal US index proposed by BW and the orthogonalized European index. Overall, the results are similar, particularly for the BW index. Finally, to check the sensitivity of the results to the incorporation of the macroeconomic variables, the analysis is repeated without including them as independent variables. The results suggest that, when the BW index is used, the effect of sentiment on returns remains the same as when the macroeconomic variables were included, except for the size variable in the UK. If the European sentiment indicator is used, some previously unobserved relationships emerge, especially in the high-low and medium-low BTM porfolios.

[14] The Fama-French HML factor is not included in the regressions of the BTM portfolios and the SMB factor is omitted from the regressions of the SIZ portfolio.

that the previous results cannot be due to the exposure of the portfolios to the classic risk factors.

In short, while interesting, the results obtained from the separate analysis of the four key European markets are less conclusive than analysis of the US market suggests. They also differ considerably across the countries considered. This appears to suggest country-specific effects reducing the explanatory capacity of stock characteristics, contrary to indications in Baker and Wurgler (2006). This may be a somewhat hasty conclusion, however, given the number of other factors influencing the results, including both potential cross-country differences in stock characteristics and country-specific variables, in line with the findings made by Chang, *et al.* (2009a and b), and the details of the sentiment index construction in each case.

5. STOCK CHARACTERISTICS OR COUNTRY-SPECIFIC FACTORS

The above results reveal considerable cross-country disparities, suggesting the possible influence of structural or cultural factors on the intensity of the sentiment effect in different countries. In fact, Schmeling (2009) and Chang, *et al.* (2009a and b) have investigated this as the possible cause of observed cross-country divergence, the case being strengthened by any evident lack of appreciable cross-country variation in stock characteristics. Nevertheless, the observed findings would also be consistent with a key role for the country effect, where stock characteristics serve as the moderator variables.

In an attempt to settle this issue, we undertake two complementary procedures. The first is to pool the stocks of all four markets and observe the joint result. Obviously, if stock characteristics are relevant, it is in this context that the strongest sentiment effects should emerge, since, by using a larger number of stocks from samples that are not necessarily uniform, we also increase the dispersion in stock characteristics. If country-specific factors are the only relevant factor, the joint result would be smaller sentiment effect as a consequence of the mixed cultural or institutional aspects in one sample. The second procedure is to construct country-neutral strategies. By controlling for the country factor, it is possible to attribute whatever findings emerge directly to stock characteristics.

The results from the overall analysis of the pooled data for all four of the markets considered appear in Table VII panel A[15]. These results show that the capacity of the sentiment effect to predict returns to the portfolios based on the above-mentioned stock characteristics is clearly significant, since even the lowest levels are on a par with the countries with the highest SUR estimates.

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[15] Given that the inclusion of the risk factors had a negligible effect on the results, they are ommitted from the pooled data analysis. Furthermore, since it is more complicated to consider national macroeconomic variables in the overall analysis, the sentiment factor is orthogonalized as in Baker and Wurgler (2006). Finally, since the results are similar across the three holding periods considered, henceforth, for the sake of simplicity, all results presented are for the 12 month period.

These findings appear to attribute an important role to stock characteristics, but for a more conclusive judgement, we must first turn our attention to the results for the country-neutral portfolios. We can use two alternative strategies to obtain these portfolios. The first assigns the same number of securities to all countries, thus giving them all equal weight. The other assigns to each country a number proportional to its share in the overall sample of securities. In the case in hand, this means that the average weight of each country in the country-neutral portfolio will be approximately France 23%; Germany 20%; Spain 4%; and the UK 53%.

The results shown in Table VII for the equally-weighted portfolios (panel B) and the proportionally-weighted portfolios (panel C) reconfirm the above observations. Stock characteristics are relevant because, if the country variable were crucial, the global country-neutral portfolio returns should not be significant. The two country-neutral strategies produce similar results. The impact of investor sentiment is possibly slightly greater for the proportionally-weighted portfolios, which are dominated by the UK, the country with the highest SUR sentiment effect estimates.

The above findings clearly rule out the country effect as the key variable to explain the impact of investor sentiment, although the observed differences in the country-by-country analysis suggest it may have some relevance. However, the country effect may also derive from cross-country differences in stock characteristics and have no influence beyond that. This suggests the need for further analysis to determine whether the observed cross-country disparities in the above results derive from differences in stock characteristics. If this were the case, there would be no need to consider further variables such as cultural or institutional factors apart from the characteristics analyzed in Baker and Wurgler (2006). Thus, it is reasonable to suppose that investor sentiment will have a stronger impact in countries where there is higher dispersion in the stock characteristics proxying for difficulties in pricing and arbitrage. Therefore, the countries with the highest coefficients of variation in stock characteristics should also show the highest sentiment effect, while markets with less dispersion in this respect will be the least affected.

Table VIII displays the coefficients of variation in terms of the four characteristics considered for the markets under analysis. Here it emerges that Spain has the lowest coefficients of variation in all four characteristics, and therefore should supposedly be the least affected by investor sentiment. The highest coefficients correspond to Germany in the BTM ratio; the UK in size; and France in both volatility and dividends. Furthermore, the coefficients of variation for all four countries and all four stock characteristics are significantly different from 1%, except those for size in the case of Germany and France and for volatility in that of Spain and Germany.[16] Table IX depicts cross-country differences in the impact of sentiment, and the results of the Wald tests of the significance of the

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[16] Obtained by testing for differences of means between markets.

difference between the coefficients shown in Table V. Table IX shows that, independently of the choice of sentiment index (BW or EU), the highest/lowest dispersion is not always associated with the strongest/weakest sentiment effect. Thus, with both indices, the expected relationship appears between high/low size dispersion and a stronger/weaker sentiment effect. In terms of the BTM ratio, use of the US/BW index yields the expected relationship, but the differences between France and Germany on the one hand and France and the UK on the other are not significant. Furthermore, use of the EU sentiment index yields no significant differences between the two extremes, Germany and Spain, although there are observable differences between the rest. In the volatility and dividend portfolios, the highest dispersion in data corresponds to France, not Germany, which is the country with the highest coefficient of the sentiment effect. Furthermore, Spain does not show significantly less impact than the other three countries.

Thus, the link between the highest/lowest level of dispersion in the various stock characteristics and the highest/lowest return-predictive power in the differential portfolios is somewhat weak, thus ruling out stock characteristics as the single key factor behind the different levels of sentiment effect in these four markets, and suggesting that country-specific factors may also influence results. Investor sentiment therefore influences asset prices both through characteristics, such as subjective valuation and limits to arbitrage, and through country-specific cultural and institutional factors. This has implications for studies using data from several countries but focusing on only one of these dimensions (stock characteristics or country-specific factors) without controlling for the other, when the results are subject to bias due to dispersion in the unobserved dimension.

6. ROBUSTNESS TEST

The choice of measures used to construct the composite index proxies for investor sentiment may alter their values, thus affecting the estimated impact of these proxies on stocks or portfolios. Observation has in fact shown that the results for two of the measures used in the index (BW and SENT EU) do not fully coincide. This section tests the results for robustness towards variations of composition on sentiment indexes. The observed sentiment effect is stronger when using the BW factor than when using the EU factor. Therefore, the first issue to explore is whether this is because the US market has a higher capacity to generate information and convey sentiment or because the BW factor involves a greater number of variables, particularly of the kind described in the literature as proxies of "hot market" moments, such as IPOs. To answer this question, we recalculate the US market index using only the three measures included in the SENT EU index. Likewise, given the availability of some partial IPO data for the Spanish and UK markets, we perform a complementary test constructing the European indicator using very similar measures as for the BW index.

In the first test, the composite index is constructed from the same three measures used for the SENT EU index, except that the volatility premium is replaced with the dividend premium. The latter was included in the original BW index (Baker and Wurgler, 2006), and later replaced in Baker, *et al.* (2009) with the volatility premium for the construction of the indices for the European markets. The other two measures are the University of Michigan Consumer Confidence Index[17], as an equivalent of the European Commission Consumer Confidence Index, and turnover. This information is taken from Wurgler's web site. Principal components analysis provides the first factor for this new indicator, which captures 59.640% of the variance. The new condensed BW index, denoted below as SENT US[18] is calculated according to the following expression:

$$\text{SENT US}_t = 0.458\ \text{CCMICH}_{t-1} + 0.403\ \text{ROT}_{t-1} - 0.433\ \text{PDIV}_{t-1}$$

To compare these results against the findings of the previous analysis, we reestimate the previous model using the new SENT US. Table X shows the results of the effect of this new indicator on the stock characteristics. As can be seen, the coefficients estimated for this new index are lower than for the BW index, and closer to those obtained for the SENT EU index. This is particularly noticeable for the UK and Germany. France also loses statistical significance in the portfolios that showed it in the analysis with the BW index (high-low BTM, medium-low BTM, volatility and dividends). The significance of the sentiment effect in the dividend portfolio for Spain also disappears. The omission of key variables in the construction of the index therefore has noticeable effects on the findings. This suggests that the greater predictive power of the BW index very probably is due to its ability to capture more and better information about sentiment than the SENT EU index and not necessarily to the fact that it proxies for a market that generates more information of worldwide interest.

The second complementary test aims to complete, as far as possible, the set of measures used to construct a new sentiment indicator for the European Union. This additional information refers to IPOs for the UK and Spanish stock markets[19].

The result is two new composite indexes for the UK (SENT UK NIPO) and Spain (SENT SP IPO) which have the following form:

$$\text{SENT UK NIPO}_t = 0.338\ \text{CC}_{t-1} - 0.544\ \text{ROT}_t + 0.103\ \text{PV}_{t-1} + 0.477\ \text{NIPO}_{t-1}$$
$$\text{SENT SP IPO}_t = 0.342\ \text{CC}_{t-1} - 0.293\ \text{ROT}_t + 0.284\ \text{PV}_{t-1} + 0.241\ \text{NIPO}_{t-1} + 0.236\ \text{RIPO}_{t-1}$$

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[17] http://research.stlouisfed.org/fred2/series/UMCSENT/downloaddata?cid=98
[18] This new index has positive correlation (0.811) statistically significant at the 1% level with the BW index.
[19] Data for the number of monthly IPOs and average first-day IPO returns were available for the Spanish market, but, given the scarcity of IPOs in the Spanish stock market, this paper uses average monthly returns for a 6 month period. Although various other possibilities were considered, observation showed this index to reflect market trends quite well. The data for the UK market are limited to the number of IPOs, which is high enough to require no adjustment. The data were supplied by the London Stock Exchange and the Madrid Bolsa, where they have been available since June, 1995.

From the new indexes for UK and Spain and the two original indexes for Germany and France, we derive a composite index for the European Union with 51.870% of the variance explained. This new index, denoted below by SENT EU IPO takes the following form:

$$\text{SENT EU IPO}_t = 0{,}274\ \text{SENT UK NIPO}_t + 0{,}431\ \text{SENT GE}_t + 0{,}328\ \text{SENT FR}_t + 0.337\ \text{SENT SPIPO}_t$$

This new index shows positive (0.920) and significant correlation with the above SENT EU index. The new indexes constructed for the UK and Spain, and the original indexes for Germany and France all show positive and significant correlation with the new composite SENT EU IPO index.

Implementation of the SUR method on this index and the portfolios constructed in section 4 yields somewhat different results. Table X also shows the estimates given by the two variables (SENT EU IPO and SENT EU) for the same period (1996-2007). The results show that the incorporation of IPO data has an impact, particularly in the UK market, where size becomes significant, and also in the Spanish market, although the increase in the impact fails to reach statistical significance except at the 15% level in dividend ratio portfolio. There is also an increase in the influence of this same variable on the results for France. It appears therefore that the introduction of even a small amount of relevant data has a significant effect on the results.

The results of both these tests lead to two important conclusions. The first is that the results are sensitive to the choice of indicators for the construction of the sentiment index. The second is that, unless sentiment indexes for different countries or geographical areas incorporate exactly the same variables, it is not possible to conclude which is the most appropiate index, without adding the caveat that the difference may simply be due to the different explanatory power of the index variables in each case.

7. CONCLUSIONS

By exploring the impact of investor sentiment in European stock markets through the separate analysis of four of the key markets, the UK, Germany, France and Spain, this study finds that investor sentiment has a significant effect on the future returns of stocks that are hard to value and more costly and risky to arbitrage. Nevertheless, the results differ across the countries considered and they highlight the sensitivity of the results to the choice of sentiment index.

The study subsequently analyzes the role played by stock characteristics and country-specific factors in explaining this effect. We find that stock characteristics are not the only variable underlying cross-country differences in the sentiment effects, and that factors such

as cultural or institutional differences may play a key role. Nevertheless, the results from the country-neutral strategies also reveal that stock characteristics have a determining influence, and therefore that the results of studies involving several countries may be biased unless the analysis controls for one of the two dimensions, since both are sources of investor sentiment.

The importance of the choice of sentiment proxy is also very evident. Overall, the results obtained using the proxy developed by Baker and Wurgler (2006) are the clearest in revealing the effect of investor sentiment on sentiment-sensitive stock. However, the choice of variables for the construction of the proxy also plays a key role, as revealed by the considerable difference in results that takes place after adding or removing certain variables. Due to some missing data for the European markets considered, there are differences in the construction of the BW and SENT EU indices. In light of the sensitivity of the results to the choice of index variables, therefore, we are unable to confirm whether the reason for the greater explanatory capacity of the BW index is that the US market is a greater generator and spreader of investor sentiment or simply that the data used to construct the European indices lacks sufficient richness.

The direction of future research needs to be towards obtaining an objective, uniformly constructed variable, particularly to investigate the way sentiment spreads and assess the explanatory capacity of global and local sentiment indices, since differences in variable construction can have considerable impact on the results obtained.

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Figure 1: Investor sentiment. Period 1992-2007.
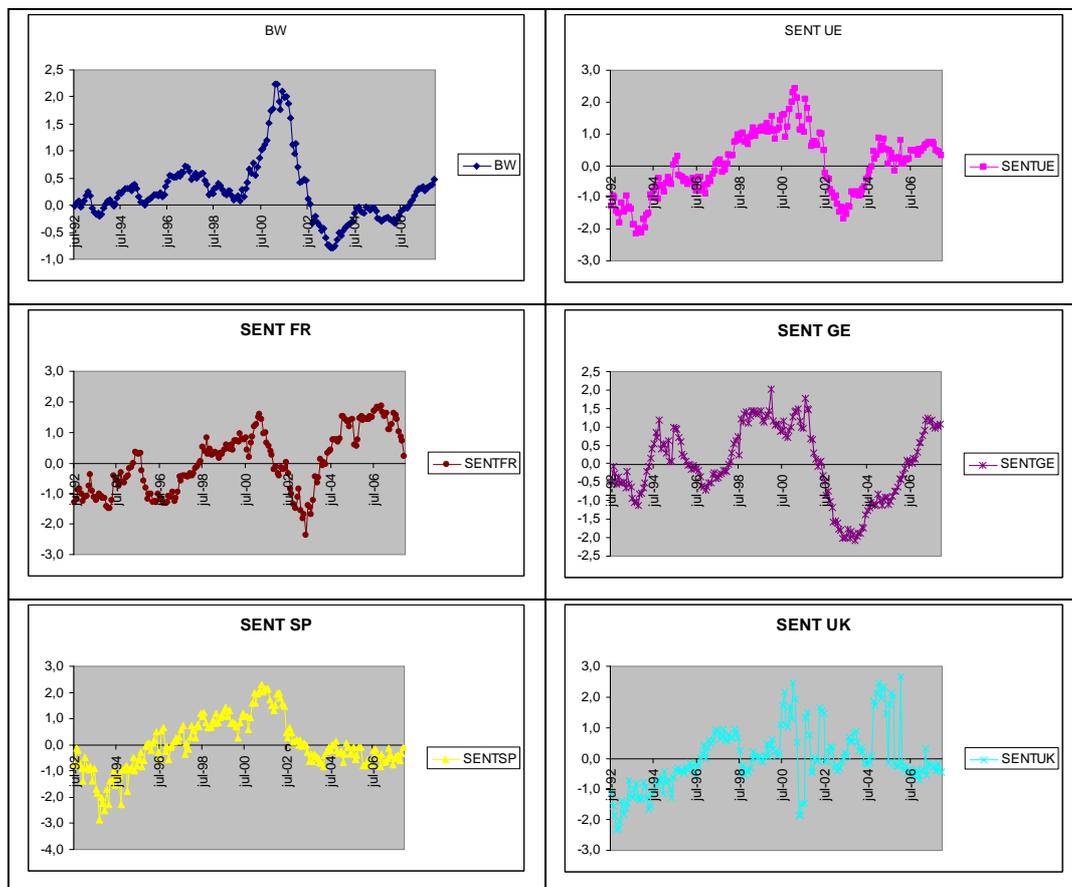
The graphs show the trend of the Baker and Wurgler (2006) index, the indices constructed for the four European markets and the composite index for the European Union. SENT SP, SENT UK, SENT GE and SENT FR are the first principal components of three sentiment indicators. SENT EU is the first principal component of the first factors extracted for each of the four European markets.

Table I: Descriptive statistics of the stock characteristics. 1990-2007.

FRANCE					Mean	
	Mean	SD	Min	Max	1990s	2000s
BTM	0.83	1.50	0.00	50.00	0.92	0.76
SIZ	1231.28	6265.42	0.01	184430.60	798.68	1562.88
VOL (%)	12.76	12.09	0.00	543.17	10.90	14.25
DIV	1.61	8.03	0.00	373.24	1.53	1.67
GERMANY						
	Mean	SD	Min	Max		
BTM	1.98	6.44	0.00	50.00	0.62	2.25
SIZ	1234.53	6311.79	0.01	263272.50	2102.79	1057.04
VOL (%)	15.82	12.52	0.00	362.99	10.76	16.73
DIV	0.43	1.63	0.00	40.60	0.70	0.38
SPAIN						
	Mean	SD	Min	Max		
BTM	0.78	0.98	0.00	33.33	0.94	0.63
SIZ	2357.12	7452.98	0.16	109360.60	1138.10	3592.67
VOL (%)	9.21	6.30	0.01	114.93	10.57	7.98
DIV	0.28	0.91	0.00	23.20	0.26	0.31
UK						
	Mean	SD	Min	Max		
BTM	0.76	1.11	0.00	50.00	0.76	0.77
SIZ	1126.79	7069.65	0.01	356338.66	856.57	1375.52
VOL (%)	12.36	8.91	0.00	255.73	10.63	13.76
DIV	9.24	26.24	0.00	1919.22	9.50	8.89

Means and standard deviations of the stock characteristics for Spain, the UK, Germany and France. The book-to-market ratio (BTM) is the ratio between the two values at the end of each month. Size (SIZ) is the end-of-month stock market capitalization of each firm in thousands of Euros. Volatility (VOL) is the last twelve months' standard deviation in percentage terms. Dividend (DIV) is the end of month dividend per share ratio.

Table II: Country-specific sentiment. 1992-2007.

	Descriptive statistics				Correlations		Correlations between each sentiment indicator					
	Mean	SD	Min	Max	Coef.	p-value	CC		TURN		PV	
FRANCE							Coef.	p-value	Coef.	p-value	Coef.	p-value
CC_t	-16.07	8.92	-35.00	3.30	0.77	0.00	1.00					
$TURN_{t-1}$	0.14	1.17	-1.40	5.11	-0.56	0.00	-0.16	0.03	1.00			
PV_{t-1}	0.64	0.86	-1.13	2.78	0.82	0.00	0.44	0.00	-0.25	0.00	1.00	
GERMANY												
CC_t	-10.09	9.20	-27.50	10.20	0.77	0.00	1.00					
$TURN_{t-1}$	-0.12	0.52	-1.54	1.32	0.89	0.00	0.51	0.00	1.00			
PV_{t-1}	1.37	1.60	-3.01	5.36	0.46	0.00	0.02	0.82	0.29	0.00	1.00	
SPAIN												
CC_{t-1}	-10.51	9.52	-38.60	5.30	0.89	0.00	1.00					
$TURN_t$	0.07	0.53	-1.00	2.03	-0.81	0.00	-0.62	0.00	1.00			
PV_{t-1}	0.21	0.40	-0.49	1.40	0.80	0.00	0.60	0.00	-0.43	0.00	1.00	
UK												
CC_t	-6.09	6.83	-29.40	7.10	0.71	0.00	1.00					
$TURN_{t-1}$	0.17	0.90	-0.97	3.75	0.68	0.00	0.14	0.05	1.00			
PV_{t-1}	0.55	2.33	-10.08	10.37	0.46	0.00	0.07	0.33	0.05	0.51	1.00	

The first four columns display the descriptive statistics of the sentiment indicators used to construct the four country-specific sentiment indices. The next two columns show the correlation between each sentiment indicator and each country-specific sentiment index. The last six columns show the correlation between the variables included in the formation of the principal components of each country. The consumer confidence index (CC) is a public index based on direct surveys conducted by the European Commission at each month end. Turnover (TURN) is measured as the natural log of the raw turnover ratio, detrended by the five year moving average. The volatility premium (VOL) is the log of the average book-to-market ratio with high and low volatility.

Table III: Correlations between the sentiment indices. Period 1992-2007.

		SENT FR	SENT GE	SENT SP	SENT UK	SENT UE	BW
SENT FR	Coef.	1.00					
	p-value						
SENT GE	Coef.	0.43	1.00				
	p-value	0.00					
SENT SP	Coef.	0.27	0.45	1.00			
	p-valor	0.00	0.00				
SENT UK	Coef.	0.30	-0.07	0.37	1.00		
	p-value	0.00	0.35	0.00			
SENT UE	Coef.	0.74	0.70	0.78	0.51	1.00	
	p-value	0.00	0.00	0.00	0.00		
BW	Coef.	0.24	0.66	0.63	0.13	0.62	1.00
	p-value	0.00	0.00	0.00	0.09	0.00	

This table shows the correlations between Baker and Wurgler's (2006) index, the 4 country-specific indexes and the composite European index. SENT SP, SENT UK, SENT GE and SENT FR are the first principal components of the three sentiment indicators. EU SENT is the first principal component of the first factors of the four country-specific indexes.

Table IV: Correlations between portfolio returns. 1990-2007.

FRANCE		BTM (H-L)	BTM (M-L)	BTM (H-M)	SIZ (S-B)	VOL (H-L)	DIV (H-L)
BTM (H-L)	Coef.	1.00					
	p-value						
BTM (M-L)	Coef.	0.90	1.00				
	p-value	0.00					
BTM (H-M)	Coef.	0.72	0.34	1.00			
	p-value	0.00	0.00				
SIZ (S-B)	Coef.	0.26	0.03	0.52	1.00		
	p-value	0.00	0.70	0.00			
VOL (H-L)	Coef.	-0.59	-0.66	-0.21	0.18	1.00	
	p-value	0.00	0.00	0.00	0.02		
DIV (H-L)	Coef.	0.62	0.67	0.25	-0.20	-0.87	1.00
	p-value	0.00	0.00	0.00	0.00	0.00	

GERMANY		BTM (H-L)	BTM (M-L)	BTM (H-M)	SIZ (S-B)	VOL (H-L)	DIV (H-L)
BTM (H-L)	Coef.	1.00					
	p-value						
BTM (M-L)	Coef.	0.76	1.00				
	p-value	0.00					
BTM (H-M)	Coef.	0.79	0.20	1.00			
	p-value	0.00	0.00				
SIZ (S-B)	Coef.	0.46	0.09	0.61	1.00		
	p-value	0.00	0.21	0.00			
VOL (H-L)	Coef.	-0.29	-0.48	0.01	0.38	1.00	
	p-value	0.00	0.00	0.87	0.00		
DIV (H-L)	Coef.	0.35	0.48	0.07	-0.36	-0.87	1.00
	p-value	0.00	0.00	0.32	0.00	0.00	

SPAIN		BTM (H-L)	BTM (M-L)	BTM (H-M)	SIZ (S-B)	VOL (H-L)	DIV (H-L)
BTM (H-L)	Coef.	1.00					
	p-value						
BTM (M-L)	Coef.	0.58	1.00				
	p-value	0.00					
BTM (H-M)	Coef.	0.64	-0.25	1.00			
	p-value	0.00	0.00				
SIZ (S-B)	Coef.	0.50	0.02	0.58	1.00		
	p-value	0.00	0.82	0.00			
VOL (H-L)	Coef.	-0.06	-0.49	0.41	0.51	1.00	
	p-value	0.45	0.00	0.00	0.00		
DIV (H-L)	Coef.	-0.05	0.42	-0.45	-0.62	-0.79	1.00
	p-value	0.50	0.00	0.00	0.00	0.00	

UK		BTM (H-L)	BTM (M-L)	BTM (H-M)	SIZ (S-B)	VOL (H-L)	DIV (H-L)
BTM (H-L)	Coef.	1.00					
	p-value						
BTM (M-L)	Coef.	0.90	1.00				
	p-value	0.00					
BTM (H-M)	Coef.	0.64	0.24	1.00			
	p-value	0.00	0.00				
SIZ (S-B)	Coef.	-0.01	-0.25	0.42	1.00		
	p-value	0.90	0.00	0.00			
VOL (H-L)	Coef.	-0.65	-0.69	-0.23	0.41	1.00	
	p-value	0.00	0.00	0.00	0.00		
DIV (H-L)	Coef.	0.58	0.72	0.02	-0.70	-0.81	1.00
	p-value	0.00	0.00	0.77	0.00	0.00	

Correlations between the four characteristic portfolios: book-to-market ratio (BTM), sixe (SIZ), volatility (VOL) and dividend (DIV) and the Four European markets: Spain, The UK, Germany and France. High (H)/big (B) were constructed from the top 20% and low (L)/small (S) from the bottom 20%. Medium (M) was constructed from the stocks in the third quintile. The differential portfolio of any given month was computed as in Jegadeesh and Titman (2001).

Table V: Regressions of the portfolio returns.

		BW						SENT UE					
		6M		12M		24M		6M		12M		24M	
FRANCE													
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	1.43	0.01	1.61	0.01	1.36	0.03	-0.90	0.09	-0.57	0.27	-0.25	0.61
BTM (M-L)	+	1.29	0.00	1.34	0.00	1.02	0.02	-0.67	0.09	-0.47	0.20	-0.32	0.36
BTM (H-M)	-	0.02	0.94	0.17	0.58	0.36	0.27	-0.25	0.40	-0.14	0.63	0.05	0.85
SIZ (S-B)	-	0.54	0.37	0.82	0.20	0.83	0.25	0.09	0.87	0.23	0.69	0.31	0.59
VOL (H-L)	-	-2.54	0.00	-2.65	0.00	-1.52	0.05	-1.19	0.07	-1.10	0.07	-0.83	0.14
DIV (H-L)	+	1.24	0.02	1.48	0.00	1.52	0.01	0.62	0.20	0.61	0.19	0.46	0.30
GERMANY													
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	2.23	0.00	2.52	0.00	2.98	0.00	0.80	0.13	0.95	0.06	1.03	0.02
BTM (M-L)	+	0.93	0.05	0.85	0.06	0.95	0.05	0.37	0.24	0.38	0.20	0.38	0.19
BTM (H-M)	-	1.25	0.02	1.64	0.00	2.04	0.00	0.47	0.19	0.60	0.08	0.68	0.02
SIZ (S-B)	-	-0.35	0.64	0.11	0.88	0.23	0.77	0.43	0.40	0.49	0.32	0.44	0.35
VOL (H-L)	-	-4.26	0.00	-4.56	0.00	-4.28	0.00	-1.73	0.01	-1.82	0.00	-1.70	0.00
DIV (H-L)	+	3.81	0.00	4.03	0.00	3.68	0.00	1.04	0.04	1.06	0.03	0.95	0.04
SPAIN													
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	0.00	0.99	0.27	0.58	0.53	0.25	0.61	0.14	0.66	0.09	0.61	0.09
BTM (M-L)	+	0.11	0.79	0.34	0.37	0.40	0.26	-0.04	0.91	0.09	0.76	0.19	0.49
BTM (H-M)	-	-0.04	0.92	-0.02	0.96	0.12	0.76	0.72	0.04	0.63	0.05	0.46	0.14
SIZ (S-B)	-	0.06	0.94	0.02	0.98	0.26	0.74	0.51	0.42	0.51	0.41	0.39	0.52
VOL (H-L)	-	-0.91	0.24	-1.14	0.14	-1.08	0.13	0.25	0.68	0.08	0.88	0.01	0.99
DIV (H-L)	+	1.71	0.01	1.66	0.01	1.25	0.07	0.29	0.60	0.29	0.59	0.16	0.77
UK													
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	2.22	0.00	2.48	0.00	2.33	0.00	0.29	0.43	0.42	0.23	0.39	0.24
BTM (M-L)	+	1.72	0.00	1.84	0.00	1.83	0.00	0.33	0.24	0.43	0.11	0.45	0.07
BTM (H-M)	-	0.39	0.09	0.55	0.01	0.51	0.02	-0.08	0.62	-0.08	0.64	-0.06	0.71
SIZ (S-B)	-	-1.71	0.00	-1.32	0.02	-1.22	0.04	-0.93	0.03	-0.76	0.07	-0.72	0.10
VOL (H-L)	-	-4.24	0.00	-4.16	0.00	-3.49	0.00	-1.73	0.00	-1.74	0.00	-1.45	0.00
DIV (H-L)	+	2.93	0.00	3.00	0.00	2.87	0.00	1.10	0.02	1.09	0.01	0.95	0.03

Regressions of long-short portfolios constructed following the approach used by Jegadeesh and Titman (2001) for a 6, 12 and 24 month time horizon. Portfolios were constructed for Book-to-market ratio (BTM), size (SIZ), volatility (VOL) and dividend (DIV). The high (H)/big (B) portfolio was formed from the top 20% of the stocks and the low (L)/small (S) portfolio from those in the first quintile. The medium (M) portfolio was formed from the stocks in the third quintile. The sentiment indicators are Baker and Wurgler's (2006), BW index, constructed from the first principal component of 6 proxies, for the period 1990 to 2007 and the European investor sentiment index EU SENT, constructed from the first principal component of the first factors obtained for Spain, the UK, Germany and France for the period 1992 to 2007. These first factors explain the common variance of the three sentiment indexes. The analysis is based on the estimation of a system of SUR equations. The macroeconomic variables included are the industrial output index, durable goods consumption, consumer goods consumption and the unemployment index.

Table VI: Regressions of the Fama-French portfolio returns.

		BW						SENT UE					
		6M		12M		24M		6M		12M		24M	
FRANCE													
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	1.21	0.01	1.23	0.01	1.03	0.04	-0.76	0.08	-0.47	0.28	-0.20	0.61
BTM (M-L)	+	1.25	0.00	1.22	0.00	0.85	0.02	-0.59	0.08	-0.42	0.19	-0.30	0.31
BTM (H-M)	-	-0.13	0.63	-0.08	0.76	0.15	0.58	-0.23	0.39	-0.09	0.71	0.06	0.78
SIZ (S-B)	-	-0.25	0.60	-0.19	0.71	-0.15	0.79	-0.11	0.80	0.04	0.93	0.11	0.82
VOL (H-L)	-	-1.94	0.00	-2.00	0.00	-1.32	0.02	-1.20	0.02	-1.08	0.03	-0.86	0.05
DIV (H-L)	+	1.05	0.00	1.07	0.00	1.11	0.00	0.51	0.12	0.51	0.12	0.39	0.22
GERMANY													
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	2.42	0.00	2.63	0.00	2.71	0.00	0.68	0.21	0.81	0.11	0.85	0.06
BTM (M-L)	+	0.74	0.13	0.69	0.14	0.68	0.17	0.19	0.55	0.21	0.48	0.22	0.45
BTM (H-M)	-	1.65	0.00	1.93	0.00	1.95	0.00	0.47	0.20	0.56	0.10	0.63	0.03
SIZ (S-B)	-	-0.42	0.58	-0.13	0.86	-0.26	0.75	0.47	0.36	0.51	0.30	0.43	0.36
VOL (H-L)	-	-2.87	0.00	-3.11	0.00	-3.31	0.00	-1.18	0.03	-1.32	0.01	-1.22	0.01
DIV (H-L)	+	2.92	0.00	2.96	0.00	2.79	0.00	0.56	0.18	0.60	0.16	0.52	0.21
SPAIN													
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	-0.21	0.66	0.01	0.97	0.23	0.59	0.42	0.28	0.48	0.19	0.45	0.18
BTM (M-L)	+	-0.12	0.74	0.02	0.96	0.11	0.75	-0.22	0.47	-0.14	0.63	-0.04	0.89
BTM (H-M)	-	-0.05	0.91	0.02	0.95	0.08	0.84	0.64	0.06	0.62	0.05	0.46	0.12
SIZ (S-B)	-	-0.03	0.97	-0.04	0.96	0.42	0.58	0.35	0.57	0.37	0.55	0.31	0.60
VOL (H-L)	-	-0.25	0.69	-0.43	0.48	-0.45	0.42	0.85	0.09	0.68	0.14	0.51	0.24
DIV (H-L)	+	1.55	0.00	1.30	0.01	0.91	0.11	-0.08	0.86	-0.10	0.83	-0.21	0.63
UK													
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	1.67	0.00	1.85	0.00	1.49	0.00	0.03	0.92	0.14	0.63	0.09	0.75
BTM (M-L)	+	1.20	0.00	1.36	0.00	1.25	0.00	0.10	0.67	0.23	0.33	0.22	0.29
BTM (H-M)	-	0.40	0.08	0.46	0.03	0.31	0.14	-0.10	0.56	-0.12	0.42	-0.14	0.34
SIZ (S-B)	-	-2.01	0.00	-1.64	0.00	-1.51	0.00	-1.02	0.01	-0.85	0.02	-0.80	0.03
VOL (H-L)	-	-2.02	0.00	-2.04	0.00	-1.69	0.00	-0.85	0.01	-0.89	0.00	-0.81	0.00
DIV (H-L)	+	1.51	0.00	1.58	0.00	1.45	0.00	0.38	0.16	0.41	0.13	0.34	0.20

Regressions of long-short portfolios constructed following the approach used by Jegadeesh and Titman (2001) for horizons of 6, 12 and 24 months. Portfolios were constructed for Book-to-market ratio (BTM), size (SIZ), volatility (VOL) and dividend (DIV). The high (H)/big (B) portfolio was formed from the top 20% of the stocks and the low (L)/small (S) portfolio from those in the first quintile. The medium (M) portfolio was formed from the stocks in the third quintile. The sentiment indicators are Baker and Wurgler's (2006), BW index, constructed from the first principal component of 6 proxies, for the period 1990 to 2007 and the European investor sentiment index EU SENT, constructed from the first principal component of the first factors obtained for Spain, the UK, Germany and France for the period 1992 to 2007. These first factors explain the common variance of the three sentiment indicators/indices. The analysis is based on the estimation of a system of SUR equations. The macroeconomic variables included are the industrial output index, durable goods consumption, consumer goods consumption and the unemployment index. As independent variables, the analysis also includes the market risk premium (RMRF) and the Fama-French risk factors (HML and SMB) for each of the four European markets included in the system of equation.

Table VII: Regressions for the four countries jointly.

Panel A: Global Portfolios.

	ES	BW 12M		SENT UE 12M	
		Coef.	p-value	Coef.	p-value
BTM (H-L)	+	2.27	0.00	0.49	0.07
BTM (M-L)	+	1.73	0.00	0.28	0.19
BTM (H-M)	-	0.54	0.00	0.20	0.05
SIZ (S-B)	-	0.18	0.68	0.00	1.00
VOL (H-L)	-	-3.69	0.00	-0.70	0.08
DIV (H-L)	+	2.41	0.00	0.61	0.06

Panel B: Portfolios constructed with the same number of stocks for every country.

	ES	BW 12M		SENT UE 12M	
		Coef.	p-valor	Coef.	p-valor
BTM (H-L)	+	1.81	0.00	0.45	0.07
BTM (M-L)	+	1.30	0.00	0.20	0.29
BTM (H-M)	-	0.51	0.00	0.25	0.03
SIZ (S-B)	-	0.07	0.85	0.15	0.54
VOL (H-L)	-	-3.12	0.00	-0.52	0.15
DIV (H-L)	+	2.33	0.00	0.30	0.29

Panel C: Portfolios constructed with the number of stocks for each country proportional to its share in total securities.

.	ES	BW 12M		SENT UE 12M	
		Coef.	p-valor	Coef.	p-valor
BTM (H-L)	+	2.24	0.00	0.42	0.11
BTM (M-L)	+	1.54	0.00	0.22	0.27
BTM (H-M)	-	0.70	0.00	0.20	0.06
SIZ (S-B)	-	0.02	0.95	-0.02	0.93
VOL (H-L)	-	-3.50	0.00	-0.70	0.06
DIV (H-L)	+	2.57	0.00	0.59	0.05

The OLS regression of the portfolios based on stock characteristics for the four countries jointly with the orthogonalized sentiment index as the independent variable. The asset characteristics considered are the book-to-market ratio (BTM), size (SIZ), volatility (VOL) and dividends (DIV). The portfolios were constructed as in Jegadeesh and Titman (2001) grouping all the stocks of Spain, the UK, Germany and France for a time horizon of 6, 12 and 24 months. For the sake of brevity, only the 12-month returns are shown. The results shown in Panel A are for the portfolios of the 4 countries constructed with no limit on the number of stocks from each country. The results in Panel B are for the portfolios constructed with the same number of stocks for every country and the results in Panel C are for the portfolios constructed with the number of stocks for each country proportional to its share in total securities. The periods of analysis run from 1990 to 2007 for the orthogonal BW index and from 1992 to a 2007 for the orthogonalized SENT EU index.

Table VIII: Coefficients of variation in stock characteristics by country for the period 1990-2007.

Panel A: Coefficients of variation

Coef. Variation	FR	GE	SP	UK
BTM	1.80	3.25	1.26	1.45
SIZ	5.09	5.11	3.16	6.27
VOL	0.95	0.79	0.68	0.72
DIV	4.99	3.76	3.20	2.84

Panel B: Results of the difference in means tests between the coefficients of variation

BTM					VOL				
p-value	FR	GE	SP	UK	p-value	FR	GE	SP	UK
FR	1.00				FR	1.00			
GE	0.00	1.00			GE	0.00	1.00		
SP	0.00	0.00	1.00		SP	0.00	0.28	1.00	
UK	0.00	0.00	0.00	1.00	UK	0.00	0.02	0.00	1.00
SIZ					DIV				
p-value	FR	GE	SP	UK	p-value	FR	GE	SP	UK
FR	1.00				FR	1.00			
GE	0.83	1.00			GE	0.00	1.00		
SP	0.00	0.00	1.00		SP	0.00	0.00	1.00	
UK	0.00	0.00	0.00	1.00	UK	0.00	0.00	0.00	1.00

Panel A shows the coefficients of variation of the various characteristics considered: book-to-market ratio (BTM), size (SIZ), volatility (VOL) and dividends (DIV), for each of the markets analyzed. Panel B shows the results of the difference in means tests between the coefficients, along with their levels of significance. FR: France, GE: Germany, SP: Spain, UK: the UK.

Table IX: Results of the tests of cross-country differences in the coefficients of the impact of investor sentiment on the various portfolio returns.

	BW		SENT UE	
BTM (H-L)	12M		12M	
	Coef.	p-value	Coef.	p-value
SP-UK	-2.21	0.00	0.24	0.60
SP-GE	-2.25	0.01	-0.30	0.62
SP-FR	-1.34	0.04	1.23	0.03
UK-GE	-0.05	0.95	-0.54	0.29
UK-FR	0.87	0.09	0.99	0.03
GE-FR	0.92	0.22	1.52	0.01
SIZ (S-B)	12M		12M	
	Coef.	p-value	Coef.	p-value
SP-UK	1.34	0.14	1.28	0.07
SP-GE	-0.10	0.92	0.03	0.97
SP-FR	-0.80	0.38	0.28	0.72
UK-GE	-1.44	0.09	-1.25	0.03
UK-FR	-2.14	0.00	-1.00	0.09
GE-FR	-0.70	0.38	0.25	0.70
VOL (H-L)	12M		12M	
	Coef.	p-value	Coef.	p-value
SP-UK	3.02	0.00	1.82	0.00
SP-GE	3.42	0.00	1.90	0.01
SP-FR	1.51	0.09	1.19	0.10
UK-GE	0.41	0.65	0.09	0.89
UK-FR	-1.50	0.04	-0.63	0.28
GE-FR	-1.91	0.03	-0.72	0.28
DIV (H-L)	12M		12M	
	Coef.	p-value	Coef.	p-value
SP-UK	-1.34	0.09	-0.80	0.22
SP-GE	-2.37	0.00	-0.77	0.22
SP-FR	0.18	0.80	-0.32	0.61
UK-GE	-1.03	0.15	0.02	0.96
UK-FR	1.52	0.01	0.48	0.34
GE-FR	2.55	0.00	0.45	0.39

Results of the Wald tests of differences between two countries in the coefficients of the impact of investor sentiment on the 12-month returns to the various characteristic-based portfolios (book-to-market ratio (BTM), size (SIZ), volatility (VOL) and dividends (DIV)). Coefficients shown in Table V.

Table X: Regression of the portfolio returns for the period 1996-2007.

		SENT US		SENT UE IPO		SENT UE	
FRANCE		12M		12M		12M	
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	0.66	0.08	-0.14	0.79	-0.27	0.67
BTM (M-L)	+	0.39	0.16	-0.13	0.75	-0.32	0.48
BTM (H-M)	-	0.29	0.15	-0.01	0.97	0.03	0.94
SIZ (S-B)	-	0.73	0.08	0.34	0.54	0.91	0.15
VOL (H-L)	-	-0.92	0.07	-0.99	0.13	-0.54	0.47
DIV (H-L)	+	0.31	0.38	0.82	0.09	0.30	0.59
GERMANY		12M		12M		12M	
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	1.41	0.00	1.16	0.12	1.27	0.12
BTM (M-L)	+	0.44	0.09	0.41	0.31	0.68	0.13
BTM (H-M)	-	0.93	0.00	0.77	0.14	0.56	0.33
SIZ (S-B)	-	0.43	0.30	0.66	0.36	1.04	0.19
VOL (H-L)	-	-1.75	0.00	-1.27	0.15	-1.77	0.07
DIV (H-L)	+	1.39	0.00	0.65	0.35	1.11	0.14
SPAIN		12M		12M		12M	
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	0.27	0.41	0.34	0.39	0.37	0.41
BTM (M-L)	+	-0.02	0.93	0.36	0.31	0.11	0.77
BTM (H-M)	-	0.35	0.22	0.13	0.67	0.40	0.22
SIZ (S-B)	-	0.63	0.24	-0.39	0.51	0.10	0.87
VOL (H-L)	-	-0.13	0.80	-0.85	0.15	-0.47	0.47
DIV (H-L)	+	0.53	0.24	0.87	0.13	0.63	0.32
UK		12M		12M		12M	
	ES	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	0.95	0.00	0.43	0.22	0.60	0.16
BTM (M-L)	+	0.88	0.00	0.55	0.05	0.64	0.06
BTM (H-M)	-	0.07	0.66	-0.11	0.46	-0.04	0.83
SIZ (S-B)	-	-0.80	0.05	-0.88	0.02	-0.62	0.20
VOL (H-L)	-	-2.07	0.00	-1.51	0.00	-1.82	0.00
DIV (H-L)	+	1.54	0.00	1.26	0.00	1.15	0.03

Regressions of long-short portfolios constructed following the approach used by Jegadeesh and Titman (2001) for a 6, 12 and 24 month time horizon. Portfolios were formed based on stock characteristics: book-to-market ratio (BTM), size (SIZ), volatility (VOL) and dividend (DIV). The high (H)/big (B) portfolio was formed from the top 20% of the stocks and the low (L)/small (S) portfolio from those in the first quintile. The medium (M) portfolio from the stocks in the third quintile. The sentiment indicators considered are the US SENT index, the SENT EU index (the table shows the results of the latter for the period 1996-2007 to enable comparison with the SENT EU IPO index) and the SENT EU IPO index. The SENT US index was constructed from the first principal component of 3 proxies, which are the same as those used to form the SENT EU index, except for the volatility premium, which is replaced by the dividend premium. The SENT EU IPO index was formed from the first principal component of the first factor extracted for each of the three markets. These first factors explain the common variance between the five sentiment indicators for Spain and four for the UK. In the case of Germany and France, three indicators are included in the construction of the SENT EU index. The analysis is based on the estimation of a system of SUR equations. The macroeconomic variables considered are the industrial output index, durable goods consumption, consumer goods consumption and the unemployment index.