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Fundación UCEIF

CANTABRIA CAMPUS INTERNACIONAL

Editorial Universidad Cantabria

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ÍNDICE

SUMMARY

This Doctoral Thesis analyzes a topic of mounting interest in the latest behavioural finance literature, namely, *investor sentiment*. Investors' views regarding future earnings and investment risk can influence asset prices and result in over- or under-pricing, which will affect asset-pricing models. It is within the above framework that this doctoral thesis aims to probe more deeply into issues relating to the potential effect of investor sentiment on asset price formation, analysts' forecasts and recommendations and the information flow between the spot and derivatives markets.

Thus, this doctoral thesis is organized in three parts comprising a total of 5 chapters that can be read independently of each other, although all are connected through the common nexus of the *investor sentiment* effect on asset prices (part one), financial analyst behaviour (part two) and the joint dynamics of the spot and derivatives markets (part three).

Part 1 Investor Sentiment Effect in Stock Markets
Chapter 1 Investor Sentiment Effect in Stocks Markets: Stock Characteristics or Country-Specific Factors?

This Chapter 1 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. 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. Our intention in considering four countries with similar levels of financial development is to enable us to eliminate any effects arising from disparities in this respect. Finally, another contribution of

this chapter 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. We performed further analyses using direct measures of investor sentiment.

Chapter 2 Investor Sentiment and Stock Returns: The Spanish Case

This chapter examines the effect of sentiment on stock returns in the Spanish stock market, thereby making various contributions to the literature. This chapter analyzes the relationship between returns and local sentiment in our domestic market. Furthermore, following Baker and Wurgler (2006, 2007), this chapter focuses on the market as a whole and on portfolios of stocks whose characteristics leave their returns potentially more vulnerable to market sentiment. Furthermore, given that all stock markets work in a global world, this study probes the relationship between stock returns and sentiment proxies, at global and local level. This chapter also incorporates the dynamic between the two sentiment proxies and tests to determine whether the transmission mechanism between them could be capital market activity. Finally, in order to check the results for the possible impact of the latest financial crisis and increase their robustness, we extend the analysis to include the crisis period.

Part 2 Influence of Investor Sentiment on the Activities of Financial Analysts
Chapter 3 Strategic Behaviour or Cognitive Bias in Analysts' Forecasts? The Role of Investor Sentiment

In this chapter, we analyze the importance of cognitive bias in analyst optimism through the role of investor sentiment in financial analysts' earnings forecasts. Our aim is to determine whether investor sentiment affects the level of analyst optimism. The first contribution of this chapter to the literature is that there is no prior evidence on this issue referring to France, Germany, Spain and the UK markets, which, furthermore, differ in their stock characteristics and possess different profiles in terms of the cultural dimensions coined by Hofstede (2001). Second, we also perform various tests based on selection bias to determine the extent to

which the bias is mainly due to strategic behaviour or to a cognitive bias in analysts' forecasts.

Chapter 4 Value of Analysts' Consensus Recommendations and Investor Sentiment

This study examines two issues. The first is whether the level of consensus recommendation is/is not affected by investor sentiment. We will focus on analysts' consensus recommendations to observe the importance of this relationship and also if this relationship is independent of the characteristics of the stocks or whether, as expected, it is higher in stocks that are hard to value or to arbitrage. If we find this relationship, the second important issue to explore is the analysis of the value of the consensus recommendations when investor sentiment and these stock characteristics are taken into account to design strategies. In particular, we have compared the risk-adjusted returns obtained by several strategies with different levels of exposure to investor sentiment to the benchmark strategy, which is to follow all the consensus recommendations.

Part 3 Investor Sentiment and the Dynamic between the Spot and Derivatives Markets
Chapter 5 Does Investor Sentiment Affect Volatility Dynamics between Spot and Futures Markets?

This chapter makes several contributions to the literature. Firstly, this, as far as we know, is the first attempt to analyze the role of investor sentiment in the contemporaneous dynamics of the spot and futures markets and in volatility spillovers between them. In more detailed terms, this study attempts to answer questions such as whether the contemporaneous correlation between the two markets changes significantly during periods of high market sentiment; how we can expect volatility in either market to be affected by news from that same market or from the other; whether there will be a stronger or weaker asymmetric reaction of volatility to good or bad news from either market; and whether are the effects are symmetrical in both markets or stronger in the one that has seen the greater withdrawal of sophisticated traders. These questions will be explored using bivariate GJR models to examine the time-varying correlation between financial markets taking into account the investor sentiment level.

INVESTOR SENTIMENT MEASUREMENT

Investor sentiment can be defined as investor opinion, usually influenced by emotion, about future cash flows and investment risk (Chang *et al.*, 2012). Some researchers also explain it as the propensity to speculate or the optimism or pessimism about a given asset (Baker and Wurgler, 2006). Measuring investor sentiment involves elements of subjectivity. In fact, in the already-mentioned absence of any generally accepted measure of this variable, the literature has constructed various approximations. 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; among others), mutual fund flows (Frazzini and Lamont, 2008), the dividend premium (Baker and Wurgler, 2004a and b), the closed-end fund discount (Zweig, 1973; Neal and Wheatley, 1998; among others), the number of IPOs and average first-day IPO returns (Ritter, 2003 and Ljungqvist *et al.*, 2006), turnover or trading volume (Jones, 2002; 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; Baker *et al.*, 2012; and Chang *et al.*, 2012) among others.

The latest proposals suggest combining some of the above variables and extracting the common factors in order to obtain as comprehensive a measure as possible (Brown and Cliff, 2004; Baker and Wurgler, 2006, 2007; Baker *et al.*, 2012; and Chang *et al.*, 2012). The last two of the cited works have also used decompositions of sentiment into global factors and local factors depending directly on the market under analysis.

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. In Chapter 1, and 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[1]: 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 (VP) 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[2]. 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:

$$SENT\ FR_t = 0.487\ CC_t - 0.355\ TURN_{t-1} + 0.519\ VP_{t-1} \quad (1)$$

$$SENT\ GE_t = 0.484\ CC_t + 0.557\ TURN_{t-1} + 0.290\ VP_{t-1} \quad (2)$$

$$SENT\ SP_t = 0.424\ CC_{t-1} - 0.386\ TURN_t + 0.382\ VP_{t-1} \quad (3)$$

$$SENT\ UK_t = 0.602\ CC_t + 0.575\ TURN_{t-1} + 0.390\ VP_{t-1} \quad (4)$$

1. The availability of data determines the sample period for the analysis including SENT EU as July 1992 to December 2007.
2. 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

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[3]. The index scores by country are:

$$SENT\ EU_t = 0.270\ SENT\ UK_t + 0.367\ SENT\ GE_t + 0.387\ SENT\ FR_t + 0.410\ SENT\ SP_t \quad (5)$$

In recent papers, the tendency is to construct global sentiment indexes, which include local sentiment proxies. Baker *et al.* (2012) construct indexes of investor sentiment for six major stock markets and compose them into one global sentiment index. Chang *et al.* (2012) use the first main component of US, UK, French and German sentiment as a measure of global investor sentiment. In Chapters 2, 3 and 4, in line with these two studies, we build a global sentiment index. We take the common component in US and Europe sentiment[4] as a measure of global investor sentiment. As a measure of overall sentiment (SentG), we form a composite index that captures the common component in the SentUS and SentEU indexes. This first main factor explains 81.15% of the sample variance, so we conclude that one factor captures much of the common variation. The resulting index is:

$$SENTG_t = 0.55 * SENTUS_t + 0.55 * SENTEU_t \quad (6)$$

For the purposes of our proposed analysis in Chapter 5, we require a short-term measure of sentiment. The majority of the above references describe long-term timing measures used to test their predictive power on future stock returns. Moreover, most of them are market-based measures whose construction requires complementary techniques that may bias the final results.

Ours needs to be a high-frequency sentiment measure in which the issue date and construction mechanism are known to traders. To obtain a measure fulfilling all these requirements,. we select two surveys that directly measure the sentiment of market participants For the U.S. market, we follow Fisher and Statman (2000) and Brown and Cliff (2004) whose sentiment measure is based on the *American Association*

3. This index captures 47.654% of the variance explained.
4. Due to lack of data, we exclude the Japanese sentiment index and all other Asian references.

of Individual Investor (AAII) survey data. Originally started, in 1987, as a weekly survey of randomly selected AAII members, this survey asks participants to predict the likely direction of the stock market during the next six months and measures the percentages of individual investors that respond "up", "down", and "the same". The AAII then labels these responses as a bullish, bearish or neutral on the stock market, respectively.

For a measure of investor sentiment in the European indexes analyzed, we use survey data from Sentix EuroStoxx 50. Since this survey began in February 2001, it has surveyed Sentix investors weekly, and currently has over 3100 registered participants, more than 77% of whom are individual investors. Participants are asked whether they are bullish, bearish, neutral, or have no opinion with regard to the future trend of the EuroStoxx50 stock index over the following one- and six-month periods. We use the two surveys measures as the spread between the percentages of bullish and bearish investors. Both the AAII and the Sentix survey meet the necessary criteria with respect to frequency and trader awareness and both indexes capture market sentiment well because they are calculated from a direct survey on the expected future state of the market. The survey results are also comparable because of the homogeneity similarity of the question they put to the participants.

PART I. INVESTOR SENTIMENT EFFECT IN STOCK MARKETS

1. Chapter 1. Investor Sentiment Effect in Stocks Markets: Stock Characteristics or Country-Specific Factors?

1.1. Motivation

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 (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 (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).

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: the most speculative stocks are also the hardest to arbitrage. These stocks 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.* (2010) 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 behaviour, investor overreaction and lower market integrity (institutional development and information quality). Chang *et al.* (2012) 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. The fact that both these studies analyze countries with widely

differing levels of financial development means that their findings may be masking a situation of this nature.

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.*, 2012). 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.*, 2012). As mentioned in the introduction, separate analysis of either of these effects can lead to misleading findings. This study aims to obtain clearer findings by interlinking both ideas and using techniques allowing the isolation of the country effect in characteristic-based analysis.

Another key issue is the actual measurement of the sentiment variable. 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 (Baker *et al.*, 2012 or Chang *et al.*, 2012. 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. As a robustness test we also employ direct sentiment measures.

1.2. Main results

The effect of investor sentiment on stock portfolios

We test the predictive capacity of sentiment on the stock portfolios based on characteristics. 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:

$$R^{i,j}_{high,t+k} - R^{i,j}_{low,t+k} = \alpha^{i,j}_{k} + \beta^{i,j}_{k} Sent_t + \sum_{s=1}^{4} \gamma^{i,j}_{k,l} M_{s,t} + u^{i,j}_{k,t}; i = 1,4 \quad (7)$$

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. We also include four macroeconomic variables.

To avoid the problems reported by Stambaugh (1999), caused by highly persistent regressors, we use a block bootstrap method[5], as suggested by Schmeling, 2009 among others. Our bootstrap method is different from theirs, however, because we construct the long-short portfolios following the procedure described by Jegadeesh and Titman (2001), to avoid problems arising from overlapping observations. Under the hypothesis that investor behaviour 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.

Table I 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

5. We use block length (l = 6), by the criterion $l = T^{1/3}$ based on $l = T^{1/3}$, where T is the sample size. The results using l = 12 are qualitatively similar. We resample the blocks and generate the bootstrap sample. We adopt the non-overlapping method and resample the dependent and independent variables. We then calculate the OLS estimator. Finally we repeat this procedure 10,000 times and calculate the bootstrap p-values for the null hypothesis. We also estimate the model using the SUR (Seemingly Unrelated Regressions) method in order to deal with the high level of contemporaneous correlation between the individual regression errors, possibly resulting from the presence of common structural factors, or unknown variables affecting the dependent variable. The actual average residual correlation coefficient 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. The SUR results are very similar to those obtained with the block bootstrap procedure.

is positive and significant for France, Germany, Spain[6] and the UK. A similar sentiment effect appears in the volatility and dividend portfolios, with the expected signs: negative for volatility and positive for dividends. The coefficient for the medium-low BTM portfolio is positive and significant in France and the UK. Finally, the sentiment effect in the high-medium BTM portfolio does not have the expected sign in all four countries.

The results are less significant when the BW index is replaced with the EU index, however. While the same results hold with respect to size for the UK, the statistical significance of the sentiment effect in both the high-low and medium-low BTM portfolios is lost for the UK and France. The statistical significance of the sentiment effect on volatility and the dividend portfolios observed in all four markets when using the BW index, disappears in all except the UK[7]. This shows that, overall, the SENT EU proxy captures much less investor sentiment than the BW proxy does[8].

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 and the results remain practically unaltered.

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

6. The exception is the 6-month portfolios, which do not present a significant sentiment effect in Germany and Spain.

7. Its significance also holds for the 12 and 24-month portfolio for Germany and for the volatility portfolio.

8. 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 indicador is used, some previously unobserved relationships emerge, especially in the high-low and medium-low BTM porfolios.

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.* (2012), and the details of the sentiment index construction in each case.

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.* (2012) 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. In order to eliminate the country effect, 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 II Panel A[9]. These results

9. 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

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 sentiment estimates[10].

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 II 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 sentiment effect estimates.

The above findings clearly indicate that, once the country has been isolated, stock characteristics play an important role in explaining the impact of investor sentiment. Given the important differences observed in the country-by-country analysis, the next step is an analysis to determine whether country-specific cultural and institutional factors also play a role in the impact of investor sentiment. Note that the observed between-country variation may be due entirely to differences in the level of dispersion in stock characteristics and thus be unrelated

periods considered, henceforth, for the sake of simplicity, all results presented are for the 12 month period.

10. Except the size portfolio, where the only significant coefficient is for the UK.

to country-specific cultural or institutional factors, which is precisely what we aim to determine.

It is reasonable to suppose that if the country effect plays no role, the greater the dispersion in stock characteristics, the greater the impact we should observe of investor sentiment on stock returns. 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 III displays the means of the time series of 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[11]. Table IV depicts cross-country differences in the impact of sentiment, and the results of the significance of the difference between the coefficients shown in table I computed by an additional bootstrap procedure[12].

Table IV 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. In terms of the BTM ratio, use of the BW index yields the expected relationship, but the differences are significant only when comparing France and the UK with Spain, which is where one would expect to find the weakest sentiment. Furthermore, use of the EU sentiment index yields no significant differences in any case. Size, both with the BW and the EU index, shows the expected results only for the UK, where the highest impact was to be expected, in relation to the rest. In the volatility and dividend portfolios, the highest

11. Obtained by testing for differences of means between markets.

12. After resampling the series of bootstrap coefficients (10,000 times), the average values of which are shown in table I, we compute the differences and the simulated p-value for the null hypothesis that: "the highest dispersion is associated with the strongest sentiment effect".

dispersion in data corresponds to France, not Germany, which is the country with the highest estimated sentiment coefficient. Furthermore, the sentiment effect is not significantly weaker in Spain, which shows the least data dispersion, than in France, which shows the highest. No significant differences between the various countries are found when using the EU sentiment index.

Thus, the link between the highest/lowest level of dispersion in the various stock characteristics and the strongest/weakest sentiment effect in the differential portfolios is somewhat tenuous, 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[13].

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.

Robustness tests: direct measures of investor sentiment and variables used to construct composite index proxies

The results of 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 appropriate

13. The limitation of the analysis to only four countries in order to control for the level of market development makes it difficult to draw conclusions about the role of country-specific factors. Despite these limitations, the countries were characterised by four specific factors: two of them cultural (uncertainty avoidance index and individualism constructed by Hofstede, 2001) and two relating to market integrity (anti-director rights and accounting standards). Assignation to groups was based on the median. In two factors (uncertainty avoidance index and anti-director rights) we found investor sentiment to have different degrees of impact on the portfolios analyzed. This finding strengthens our previous evidence concerning the specific role of cultural and institutional factors in the impact of investor sentiment on stock returns.

index, without adding the caveat that the difference may simply be due to the different explanatory power of the index variables in each case.

1.3. Conclusions

In this chapter, we focus only on European markets because we wish to control for the level of financial development. The separate analysis of these four markets shows 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. By controlling for country-specific effects, we find that stock characteristics are very relevant in explaining the effect of investor sentiment on stock returns. Nevertheless, we find that they are not the only variable underlying cross-country differences in sentiment effects, since other factors, such as cultural or institutional differences may also play a key role. This suggests potential bias in the results of studies that consider several countries without controlling for one or other of these 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 results using direct measures of investor

sentiment, while showing some sensitivity to the choice of proxy, lead to similar conclusions.

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.

2. Chapter 2. Investor Sentiment and Stock Returns: The Spanish Case

2.1. Motivation

In recent years, researchers have held up market sentiment as a key driver of stock returns. The incorporation of this variable into behavioural finance models has, in fact, brought us nearer to an integral understanding of investor behaviour. The consideration of psychological or behavioural factors broadens our perspective on investors' dilemmas and enables us to analyse them according to the principles of reasoned decision-making. Claims made by authors such as Isen (1987), Schwarz (2002) or Au *et al.* (2003) suggest that emotions play an informational role in investors' decision-making processes, causing them to alter their trading behaviour.

Sentiment, defined as the optimism or pessimism shown by investors, is an indication of the expectations of market traders and, as such, provides a measure of the global, subjective perception of stock prices. According to findings drawn mainly from the US stock market, this variable is apparently able to explain future stock returns (Qiu and Welch, 2004; Brown and Cliff, 2005; Lemmon and Portnaiguina, 2006; and Baker and Wurgler, 2006 and 2007). Other evidence shows that sentiment also influences stock market relationships or phenomena, such as the mean-variance relationship (Yu and Yuan, 2010) or the book-to-market ratio (Kothari and Shanken, 1997), among others.

Baker and Wurgler (2006, 2007) argue that some stocks are more vulnerable to speculative demand and will therefore be more sentiment prone. Stocks that are difficult to value or arbitrage are ideal candidates

to attract subjective investors and thus become sentiment-prone. Specifically, this kind of stocks includes those that are small, volatile, young, non-dividend-paying, or have extreme book-to-market ratios. When sentiment is high/low this type of stock suffers from over/under pricing, which later reverts

In this background, this study examines the effect of sentiment on stock returns in the Spanish stock market, thereby making various contributions to the literature. In view of the important role of institutional factors and stock characteristics in this phenomenon (see Schmeling, 2009; and Chang *et al.*, 2012), and the fact that, as far as we are aware, this market has not been studied previously, this chapter analyzes the relationship between returns and local sentiment in our domestic market. To this end, bearing in mind Brown *et al.*'s (2003) observation that different markets may have different sentiment proxies, we construct a local sentiment measure by applying the procedure described in Baker and Wurgler (2006, 2007) to Spanish stock market variables. The aim is to obtain a truer picture of Spanish investor sentiment that will enable us to perform a more accurate analysis of the relationship between this and future stock returns in this market. A set of macroeconomic variables is also included in order to protect the results from the influence of possible changes in the economic cycle

Furthermore, following Baker and Wurgler (2006, 2007), this chapter focuses on the market as a whole and on portfolios of stocks whose characteristics leave their returns potentially more vulnerable to market sentiment. The results are consistent with the existing literature in finding a significant negative effect of sentiment on future returns to stocks in the Spanish stock market, where the impact is considerably more intense in stocks that are difficult to value and likely to pose problems to potential arbitrageurs.

Given that all stock markets work in a global world, this chapter probes the relationship between stock returns and sentiment proxies, at global and local level. In line with Baker *et al.* (2012) and Chang *et al.* (2012) we construct a global sentiment indicator, from an aggregation of US market sentiment, using the index created by Baker and Wurgler (2007), and the market sentiment indexes of some European countries. We estimate a local sentiment indicator net of global sentiment by running

an auxiliary regression. The results obtained reveal that both sentiment indexes play a role, thereby revealing the importance of the cultural and institutional factors captured by the local index estimated net of the global index. These findings are in line with those obtained by Baker *et al.* (2012), but differ from those of Chang *et al.* (2012), who report that, when modelling both indexes jointly, the local sentiment effect fades almost completely. This study also incorporates the dynamic between the two sentiment proxies and tests to determine whether the transmission mechanism between them could be capital market activity. The results obtained show that global sentiment drives local sentiment but not vice-versa. Also, in contrast to what is reported in Baker *et al.* (2012), our results do not allow us to confirm that the capital flows from US to Spain is the channel by which global sentiment spreads to local markets, thus raising the possibility that the contagion is through variables relating to investor sentiment. Finally, in order to check the results for the possible impact of the latest financial crisis and increase their robustness, we extend the analysis to include the crisis period. Overall, we are able to assert that the sentiment effect on portfolios constructed from difficult-to-value and to arbitrage stocks still holds. One difference that does emerge over the crisis period, however, is that the local sentiment effect fades when the analysis also considers the global effect. This finding appears to underline the global nature of the crisis and the consequent diminishment in the importance of local market factors.

2.2. Main results

The effect of investor sentiment on stock portfolios

As advanced earlier, our analysis uses portfolios of stocks with characteristics that are likely to be sensitive to sentiment-driven demand. These self-financing portfolios are based on the four stock characteristics that, as indicated earlier, give the greatest possible exposure to investor sentiment. This results in a small-large size portfolio, a high-low volatility portfolio and a low-high dividend portfolio. For the fourth characteristic, given that the stocks with the highest growth potential and those in distress fall into the extreme BTM quintiles, we follow Baker and Wurgler (2006) by constructing three BTM portfolios: high-low and

high-medium for stocks with high distress risk and medium-low for those with high growth potential.

The portfolio construction process uses different horizons to suit the stock characteristics. To avoid overlapping observations and potential self-correlation problems, we follow the proposal given in Chang *et al.* (2012), which is to adopt the calendar-time approach used by Jegadeesh and Titman (2001) to study the momentum effect. To examine the power of the Spanish investor sentiment indicator to explain returns to characteristic-based portfolios, we run the following regression:

$$R^{j}_{high,t+k} - R^{j}_{low,t+k} = \alpha^{j}_{k} + \beta^{j}_{k} SENTSP_{t} + \sum_{s=1}^{4} \gamma^{j}_{k,s} M_{s,t} + u^{j}_{k,t} \quad (8)$$

where $R^{j}_{high,t+k} - R^{j}_{low,t+k}$ is the return to the self-financing characteristic-based portfolio j, for the k = 6, 12 or 24-month holding period. As independent variables, we use the constructed sentiment indicator (SENTSP) and the macroeconomic variables (M_s).We also run another regression using only the orthogonalized (macro-adjusted) sentiment indicator. The model is estimated using OLS and the Newey-West (1987) variance-covariance matrix, which is robust to autocorrelation and heteroscedasticity. The results (see table V) are in line with expectations, except for the size portfolio, which has a non-significant coefficient[14]. We can see that the effect of sentiment on the volatility and dividend portfolios is significant and of the expected sign, with a negative coefficient in both cases. Therefore high (low) sentiment will generate lower (higher) future returns on both the volatility- and the dividend-based portfolios. The high-low BTM portfolio has a significant positive coefficient for the three time horizons considered, as does the medium-low BTM portfolio, but for the last portfolio the significance practically disappears in the analysis using the orthogonalized index. Finally, the high-medium BTM portfolio shows no significant sentiment effect. The results including the Fama-French (1993) risk factors and the momentum factor are similar to that shown in table V.

14. It should be noted that overall stock size in the Spanish continuous market is medium to large. In fact, the average capitalization of the firms in the first quartile in the Spanish continuous market over the period analyzed is 123 million Euros, which is much higher than European firms overall (almost triple that of the first quartile of German firms and roughly 6 times that of the first quartile of French or British firms).

Thus, the results show that Spanish investor sentiment influences future returns to stocks that pose valuation problems or are associated with high arbitrage risk and transaction costs. When sentiment is high (low), future returns on high-volatility, high-growth-potential and non-dividend-paying stocks will be lower (higher) owing to over- (under-) pricing followed by reversion to their fundamentals.

Investor sentiment: is the effect globally or locally sourced?

The above results show that Spanish investor sentiment influences future stock returns in the domestic market. The effect can be observed across the market but more so in groups of stocks with characteristics that make them more sentiment prone. Nevertheless, in line with recent findings (see Baker *et al.*, 2012; and Chang *et al.*, 2012), it is reasonable to suppose that the sentiment effect is to some extent a global phenomenon. This being the case, this section aims to analyze the potential influence of what we will call global sentiment and a more specific local sentiment on future returns in this market. For this analysis we need to estimate the following regression[15]:

$$R^{j}_{high,t+k} - R^{j}_{low,t+k} = \alpha^{j}_{k} + \beta^{j}_{k} GLOBAL^{\perp}_{t} + \mu^{j}_{k} RESSENTSP^{\perp}_{t} + u^{j}_{k,t} \quad (9)$$

where $R^{j}_{high,t+k} - R^{j}_{low,t+k}$ is the return to the self-financing characteristic-based portfolio j, for the k = 6, 12 or 24-month holding period, $GLOBAL^{\perp}_{t}$ denotes an index representing global sentiment, and $RESSENTSP^{\perp}_{t}$ denotes local sentiment net of the global effect, computed by orthogonalizing the local Spanish sentiment index to the global sentiment index, both indexes also being orthogonalized to the macroeconomic variables described earlier. Our global orthogonalized sentiment index ($GLOBAL^{\perp}$) is computed using the strategy employed by Baker *et al.* (2012)[16].

15. Henceforth, for the sake of clarity, we show only those estimations that employ the orthogonalized (macro-adjusted) indexes. The results obtained using the raw indexes and the macroeconomic variables are similar to those shown with the orthogonalized indexes. All are available from the authors upon request.

16. Although it is difficult to conceive of supranational indexes in the presence of such considerable cross-market differences, this approach is meant to capture latent market sentiment for the market as a whole.

Table VI (Panel A) reports the impact of the global and local indexes and Panel B reports the coefficients with risk factors included. As can be seen, the impact of global sentiment, especially on volatility and dividends, is qualitatively similar to that of local Spanish sentiment reported in the previous section, probably because the latter captures a large portion of global sentiment. Global sentiment has a significant negative effect on the volatility and dividend portfolios. However, although the sign is consistent with predictions, none of the coefficients for the high distress risk and size portfolios are statistically significant. The same lack of significance is found for the medium-low and high-low book-to-market portfolios[17]. The local component of the sentiment index loses some of its explanatory power in the BTM portfolios, but retains a significant impact in the volatility and dividend portfolios. This suggests the presence of a significant sentiment effect in two different spheres, one global the other local, the latter of which is not subsumed in the former and may well be driven by institutional or cultural factors specific to individual domestic markets. In fact, Schmeling (2009) presents arguments based on country-specific factors, suggesting that the results of investor sentiment analysis depend to a significant degree on the quality of governance or cultural factors specific to individual markets. Chang *et al.* (2012) offer further explanations including market integrity, data availability or levels of collectivism. Finally, Chang *et al.* (2012) also emphasize the role played by country-specific factors, attaching particular importance to differences in informational quality, legal systems or corporate governance.

Thus, in line with the findings reported by Baker *et al.* (2012), we are able to observe that both global and local sentiment play a key role in returns to sentiment-prone, and, more particularly, high-volatility and low-dividend, stocks.

As already mentioned, these results confirm that stock returns are subject to investor sentiment, which affects them to a statistically

17. Our results for the BTM ratio are in line with those reported in Baker and Wurgler (2006) and Baker *et al.* (2012). Neither of the cited studies finds a significant impact in the high-medium portfolio, while, in the medium-low portfolio, both find a significant positive effect that fades after including the Fama-French factors (in the case of Baker and Wurgler, 2006). Comparison with Baker *et al.* (2012) is impossible because they do not perform an estimation including risk factors.

significant degree both globally and locally. The interesting question that arises at this point is whether the two indexes might be related. Thus, while it is reasonable to suppose that these indexes reflect a good deal of common information (as shown by the high levels of correlation between their individual component variables), it is less easy to predict potential causal relationships between them. To solve this question, we test for causality between the two indexes in order to reveal potential dependencies[18]. According to the Granger test results, the null hypothesis that the orthogonalized local Spanish sentiment index does not drive the orthogonalized global sentiment index cannot be rejected (p-value=0.70). However, the hypothesis proposing the reverse causal relationship between the two can be rejected for a p-value of 0.06. This finding shows that the local sentiment effect is partly a reflection of global sentiment. This raises the issue of a possible cross-market sentiment transmission mechanism. Without claiming to be able to settle this complex issue, we follow Baker *et al.* (2012) by running a regression including a variable to measure flows of capital from the US to the Spanish market, and another to capture the interaction between this and the investor sentiment index. A statistically significant positive relationship between this interaction variable, if found, would give us reasonable grounds to assert that the sentiment effect is transmitted through international flows of capital induced by strongly sentiment-driven behaviour on the part of US traders. It can be written as follows:

$$R^{j}_{high,t+k} - R^{j}_{low,t+k} = \alpha^{j}_{k} + \beta^{j}_{k} SENTSP^{\perp}_{t} + \mu^{j}_{k} BW^{\perp}_{t} + \varphi^{j}_{k} |FC_{t}| + \eta^{j}_{k} |FC_{t}| * BW^{\perp}_{t} + u^{j}_{k,t} \quad (10)$$

where $R^{j}_{high,t+k} - R^{j}_{low,t+k}$ is the return to the self-financing characteristic-based portfolio j, for the k = 6, 12 or 24-month holding period, $BW^{\perp}$ is the orthogonalized sentiment index constructed by Baker and Wurgler (2007) for the US market, as defined earlier, $SENTSP^{\perp}_{t}$ is the orthogonalized local Spanish sentiment index and FC is the flow of capital from US investors to the Spanish market[19].

18. A VAR including both indexes and the macro-economic variables has been carried out. The ADF test indicates that all the variables are stationary. The number of lags was set according to the Schwarz criterion.

19. The data are drawn from the US Treasury Bulletin. They are calculated from the absolute value of the cash flows standardized after being normalized by the market value.

Table VII shows the results of this estimation[20]. The effects of both sentiment indexes ($SENTSP^{\perp}$ and $BW^{\perp}$) are of the same level of significance, as shown above. However, although the FC coefficient is significant in the medium-low BTM, volatility and dividend portfolios, the coefficient of interaction between US investor sentiment and capital flows, which is the one that should reflect this transmission mechanism, lacks significance. This suggests that the results reported by Baker *et al.* (2012) concerning this transmission mechanism do not hold for the Spanish market. This suggests the absence of any underlying issues relating to capital flows in the relationship between sentiment indexes and allows explanations based entirely on investor behaviour variables to gain more credence. However, as Baker, *et al.*. (2012) also point out, this is a complex issue that will require deeper analysis to obtain more solid findings.

Robustness of the findings to last financial crisis

In order to ascertain whether the results hold in the face of the current financial crisis, we are going to test for variation in the observed impact of investor sentiment on future stock returns after incorporating this recent crisis into the analysis[21]. We therefore extend the study period to 2010 to include data for the last three years by re-estimating the above equations. The incorporation of the current financial crisis therefore does not appear to alter the observed effect of local sentiment on future stock returns, because the results prove robust to this situation.

In view of the global nature of the current financial crisis, it is interesting to observe whether the findings for the effect of global sentiment and that of strictly local sentiment hold for the extended study period. Joint inspection confirms that global sentiment retains its significance and the impact of more specific local sentiment (net of global effects) however, is found to fade and lose much of its explanatory power in all

20. For the sake of clarity, we show only the results for the 12-month horizon and the orthogonalized indexes. Overall, the results for the 6- and 24-month horizons are similar, as are those for the macro-unadjusted indexes. All are available from the authors upon request.

21. Zouaoui *et al.* (2011) and Bandopadhyaya and Troung (2010) analyze the sentiment-crisis relationship, although from a different perspective from that used to explain it in this section. The focus of the cited studies is on examining the possibility of predicting or explaining the crisis in terms of investor sentiment. This chapter aims to observe the sentiment effect in a context of deep worldwide crisis such as the one currently prevailing.

those cases where it was previously significant. This may be because the global reach of this crisis makes it more receptive to overall market sentiment, while local sentiment becomes ineffective.

The Granger's test results again fail to reject the null hypothesis that the orthogonalized Spanish local investor sentiment does not drive the orthogonalized global sentiment index and show that, in fact, the reverse hypothesis holds, with a p-value of 0.01. These data show that, in these times of widespread financial crisis, local sentiment is, more than ever, a reflection of global sentiment.

Finally, we test whether the transmission mechanism is related to cross-market capital flows within the context of this latest global financial crisis. The results from the re-estimation of equation (9) are virtually the same as those of the first estimation. The FC variable retains its significance in the medium-to-low BTM ratio, volatility, and dividend portfolios. Likewise, the effect of interaction between the US sentiment index and capital flows is non-significant in all the portfolios considered.

This set of results for the extended study period adds robustness to the initial findings, in that, overall, the significance of the parameters remains intact across the various estimations. The only point worth noting is the loss of explanatory power of the Spanish local sentiment index when considered in conjunction with global sentiment. This finding may derive from the global nature of the economic crisis and may support the idea that local sentiment mimics global sentiment more closely in this kind of circumstances.

2.3. Conclusions

This study examines the effect of investor sentiment on Spanish stock returns by building a local sentiment index using variables from the Spanish market, following the proposal given by Baker and Wurgler (2006 and 2007).

The influence of local sentiment is analyzed for the market as a whole and for portfolios of sentiment-prone stocks, that is, stocks that are small, have high-volatility, are non-dividend-paying or have extreme

book-to-market ratios. The results reveal that sentiment has a significant negative impact on these types of stocks, suggesting that sentiment-driven over- or under-pricing will ultimately end in return reversal.

We have also studied the effect of a global sentiment index constructed from a multi-market aggregate, and the local index orthogonalized to it. The results reveal a significant sentiment effect in two separate spheres, one more global, the other local and independent of the global one, possibly due to institutional or cultural factors peculiar to the domestic market, in line with a strand of research that highlights the role of country-specific effects in the impact of investor sentiment on stock returns (see Schmeling, 2009; and Chang *et al.*, 2012).

We have also shown that global sentiment is a significant driver of local sentiment, and that the latter is, to some extent, a reflection of the former. Moreover, the fact that sentiment does not appear to spread via capital flow activity suggests that investor behaviour variables may provide the transmission mechanism.

Lastly, analysis of the role of the current financial crisis in our findings has shown that, probably because of the generalized nature of this crisis, the global index captures a greater portion of the local index during the crisis period.

Given the nature of the variable under analysis, it is hard to derive explanations based on legal protection or market regulation factors. Regulatory measures can correct the impact of agent or trader incentives but not that of behavioural biases. It also appears unlikely that the presence of informed traders is, per se, enough to correct this mispricing. Indeed informed trading activity tends to involve quite considerable arbitrage problems and high trading costs. Future research based on several countries with differentiating features or a single country in different situations might shed more light on the potential implications for investors or market regulators.

PART 2. INFLUENCE OF INVESTOR SENTIMENT ON THE ACTIVITIES OF FINANCIAL ANALYSTS

1. Chapter 3. Strategic Behaviour or Cognitive Bias in Analysts' Forecasts? The Role of Investor Sentiment

1.1. Motivation

The literature on EPS forecast errors has widely shown that they are positively biased (Brown, 1997; Chopra, 1998; Richardson *et al.*, 2004; and Qian, 2009, among others). Incentives to issue optimistic forecasts are diverse. There is a link between the bias in the degree of analyst optimism and both the development of their careers and their facility of access to non-public information (Hong and Kubik, 2003; Chen and Matsumoto, 2006; among others). Optimism in EPS forecasts is also associated with subsequent investment banking business and commissions for analysts' brokerage houses (Michaely and Womack, 1999; Lim, 2001; and Agrawal and Chen, 2008, among others). This evidence reflects the companies' preference for positive rather than negative forecasts, which could induce the bias detected.

There are three different types of bias that could produce the optimism observed in analysts' forecasts (see Francis, 1997). Reporting bias, which reflects an explicit intention to mislead, increasing earnings expectations artificially. Selection bias, observed when analysts prefer not to issue a report rather than issue negative information about a company. And, finally, cognitive bias, which is due to analysts inadequately processing the information available, resulting in their being unable to produce unbiased forecasts.

Although there are incentives to offer biased forecasts, the ultimate cause of analyst optimism is far from clear and there is an interesting ongoing debate with empirical evidence favourable to both explanations: strategic behaviour or cognitive bias (see Karamanou, 2011 and Ertimur *et al.*, 2011 or Qian, 2009 and Hribar and McInnis, 2012, as recent examples of different conclusions on this question).

Investor sentiment is a variable that reflects optimism or pessimism about stocks in general (Baker *et al.*, 2012) or investor opinion, usually influenced by emotion, about future cash flows and investment risk (Chang *et al.*, 2012). The existence of high or low sentiment in the market will affect all the participants therein, including financial analysts. Baker and Wurgler (2006, 2007) show that when investor sentiment is high/low, stock returns suffer an over/undervaluation which later revert to their fundamentals.

The most speculative stocks are also the hardest to arbitrage and these stocks will, therefore, be those most influenced by investor sentiment. Lemmon and Portniaguina (2006) find this effect to be present particularly in small stocks and in those 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 and likely to suffer from over- or under-pricing, depending on investor sentiment.

To the best of our knowledge, very few papers have analysed the relationship between investor sentiment and analyst optimism, trying to test whether sentiment is the cause of analyst optimism, and they focus on the American market. Bergman and Roychowdhury (2008) and Qian (2009) present evidence of the association between sentiment and the bias in analysts' earnings estimates without going into the strategic or cognitive origin of the analyst optimism in depth. Qian (2009) shows that analysts issue more optimistic earnings forecasts when sentiment is high, especially in smaller assets and value stocks. Hribar and McInnis (2012) also find this relationship. They show that forecast errors are an intermediating variable in the relation between sentiment and future stock returns. This finding supports the presence of cognitive bias in analysts.

This chapter studies this question by analysing four European markets with significant differences in stock characteristics, financial systems and cultural dimensions to obtain more robust conclusions. In our discussion of the difficulties involved in determining the source of optimism, we run a set of tests taken from the literature, as well as on the analysis of selection bias because it allows a more direct interpretation of the results. Regardless of the level of investor sentiment, the systematic presence of

this bias is necessarily due to strategic behaviour. However, the analysis of how this bias changes with high sentiment levels compared to the unconditional case allows, can sometimes help to determine whether optimism is basically strategic in its origin, or, alternatively, whether cognitive bias in investor sentiment may be playing a role.

1.2. Main results

Effect of Sentiment on Forecast Errors

Previous results have shown that analysts tend to be optimistic, issuing earnings forecasts greater than the earnings actually obtained by the companies. One of the possible causes of this may be the reaction of analysts to variations in the level of sentiment. If the latent sentiment is high, analysts could be optimistic about stocks. However, they could also exploit this situation by issuing optimistic forecasts. Given that we have shown that EPS forecasts are more optimistic in hard to value or difficult to arbitrage stocks and taking into account that these stocks are more sensitive to investor sentiment, we can expect a greater investor sentiment effect on EPS forecast errors. For this purpose, we estimate the following equation adapted to the two extreme quintiles of each characteristic j:

$$FE_{q,t}^{c,j} = \alpha_q^{c,j} + \beta_q^{c,j} SentG_{t-1}^{\perp} + \gamma_q^{c,j} Skew_{q,t}^{c\perp} + u_{q,t}^{c,j} \qquad (11)$$

where $FE_{q,t}^{c,j}$ is the average of the EPS forecast errors in the stocks belonging to quintile q (first and fifth) for country c, characteristic j and quarter t. $Sent^{\perp}$ is the investor sentiment variable orthogonal to the economic variables. Moreover, like Qian (2009), we include a proxy for the skewness in the analysts' forecast errors ($Skew^{C\perp}$) as a control variable, because optimistic bias can result from analysts' effort to improve forecast accuracy when the distribution of earnings is skewed (Gu and Wu, 2001). Finally, an AR (1) model is applied to correct for serial correlation. OLS estimation is used with the Newey and West (1987) standard errors.

The impact of investor sentiment on EPS forecast errors for each quintile is shown in table VIII. The results are in line with our expectations. When

analysing portfolio volatility, the results are unanimous for the four markets. The impact of sentiment on the more volatile stocks is greater than the impact shown in less volatile stocks and the difference between the two groups is significant for the four markets analysed. In the case of the UK, in the analysis of portfolios classified by size and dividends per share, the first quintile (which contains the most sensitive stocks to investor sentiment) has coefficients superior in magnitude to those of the fifth quintile, the differences being significant in both cases. For the other stock markets, in these characteristics, the coefficients associated with the first quintile are also higher, although they are not significant. When we study portfolios sorted by BTM, the impact is higher in the first quintile than in the fifth, but the differences are not significant in any case.

To sum up, analyst optimism is related to the level of investor sentiment. This relationship is stronger in hard to value and difficult to arbitrage stocks, especially when these characteristics are proxied by stock volatility.

Analysts' behaviour: bias in expectations or strategic behaviour?

A possible explanation for the impact of investor sentiment on EPS forecasts is that analysts are, unconsciously, affected by latent investor sentiment. Under this assumption, analysts are affected by the environment and are not able to isolate themselves from the situation of the market. This means that, when sentiment is high, analysts, unintentionally, produce earnings forecasts that are more optimistic than usual. However, this detected effect may also be due to analysts strategically using investor sentiment. If analysts are aware of the state of sentiment, they can exploit this situation by issuing more optimistic forecasts than those they would have issued in another situation. This action will provide personal benefits from earning more commissions associated with the brokerage houses and increased investment activity. Of course, the effect detected may also be the result of the combination of the two explanations.

We run 2 tests. With the first one, the traditional selection bias, we analyse whether, regardless of the level of sentiment, analysts behave strategically, revising their forecast upward in the presence of positive

news and not revising it downwards in the presence of negative news, thus causing bias in the distribution of forecast errors. If we obtain significant evidence of this fact, independent of the level of sentiment, it will indicate the presence of strategic behaviour by analysts. Ignoring information that does not conform to agents' prior beliefs is a sign of over-confidence or self-attribution. However, the presence of selection bias suggests a systematically different response to good versus bad news, irrespective of whether the news conforms to prior beliefs.

The second test, the modified selection bias which is proposed in this chapter, studies the effect of sentiment on the relationship between news and EPS revisions. Although this test provides a particularly useful means to proceed with the testing of our various hypotheses, the extreme difficulty involved in the separation of these hypotheses will seriously hamper its identification capability. Under the assumption of strategic behaviour, whether analysts make more upward or downward revisions in relation to the number of pieces of positive news in hard to value or difficult to arbitrage stocks will depend on the intensity of the opposing incentives, that is, the incentives or pressures for analysts to issue optimistic forecasts when SEO and IPO activity is at a peak and non-confirmation of their predictions would carry high reputational costs. Note that, in market states such as these, analysts do not need to encourage higher trading volume. In this line, Bergman and Roychowdhury (2008) show that managers strategically reduce the frequency of long-horizon earnings announcements during high-sentiment periods. In addition, bearing in mind the price reversal in the medium term for this type of stocks (see Baker and Wurgler, 2006 and Corredor *et al.*, 2011), the reputation costs for the analyst of issuing over-optimistic forecasts that are not confirmed by the market are particularly important and lead to a reduction of upward revisions in relation to the number of pieces of positive news. Thus, if analysts are not under too much pressure to issue optimistic forecasts, the net effect could be fewer upward revisions. However, if the origin of analysts' optimism lies in a cognitive bias, a high level of investor sentiment will lead to an increase in their optimism and a greater effect should be observed in hard to value and difficult to arbitrage stocks, which are the stocks in which investor sentiment has the most noticeable effect. However, it is important to emphasize that an observed increase in upward revisions in relation

to the number of pieces of positive news would seriously compromise the identification capability of this test, since it could be the result of strategic behaviour (due to pressures outweighing reputational costs) or cognitive bias, or both at once.

Given that our modified selection bias tests take into account the effect of investor sentiment in hard to value and difficult to arbitrage stocks, we use stock volatility as a proxy for this type of stocks because, in all four countries analysed, the main effect of sentiment on the EPS forecast errors has been detected in the portfolio consisting of the most volatile assets. To compute our test, the first step is to choose the stocks to compose this portfolio. For this purpose, each quarter, the stocks are sorted by their volatility and grouped into quintiles. Then we calculate the percentage of quarters that each stock appears in each of the extreme quintiles, the first and fifth. Finally, the stocks selected as more volatile (less volatile) will be those that, for more than 60% of the quarters, appear in the fifth quintile (first quintile) and for less than 10% of the quarters in the first quintile (fifth quintile)[22]. The number of upward and downward EPS revisions is obtained from Factset and we compute the number of revisions issued by the analysts following a firm during the last month of the quarter. The proxy for news is the unexpected stock return (20% extreme). As Antoniou *et al.* (1998), Engle and Ng (1993) and Pagan and Schwert (1990) argue, it is typical to define news as the unexpected component of returns, u_t, Let r_t be the return on a stock from t - 1 to t and Φ_{t-1} be the information set containing all relevant information up to time, t-1. The conditional expected return, ρ_t, is defined as $E(r_t|\Phi_{t-1})$ so news is defined as $u_t = r_t - \rho_t$. Moreover, Engle and Ng (1993) assert that a large value of u_t implies that the news is "significant" and it is critical to distinguish between positive and negative return shocks by examining the magnitude of a piece of news and they proposed identifying the more extreme values using the αth percentile of the set of $\{u_t\}$. Blasco *et al.* (2010) find that using the top and bottom quintiles of the residual is a good proxy for good and bad news, respectively. For the sake of homogeneity each quarter, we compute the total number of pieces of positive or negative news for each stock during the last month of the quarter.

22. To ensure that the results are not firm specific, the number of stocks in each market is greater or equal to 10.

Finally we compute the ratio between the number of upward EPS revisions (the number of downward EPS revisions) and the number of pieces of positive (negative) news on a quarterly basis[23].

$$R^U = \frac{\text{Upward Revisions}}{\text{Positive News}} \quad \text{and} \quad R^D = \frac{\text{Downward Revisions}}{\text{Negative News}} \tag{12}$$

Table IX presents, for each country, the average values of both ratios, R^U and R^D, for the total stocks and for the extreme volatility portfolios, as well as the p-value from the t-test for a difference in means. The first four rows show the average for all analysed assets. The results of the first test show that, in 3 of the 4 markets analysed, the ratio between the number of positive revisions and the number of pieces of positive news (R^U) is significantly greater than the ratio between the number of negative revisions and the number of pieces of negative news (R^D). It is important to emphasize that these results are not conditional on investor sentiment. They are a consequence of analysts' strategic behaviour in response to their incentives.

Our second test compares the expected R^U and R^D ratios that are conditional on high level sentiment (HS) to their respective unconditional ratios.

$$T^U = E(R^U / HS) - E(R^U) \quad \text{and} \quad T^D = E(R^D / HS) - E(R^D) \tag{13}$$

Under the null hypothesis of the absence of any effect of investor sentiment in the R^U and R^D ratios, the T^U and T^D statistics should be zero (H_0: $T^U = T^D = 0$). The alternative hypotheses (analysts' strategic behaviour (SB) or cognitive bias (CB)) may differ significantly in the behaviour of the T^U statistic for the most volatile stocks (which are those most sensitive to investor sentiment). Under the alternative hypothesis of analysts' strategic behaviour, the T^U statistic should be negative if the reputational costs for analysts outweigh either their incentives to make the most of high investor sentiment to drive up trading volume or the pressures they are under to issue optimistic forecasts in order to support SEOs or IPOs. (: (Reputational costs > Firms pressure) $T^U < 0$). The T statistic will be positive if the optimism is due to cognitive factors (: $T^U > 0$); if it is due to strategic behaviour made possible when the reputation costs do not outweigh the remaining incentives (: (Firms pressure > Reputational

23. For the sake of homogeneity, both variables are standarised.

costs) $T^U > 0$); and also in the event of a combination of both these conditions.

In the case of the T^D statistic, the effect should be lower than in the T^U statistic. A positive or not different from zero T^D statistic is expected in the case of analysts' strategic behaviour, because negative news is more informative during periods of high sentiment analysts, taking into account the reputational costs, tend more frequently to revise downwards. Note, however, that pressures for analysts to issue optimistic forecasts to support SEO and IPO activity also have this effect. In the case of cognitive bias, a negative or not different from zero T^D statistic is expected because negative news is not confirmed by their own expectations and they probably do not downwardly revise their forecasts. Finally, the expected sign of the statistics for the less volatile stocks is the same as that expected for the most volatile stocks, but the statistics should probably not be significantly different from zero because, in these stocks, investor sentiment has a lower effect and the magnitude of the optimism bias will also be lower.

The results of these modified statistics are shown in table IX. The T^U test, the difference between the expected R^U in the conditional and unconditional cases, for the portfolio of the most volatile stocks is significant in two of the four markets analysed (the United Kingdom and Spain). The R^U ratio conditional on high sentiment displays a greater average than the unconditional one in the other two markets, although the variance is too high to obtain T^U tests significantly different from zero. The T^D test, the difference between the expected R^D in the conditional and unconditional cases, for the portfolio of the most volatile stocks does not offer significant differences in any case. These results, especially those from the T^U test, are not clear because they are compatible with both explanations. Finally, as expected, the results of the T^U test and the T^D test for the portfolio of less volatile stocks are not different from zero in any case.

The T statistic scores do not enable us to explain the source of investor optimism because there are two possible causes. What can be noted is that, if it has a strategic component, as the ordinary selection bias evaluation appears to suggest, the reputation costs are lower than either the incentives or the pressures to issue optimistic forecasts, which may

provoke thought as to the effectiveness of regulatory measures. The non-significance of the T statistic scores for less volatile stocks might suggest that cognitive bias has some power to explain this phenomenon.

1.3. Conclusions

This study focuses on the debate regarding the source of analysts' optimism in their forecasts. Recent papers have rekindled the debate about whether the optimism observed is due to analysts' strategic behaviour (see Karamanou, 2011 or Ertimur *et al.*, 2011) or if it is a consequence of their cognitive bias (see Hribar and McInnis, 2012).

In this chapter, we analyse the effect of investor sentiment on the expectations of these agents. We study the four European markets most important by capitalisation and with significant differences in stock characteristics, financial systems and cultural dimensions to ensure the robustness of our results. The results confirm the presence of an optimistic bias in analysts' forecasts, a bias which is enhanced in the assets most sensitive to investor sentiment, namely, those that are hard to value or difficult to arbitrage. Moreover, we find that investor sentiment significantly affects forecasts errors in all of the market analysed. Due to the difficulty of separating the two alternative hypotheses, the various tests performed in this study yield mixed conclusions. While the results of the selection bias evaluation are consistent with the presence of strategic behaviour on the part of analysts, those of the modified test contribute little towards a fuller identification of the source of optimism, since they are compatible with both hypotheses. In any event, the detection of strategic behaviour emphasizes the relative unimportance of reputational costs within the set of incentives to which analysts are subject. Furthermore, the observed difference in the findings for stocks that are easy versus difficult to value or to arbitrage permits the assertion that cognitive biases also play a relevant role in explaining analysts' optimism.

The main practical implication of our results is that regulation can reduce analysts' optimism because part of this optimism is strategic. However, the fact that the rest of this optimism is associated with a cognitive bias suggests that the benefits of regulation will be more limited. The

effect of this bias is greater in hard to value and difficult to arbitrage assets, which means that, in times of a high level of sentiment, the EPS forecasts will be more upwardly biased for these types of assets.

Finally, the results of the test proposed in the paper of Hribar and McInnis (2012) do not confirm that EPS forecast error is an intermediating variable between sentiment and returns. It may suggests that the relationship between sentiment and stock returns is more complex or forecasts errors perhaps is not a good measure for expectation errors by investors in European markets. It could be an interesting avenue for future research.

2. Chapter 4. Value of Analysts' Consensus Recommendations and Investor Sentiment

2.1. Motivation

The literature has shown the existence of a systematic optimistic bias in analysts' behaviour (see, among others, Brown, 1997; Chopra, 1998 and Easterwood and Nutt, 1999 or, more recently, Kothari, 2001 or Ramnath *et al.*, 2006). On the one hand, there is also a systematic tendency to issue optimistic estimates of the future earnings of firms (Chopra, 1998 and Richardson *et al.*, 2004). On the other hand, it is also clearly established that analysts are inclined to give more buying than selling recommendations. An extensive literature has focused on the investment value of analysts' stock recommendations revealing two complementary strands of research. Firstly, studies that examine whether investors can profit from investment strategies involving consensus recommendations and changes in analysts' recommendations (Womack, 1996; Barber *et al.*, 2001 and 2003; and Balboa *et al.*, 2008 and 2009). Secondly, there are some authors who have analyzed the relationship between the characteristics of recommended companies and their value, both consensus recommendations and their changes (Jegadeesh *et al.*, 2004; and Azzi *et al.*, 2006).

With respect to the first strand, Womack (1996) and Barber *et al.* (2001) find that a strategy consisting of buying stocks with the most favourable recommendations and selling stocks with more unfavourable consensus recommendations yields positive returns. These results are

more pronounced for small firms. Jegadeesh *et al.* (2004) document that upgraded stocks outperform downgraded stocks. In addition, they find that strategies based on changes in consensus recommendations offer better returns than those based on the level of consensus. These authors, in relation to the second line of study, find that analysts tend to recommend growth stocks, those with a greater momentum and those with a high turnover. These stocks generate higher returns than those that have the opposite characteristics.

Previous evidence is centred on the US market. In an international context, Jegadeesh and Kim (2006) examine the returns generated following the revisions of analysts' recommendations for the G7 countries. Azzi *et al.* (2006) study 15 European markets, showing the trend of analysts in favour of large firms, stocks with a greater momentum and growth stocks. Azzi and Bird (2005) evaluate Australian analysts and suggest that they attempt to adjust the biases in their recommendations over the market cycle.

Finally, Balboa *et al.* (2008 and 2009) explore 8 developed stock markets. The first paper documents that sell recommendations seem to be much more useful for providing significant positive returns. At the same time, they note that consensus changes are a valuable tool for investment decisions. In addition, they show that the optimistic bias of analysts influences the value of consensus recommendations portfolios but not the portfolios of change of consensus. In the second paper, they show that the country-bias is an important input for making financial decisions, especially when working with consensus levels.

The explanations for the detected optimism focus mainly on three aspects: the economic incentives which affect the analysts, the cognitive bias of the analysts and the negative skewness in earnings (see Kothari, 2001 or Qian, 2009).

The first aspect is linked to investment banking businesses and commissions for their brokerage houses, which leads analysts to issue upward-biased recommendations and earnings forecasts (Lin and McNichols, 1998; and Agrawal and Chen, 2008). Michaely and Womack (1999) noted the relationship between brokerage house membership and analysts' forecasts. Das *et al.* (1998), Lim (2001) and Hong and Kubik

(2003) examine the link between the bias in the degree of optimism of analysts and both the development of their careers and their facility of access to non-public information. Irvine (2004) finds that optimistic recommendations generate high trading commissions through the analysts' brokerage firms.

The second aspect relates the bias to analysts' errors when processing information. Overreactions of analysts to good news about earnings, over-valuation due to the existence of speculators or overconfidence in the accuracy of their own information are some of the interpretations offered in the previous literature (Easterwood and Nutt, 1999 or Friesen and Weller, 2006).

In relation to the third aspect, Gu and Wu (2003) indicate that the optimism bias may come from analysts attempting to improve the accuracy of their forecasts by taking the observed skewness in earnings into account).

In the above-mentioned connection between the cognitive bias and the optimism of analysts, investor sentiment arises as a possible explanatory factor for the optimism latent in the forecasts and recommendations issued by analysts. Baker and Wurgler (2006, 2007) associate investor sentiment with the propensity to speculate or optimism or pessimism about a stock. The influence of sentiment on future stock returns varies depending on the difficulty of valuation (which would lead to an increased presence of speculative investors) and the difficulty of arbitrage. This implies that sentiment has greater effects on small, young, volatile, non-dividend payers, those with greater growth opportunities and those with higher default risk stocks. As a result, these stocks will be more likely to be affected by states of optimism. Hribar and McInnis (2012) analyze this relationship and incorporate forecast errors as an explanatory element. Their results indicate that errors absorb much of the influence of sentiment on the future stock returns because errors are intermediating variables in the cross-sectional patterns documented between sentiment and stock returns.

The effect of investor sentiment on stock recommendations has been analyzed by Hribar and McInnis (2012) who apply a correlation analysis and find no significant relationship between sentiment and

recommendations. Bagnoli *et al.* (2009), however, find that analysts tend to issue more optimistic recommendations when the recent or past investor sentiment is high. In addition, they try to identify the analysts who are more influenced by sentiment in their forecasts and show that these analysts issue less profitable recommendations.

Following this new stream of research, we analyze the relationship between investor sentiment and consensus recommendations in four key European markets. We also study if this relationship is homogeneous across stocks or whether it depends on characteristics of the stocks related to the difficulty of valuation or arbitrage. Finally, we test whether this connection affects the value of strategies based on analysts' consensus recommendations.

2.2. *Main results*

Investor sentiment and analysts' consensus recommendations

To analyze the effect of sentiment on analysts' recommendations, we test the explanatory power of this variable on several portfolios based on the four characteristics discussed earlier. We classify stocks into quintiles according to stock characteristics. As we stated before, stocks are sorted each month by each characteristic and, then, the analysts' consensus recommendations are grouped into quintiles and the average consensus is obtained for the following month. Taking into consideration the extreme quintiles (q_1= first quintile and q_5 = fifth quintile) for the four countries studied (i = FR, GE, SP and UK) and according to the stock characteristics (j = BTM, SIZ, VOL and DIV), the system of equations to be estimated takes the following form:

$$C_{q,t}^{T^{i,j}} = \alpha_q^{i,j} + \beta_q^{i,j} SentG_{t-1}^{*} + \gamma_q^{i,j} Skew_t^{\perp} + u_{q,t}^{i,j}; q = q1 \; and \; q5 \qquad (14)$$

where $C_{q,t}^{T^{i,j}}$ is the transformed consensus recommendation associated with q in month t, for country i and characteristic j. The dependent variable is calculated considering the two alternatives including (A) and not including (B) the "hold" recommendation as a negative recommendation. The independent variables are global sentiment (SentG*), alternatively measured as raw sentiment (SentG) and orthogonal sentiment (SentG$^{\perp}$),

and a variable proxy of the skewness in the analysts' recommendations ($Skew^{\perp}$), following Gu and Wu (2003). $Skew^{\perp}$ is the residual of the following equation:

$$Skew_t = \lambda_q^{i,j} + \phi_q^{i,j} SentG_{t-1}^{*} + \varepsilon_t^{i,j} \quad (15)$$

Finally, an AR(1) model is applied to correct for serial correlation. The system is estimated via GMM to address possible problems of endogeneity[24]. The estimated coefficients are robust to general forms of heteroscedasticity and autocorrelation.

The Effect of Investor Sentiment on Analysts' Optimism

Table X shows the results of the effect of investor sentiment in more detail, analyzing the four characteristics associated with the sensitivity of stocks to investor sentiment: size, volatility, BTM and dividends. In particular, we analyze the effect of investor sentiment on the two extreme quintiles of each of these characteristics. The first result, in line with our previous results, is that sentiment has a positive and significant effect on consensus recommendations, that is, ceteris paribus, the greater the sentiment, the more positive the recommendation. This effect is significantly higher for HSS stocks.

Analysis by individual stock characteristics allows to offer a more detailed picture. In particular, when using stock size, smaller stocks show a greater effect of sentiment than larger ones. This effect is significant for all countries. The analysis of volatility indicates the greater effect of sentiment in the most volatile stocks while the UK, using global sentiment, and Spain, using orthogonal sentiment, do not yield significant results. The results with respect to book-to-market ratio show higher in assets with greater book-to-market, with the exception of France for which the differences are not significant. Finally, the results using dividend per share show that stocks with a lower dividend per share present a greater impact of sentiment than stocks with a higher dividend per share. Therefore, two important conclusions can be

24. We find endogeneity problems because independent variables are correlated with the residuals of the regression. The instrumental variables used are 3 lags for each of the explanatory variables (the p-value of the test of Hansen of over identifying instruments ranges between 0.30-0.50).

drawn from these results. The first is that the level of general optimism, proxied by global sentiment, has a significant influence on analysts' consensus recommendations. Analysts are not able to isolate themselves from the general sentiment of optimism, despite the great importance of their role in financial markets. The second important conclusion is that the influence of investor sentiment on consensus recommendations is greater in stocks whose characteristics make them harder to value or to arbitrage (HSS). This indicates that the influence of investor sentiment on the prices of stocks (see Baker and Wurgler, 2006) may be transferred to analysts' estimations and, in this way, generates a significant bias in the level of consensus recommendations.

Value of analysts' consensus recommendations: the role of sentiment

Empirical evidence has shown that it is possible to implement profitable strategies based on consensus recommendations (see Jegadeesh *et al.*, 2004; Jegadeesh and Kim, 2006; and Balboa *et al.*, 2008 and 2009[25]). Recently, Bagnoli *et al.* (2009) incorporate the role of investor sentiment and show that recommendations that are more correlated with investor sentiment are less profitable, so analysts who wish to maximize the value of their recommendations should pay attention to fundamentals such as benefits, cash flows or discount rates. We study the effect of investor sentiment on several portfolios of recommendations during the month following their issuance.

Table XI presents the ranking of the results of the risk-adjusted returns from several strategies: the benchmark portfolio, the short position in all stocks with a negative recommendation, the short position in HSS stocks with a negative recommendation, as well as the maximum sentiment exposure and negative skewed portfolios. The results are very revealing. These last portfolios are ranked in the first positions when the second criterion is used. The negative skewed portfolio occupies leading positions

25. Balboa *et al.* (2009) adjust the recommendation bias for each of the countries they analyze. Their adjustment takes into account the differences across countries as well as the variations in time to correct for the changes in bias over time within countries. In this chapter, we do not include this adjustment because investor sentiment has effects not only according to the country but also because of stock characteristics (see Corredor *et al.*, 2011). In fact, this procedure may eliminate part of the impact of sentiment on consensus recommendations, the study of which is the main objective of this chapter.

in the first criterion. Indeed, it is the best strategy in two countries: France and the United Kingdom. However, the most notable result is that the benchmark portfolio occupies between 8th and 10th place and the short position in all stocks with negative recommendations is ranked last in all of the markets analyzed. This suggests that it is important to take into account the effect of investor sentiment on the value of analysts' consensus recommendations. Note that a very important part of the explanation of the return of portfolios which take into account the effect of investor sentiment on the recommendations is linked to the performance of one specific portfolio: the HSS stocks with a negative recommendation. In fact, this strategy is ranked in second place in France and in third place in the UK. Perhaps when investor sentiment is very high, the prices of HSS stocks are far from their fundamentals and, therefore, they have a high probability of short-term reversion.

2.3. Conclusions

In this study, we analyze analysts' consensus recommendations in four key European markets, France, Germany, Spain and the United Kingdom, and show that analysts have a bias towards the issuance of more favourable recommendations. We have also found evidence of a bias in analysts' coverage towards stocks that are large, not very volatile, have a low BTM and yield high dividends.

In addition to these aspects, widely described in the literature, we find that the level of general optimism, proxied by market sentiment, has a significant influence on analysts' consensus recommendations. Therefore, the first conclusion is that analysts are not able to isolate themselves from the general sentiment of optimism, despite the great importance of their role in financial markets. The second important conclusion is that the influence of investor sentiment on the consensus recommendations is greater in stocks whose characteristics make them harder to value or to arbitrage (HSS). This indicates that the influence of investor sentiment on the prices of stocks (see Baker and Wurgler, 2006) may be transferred to analysts' estimations and, in this way, generates a significant bias in the level of consensus recommendations.

This influence has important consequences for the value of consensus recommendations issued. We find that the consideration of investor sentiment offers strategies that yield higher risk-adjusted returns than those obtained in portfolios based on all of the recommendations. In particular, the strategy that takes the long position in LSS stocks with a positive recommendation and the short position in HSS stocks with a negative recommendation or, even, the strategy that takes the long and short positions in HSS stocks with positive and negative recommendations, respectively, offers risk-adjusted returns that exceed the benchmark strategy (long position in all stocks with a positive recommendation and short position in all stocks with a negative recommendation). The simple strategy of taking the short position in HSS stocks with a negative recommendation is, per se, one of the strategies that occupies leading positions among all of the strategies analyzed. Perhaps, when investor sentiment is very high, prices of HSS stocks are far from their fundamentals and, therefore, they have a high probability of short-term reversion.

PART 3. INVESTOR SENTIMENT AND THE DYNAMIC BETWEEN THE SPOT AND DERIVATIVES MARKETS

1. Chapter 5. Does Investor Sentiment Affect Volatility Dynamics Between Spot and Futures Markets?

1.1. Motivation

If interest rates and dividend yields were non-stochastic, in a perfectly frictionless world, price movements in the spot and futures markets would be contemporaneously perfectly correlated and non-cross autocorrelated (Chan, 1992). Relationship between price movements in the futures index and underlying spot markets should be instantaneous, because they are both driven by the same market information and both reflect the aggregate value of the underlying shares. Thus, in efficient market conditions, it would make no difference to trade in one market or the other. Under certain market conditions (liquidity, transaction costs, investor typology), however, one market may assimilate new information more quickly than the other, thereby affecting volatility spillovers.

Classical finance theory neglects the role of investor sentiment (Gomes *et al.*, 2003) assuming investors to be rational. Even if some investors are not rational, arbitrageurs can exploit their irrational behaviour, thus causing prices to reflect future discount cash flows. The behavioral finance literature suggests, however, that investor sentiment, defined as investors' opinions regarding future cash flows and investment risk (Chang *et al.*, 2012), affects trading decisions. The influence of investors' future expectations may result in mispricing that will affect pricing models. To the best of our knowledge, however, there is no research examining the effect of sentiment on the interaction between the spot and futures markets. The key question is whether it is reasonable to expect the level of investor sentiment to affect the joint dynamics of these two markets.

A possible argument to support such an idea is variation in the mix of traders who are active when market sentiment is high. For example, noise traders tend to trade more when markets are bullish than when they are bearish (Baker and Stein, 2004). Barber and Odean (2008) argue that individual traders are more prone to cognitive biases and Kumar (2009) finds empirical evidence to support this, especially in assets that are hard to value and during periods of higher market-level uncertainty. This noise trader risk pushes asset prices away from equilibrium (Barberis *et al.*, 1998 or De Long *et al.*, 1990) and makes institutional traders less inclined to engage in arbitrage trading. They may also prefer less exposure in the equity market in the knowledge that this kind of assets, especially those that are hard to value or present limited arbitrage opportunities, are over-priced and will tend towards medium- to long-term reversion (see Baker and Wurgler, 2006). Institutional trading will not affect spot and futures markets to the same degree, however. In fact, De Long *et al.* (1990) report a higher percentage of this type of trader in markets dealing in complex assets, such as the futures market. Kavussanos *et al.* (2008) argue that the futures market is less prone to noise trader risk, and Bohl *et al.* (2011) find futures markets to be dominated by institutional investors, who are assumed to be informed or rational. Thus, these sophisticated traders, who are knowledgeable both about the latent state of market sentiment and the subsequent effects of sentiment on future returns, may reduce their arbitrage activity and their exposure in equity markets, and thus provoke a stronger effect in futures markets than in spot markets.

During periods of market optimism, the combination of an increase in noise trading and a lull in sophisticated trading could reduce the price correlation of these two markets within the no-arbitrage band, by lowering the pressure for price movements within that band. To this, we must add the fact that a decline in trading volume, brought about by the withdrawal of institutional traders, will also reduce the correlation, given that trading volume and correlation between these two markets are directly related (see Stoll and Whaley, 1990 and Chan, 1992). Bohl *et al.* (2011) also report this relationship, adding that correlation between derivatives and spot markets will increase with the volume of trading by institutional investors.

According to the noise trading hypothesis, order flow is less informative when investors are optimistic. Daniel *et al.* (1998) assume that investors are overconfident about their private information. If investors are also affected by self-attribution bias, they will react asymmetrically to confirming versus disconfirming pieces of news and become even more over confident after receiving confirming news. Self-attribution bias leads investors to under react to the release of public information. The conservatism bias hypothesis states that investors do not fully adjust their priors to the arrival of new information (Barberis *et al.*, 1998). During periods of high investor sentiment, these biases will make investors in general, and noise traders in particular, less alert to information coming from their own market, thus reducing the impact of volatility shocks. By the same token, they will also pay attention to information coming from the other market. Furthermore, noise traders' reaction to bad news that contradicts their prior beliefs will have less impact on price formation. This means that, during periods of high investor sentiment, the reaction to information from either market will be less asymmetric.

1.2. Main results

Impact of investor sentiment on the correlation between the spot and futures markets

The estimates are shown in table XII. Given that the model permits the correlation to vary as a function of market sentiment, we need to examine the parameter that is associated with this change (γ_1). The results showed in Panel A reveal that, when investor sentiment is high, correlation decreases in all the market analyzed. This decrease is significant at the 1% level in all cases. This finding appears to support the hypothesis that, when sentiment is high, noise traders are more active than at other times, while institutional investors decrease their activity, thereby reducing the proportion of institutional investors in the market and allowing prices independently to deviate further from their fundamentals.

Effects of investor sentiment on the volatility of its own market

The estimates from Model 2 are given in Panel B. Observation of the coefficients associated to the influence of sentiment on information (α_6

for the spot market and β_6 for the futures market), shows that they are in most cases negative and significant. The negative sign tells us that, during periods of high investor sentiment, information reaching the market has a lower impact on prices, consistent with over-confidence and self-attribution among uninformed investors, and thus less impact on volatility. These arguments are confirmed by the results for both types of market, especially those for the futures markets.

The data on the effect of sentiment on volatility asymmetry in the presence of negative news originating in its own market are given in Panel C. The coefficients on the variable used to capture the effect of sentiment on volatility asymmetry (α_8 and β_8) are less affected. In fact, only two of the six indexes analyzed (EuroStoxx60 and S&P500) show a significant decrease in volatility asymmetry in the presence of negative shocks in both the spot and the futures markets. None of the other indexes shows significant effects of any kind.

This set of results, as stated, suggests that when investor sentiment is high, news plays a somewhat less important role in price setting driven by the biases of noise traders, whose percentage presence at such times is higher than when investor sentiment is low. This less prominent role is particularly noticeable in the effect of news on volatility. The asymmetric effect on volatility is less pronounced, since major negative shocks can shake sophisticated traders into action or even persuade noise traders to reassess their own a priori information.

Effects of investor sentiment on volatility spillovers

The next step is to test the effect of sentiment on volatility spillovers. The estimates from Model 4 are shown in Panel D. Coefficients α_7 and β_7 capture the impact of sentiment on information coming from the other market. IAs can be seen, when sentiment is high, we find a generalized decrease in cross-market volatility spillovers. Thus, in all the markets analyzed, at least one of the coefficients is negative and significant[26], and in three of the six markets both coefficients are significant. This suggests that, in a given market, news from the other market is having

26. Except in the case of the CAC40 index, because, although the coefficient displays a negative sign, it is not significant.

even less impact than its own news. Panel E gives the coefficient estimates obtained from the estimation of Model 5. Coefficients α_9 and β_9 associated with the effect of sentiment on the transmission of negative shocks in the spot and futures markets, respectively, show negative signs, some of which are significant, on four of the indexes considered. The remaining coefficients are not statistically significant. The fact that news from the other market loses more of its impact than a market's own news may also explain why there is a greater decline in the asymmetric reaction to the former than there is to the latter. However, as noted earlier, the asymmetry effect has less impact; probably because major negative shocks will induce an increase in sophisticated trading aimed at arbitraging prices, which will strongly affect volatility.

1.3. Conclusions

This study is an attempt to establish a link between the published research on volatility dynamics literature and investor sentiment. Through its potential influence on investor behaviour, periods of high sentiment can have a significant impact on volatility dynamics. Noise traders, in particular, will show an increased presence in the market, while sophisticated investors, faced with higher arbitraging risk driven by the irrational behaviour of noise traders, and conscious of over-pricing, will reduce their activity until prices revert to their fundamental values. To explore this issue, we analyze spot and futures markets on stock market indexes in different countries: the S&P500 for the US, and a representative set of European indexes (CAC40, DAX30, FTSE100, IBEX35 and Eurostoxx50).

Consistent with expectations, during periods of high investor sentiment in all of the countries considered, trading volume drops significantly in both markets, although more notably in the futures market, where there is a stronger presence of institutional investors. This variation in the investor mix can have a major impact on the joint volatility dynamics between the two markets. In fact, the results show that the level of cross-market correlation decreases significantly in all the countries analyzed. This is due not only to the imbalance created by the activity of noise traders themselves but also to institutional investors slackening their arbitrage activity, unless prices deviate considerably from the

no-arbitrage bands. Consistent with the impact of overconfidence and self-attribution bias, which is stronger in individual investors and during periods of higher market-level uncertainty, prices take longer to adjust pending news announcements. In fact, shocks on volatility in either market have significantly less impact during periods of high sentiment. To a lesser degree, the same can be said of the asymmetric reaction of volatility to negative shocks, which, if very large, will cause a temporary increase in sophisticated trading aimed at arbitraging prices that fall outside the no-arbitrage bands.

These findings reveal that the joint dynamics of the spot and futures markets is strongly influenced by the diversity and mix of investors at any given moment and also by variables affecting trading behaviour, one being investor sentiment. The latter's usefulness in describing cross-market conditional correlation and the reaction of stock prices to news justifies examination of its role in the dynamics of these two markets.

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TABLES

Chapter 1

Table I. Regressions of the Fama-French portfolio returns

		BW						SENT EU					
		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)	+	1.60	0.08	1.89	0.07	1.82	0.05	-0.78	0.88	-0.45	0.77	-0.10	0.53
BTM (M-L)	+	1.50	0.01	1.64	0.02	1.38	0.02	-0.68	0.94	-0.46	0.87	-0.28	0.84
BTM (H-M)	-	0.05	0.64	0.26	0.77	0.43	0.84	-0.06	0.58	0.03	0.52	0.16	0.68
SIZ (S-B)	-	0.48	0.80	0.74	0.89	0.86	0.88	0.45	0.84	0.69	0.84	0.76	0.86
VOL (H-L)	-	-2.22	0.04	-2.17	0.04	-1.95	0.03	-0.51	0.28	-0.49	0.82	-0.50	0.27
DIV (H-L)	+	1.47	0.03	1.55	0.02	1.45	0.03	0.12	0.39	0.14	0.41	0.12	0.41
GERMANY	ES	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*
BTM (H-L)	+	1.86	0.14	2.50	0.09	2.83	0.05	0.58	0.25	0.70	0.23	0.80	0.17
BTM (M-L)	+	0.74	0.13	0.70	0.16	0.78	0.18	0.11	0.43	0.14	0.38	0.13	0.38
BTM (H-M)	-	1.29	0.89	1.68	0.93	2.03	0.98	0.44	0.88	0.55	0.87	0.65	0.94
SIZ (S-B)	-	-0.36	0.34	0.13	0.58	0.09	0.55	0.46	0.77	0.54	0.81	0.50	0.83
VOL (H-L)	-	-4.16	0.01	-4.27	0.01	-4.12	0.01	-1.13	0.14	-1.28	0.08	-1.05	0.10
DIV (H-L)	+	3.65	0.01	3.67	0.01	3.14	0.02	0.43	0.30	0.56	0.23	0.43	0.27
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	0.29	0.58	0.08	0.75	0.04	0.86	0.02	0.93	0.01	0.86	0.01
BTM (M-L)	+	0.27	0.19	0.41	0.15	0.56	0.07	0.10	0.36	0.24	0.23	0.37	0.13
BTM (H-M)	-	-0.06	0.54	0.19	0.69	0.22	0.71	0.77	0.99	0.68	0.98	0.50	0.95
SIZ (S-B)	-	0.12	0.59	0.35	0.73	0.54	0.83	0.73	0.90	0.77	0.92	0.68	0.90
VOL (H-L)	-	-1.05	0.08	-1.24	0.03	-1.15	0.06	0.12	0.56	-0.01	0.53	-0.08	0.58
DIV (H-L)	+	1.78	0.01	1.59	0.03	1.21	0.06	0.19	0.38	0.19	0.37	0.07	0.43
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	0.03	2.49	0.02	2.41	0.01	0.50	0.18	0.61	0.15	0.55	0.15
BTM (M-L)	+	1.81	0.03	1.88	0.02	1.88	0.01	0.42	0.17	0.52	0.13	0.53	0.10
BTM (H-M)	-	0.42	0.92	0.58	0.96	0.54	0.93	0.03	0.56	0.03	0.58	0.01	0.55
SIZ (S-B)	-	-1.70	0.00	-1.37	0.03	-1.21	0.04	-0.73	0.08	-0.57	0.13	-0.49	0.15
VOL (H-L)	-	-4.26	0.00	-4.19	0.00	-3.69	0.00	-1.44	0.06	-1.53	0.05	-1.37	0.05
DIV (H-L)	+	3.28	0.00	3.20	0.00	2.99	0.00	0.96	0.08	0.97	0.07	0.95	0.06

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. We use a block bootstrap method to compute the simulated p-value for the null hypothesis that the coefficient has the expected sign. The macroeconomic variables included are the industrial output index, durable goods consumption, consumer goods consumption and the unemployment index.

Table II. Regressions for the four countries jointly

Panel A. Global Portfolios

		BW		SENT EU	
		12M		12M	
	ES	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	2.09	0.05	0.45	0.14
BTM (M-L)	+	1.58	0.05	0.26	0.22
BTM (H-M)	-	0.50	0.92	0.20	0.93
SIZ (S-B)	-	0.10	0.62	0.00	0.51
VOL (H-L)	-	-3.54	0.01	-0.75	0.09
DIV (H-L)	+	2.22	0.04	0.60	0.10

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

		BW		SENT EU	
		12M		12M	
	ES	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	1.67	0.07	0.43	0.14
BTM (M-L)	+	1.16	0.07	0.20	0.29
BTM (H-M)	-	0.52	0.93	0.24	0.96
SIZ (S-B)	-	0.06	0.61	0.13	0.72
VOL (H-L)	-	-2.93	0.01	-0.55	0.14
DIV (H-L)	+	2.17	0.02	0.31	0.23

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

		BW		SENT EU	
		12M		12M	
	ES	Coef.	p-value	Coef.	p-value
BTM (H-L)	+	2.01	0.08	0.37	0.24
BTM (M-L)	+	1.27	0.10	0.20	0.31
BTM (H-M)	-	0.63	0.93	0.20	0.85
SIZ (S-B)	-	-0.04	0.50	0.20	0.87
VOL (H-L)	-	-3.31	0.02	-0.70	0.15
DIV (H-L)	+	2.45	0.03	0.55	0.18

Regression of the stock characteristic portfolios for the four countries jointly, using the orthogonalized sentiment index as the independent variable. P-values are computed by means of a block-bootstrap procedure. 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 III. 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				
p-value	*FR*	*GE*	*SP*	*UK*
FR	1.00			
GE	0.00	1.00		
SP	0.00	0.00	1.00	
UK	0.00	0.00	0.00	1.00

VOL				
p-value	*FR*	*GE*	*SP*	*UK*
FR	1.00			
GE	0.00	1.00		
SP	0.00	0.28	1.00	
UK	0.00	0.02	0.00	1.00

SIZ				
p-value	*FR*	*GE*	*SP*	*UK*
FR	1.00			
GE	0.83	1.00		
SP	0.00	0.00	1.00	
UK	0.00	0.00	0.00	1.00

DIV				
p-value	*FR*	*GE*	*SP*	*UK*
FR	1.00			
GE	0.00	1.00		
SP	0.00	0.00	1.00	
UK	0.00	0.00	0.00	1.00

Panel A shows the time-series average coefficients of variation for 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 IV. Results of the tests of cross-country differences in the coefficients of the impact of investor sentiment on the various portfolio returns

		BW		SENT EU			BW		SENT EU	
	ES	12M		12M		ES	12M		12M	
	BTM (H-L)					VOL (H-L)				
		Coef.	*p-value*	*Coef.*	*p-value*		*Coef.*	*p-value*	*Coef.*	*p-value*
GE-FR	+	0.45	0.37	1.14	0.16	-	2.10	0.86	0.78	0.72
GE-UK	+	-0.16	0.51	0.08	0.52	-	2.02	0.91	1.04	0.79
GE-SP	+	1.31	0.16	-1.38	0.60	-	-0.93	0.21	-0.48	0.33
FR-UK	+	-0.61	0.66	-1.06	0.90	-	-0.08	0.47	0.26	0.59
FR-SP	+	1.31	0.10	-1.38	0.98	-	-0.93	0.05	-0.48	0.12
UK-SP	+	1.91	0.05	-0.32	0.68	-	-2.95	0.01	-1.52	0.08
	SIZ (S-B)					DPS (H-L)				
		Coef.	*p-value*	*Coef.*	*p-value*		*Coef.*	*p-value*	*Coef.*	*p-value*
UK-FR	-	-2.11	0.02	-1.25	0.08	+	-2.12	0.94	-0.42	0.66
UK-GE	-	-1.50	0.09	-1.10	0.08	+	-1.65	0.93	-0.83	0.69
UK-SP	-	-1.72	0.03	-1.33	0.04	+	-0.04	0.53	-0.05	0.52
GE-FR	-	-0.62	0.27	-0.15	0.43	+	0.47	0.34	-0.41	0.67
GE-SP	-	-0.23	0.43	-0.23	0.39	+	2.08	0.06	0.37	0.35
FR-SP	-	0.39	0.69	-0.08	0.47	+	1.61	0.07	0.78	0.19

Results of the tests of differences between countries with respect to their estimated coefficients of investor sentiment for the 12-month stock characteristic portfolios (book-to-market ratio (BTM), size (SIZ), volatility (VOL) and dividends (DIV)). The time-series bootstrap coefficient estimates from model 6 are resampled 10,000 times to compute the simulated p-value for the null hypothesis that Ho: A - B > 0 if expected sign (ES) is positive and Ho: A - B < 0 if it is negative (A,B = FR,GE, SP and UK).

Chapter 2

Table V. Regressions of the portfolio returns. 1993-2007

		SENTSP						SENTSP$^{\perp}$					
		6M		12M		24M		6M		12M		24M	
	ES	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*
BTM (H-L)	+	0,71	0,05	0,62	0,06	0,57	0,08	0,71	0,05	0,62	0,07	0,55	0,12
BTM (M-L)	+	0,56	0,07	0,55	0,10	0,56	0,06	0,58	0,12	0,57	0,16	0,57	0,10
BTM (H-L)	-	0,16	0,66	0,08	0,82	0,02	0,96	0,13	0,71	0,05	0,89	-0,02	0,96
SIZE (S-B)	-	-0,10	0,89	-0,11	0,88	-0,30	0,68	-0,18	0,79	-0,18	0,78	-0,36	0,58
VOL (H-L)	-	-1,35	0,03	-1,36	0,04	-1,23	0,07	-1,37	0,02	-1,39	0,03	-1,26	0,05
DPS (H-L)	-	-1,71	0,01	-1,67	0,01	-1,54	0,01	-1,75	0,01	-1,71	0,01	-1,58	0,01

Results of the regressions of the portfolios constructed according to the calendar time approach used by Jegadeesh and Titman (2001) for a 6-, 12- and 24-month time horizon. The portfolios are based on the book-to-market ratio (BTM), size (SIZE), volatility (VOL) and dividends (DPS), High (H)/large (L) indicate quintile five stocks and low (L)/small (S) quintile one stocks, Medium (M) groups stocks from quintile three. The sentiment index is constructed by means of a principal components analysis of five individual sentiment indicators. The macroeconomic variables included are the industrial output index, the consumption of durable and consumer goods and the unemployment index. The SENTSP$^{\perp}$ index has the same component factors as above except that its component indicators are orthogonalized to the macroeconomic variables. Newey and West (1987) standard errors are used to compute t-statistics. Coefficients multiplied by 100.

Table VI. The effect of global and local sentiment on portfolio returns. 1993-2007

Panel A. Effect of global and local sentiment, both orthogonalized to the macroeconomic variables

		GLOBAL$^{\perp}$						RESSENTSP$^{\perp}$					
		6M		12M		24M		6M		12M		24M	
	ES	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*
BTM (H-L)	+	0,24	0,33	0,32	0,19	0,31	0,18	0,27	0,27	0,18	0,46	0,13	0,61
BTM (M-L)	+	0,36	0,14	0,41	0,12	0,37	0,11	0,06	0,82	0,01	0,96	0,11	0,65
BTM (H-L)	-	-0,12	0,57	-0,09	0,67	-0,06	0,79	0,21	0,30	0,17	0,37	0,03	0,89
SIZE (S-B)	-	-0,30	0,43	-0,26	0,50	-0,28	0,48	0,07	0,85	0,05	0,88	-0,06	0,87
VOL (H-L)	-	-1,06	0,01	-1,11	0,01	-0,99	0,01	-0,61	0,12	-0,62	0,10	-0,67	0,05
DPS (H-L)	-	-1,19	0,01	-1,16	0,02	-1,06	0,02	-0,63	0,09	-0,61	0,10	-0,57	0,10

Panel B. Effect of global and local sentiment, both orthogonalized to the macroeconomic variables, after controlling for the Fama-French (1993) risk factors and the momentum factor

		GLOBAL$^{\perp}$						RESSENTSP$^{\perp}$					
		6M		12M		24M		6M		12M		24M	
	ES	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*
BTM (H-L)	+	0,45	0,11	0,48	0,08	0,41	0,10	0,03	0,93	-0,05	0,86	-0,03	0,92
BTM (M-L)	+	0,32	0,24	0,33	0,26	0,26	0,31	-0,08	0,78	-0,13	0,65	-0,03	0,91
BTM (H-L)	-	0,12	0,60	0,14	0,54	0,15	0,51	0,11	0,61	0,08	0,72	0,00	1,00
SIZE (S-B)	-	0,14	0,70	0,15	0,68	0,12	0,75	0,09	0,83	0,07	0,85	-0,02	0,97
VOL (H-L)	-	-0,52	0,10	-0,56	0,05	-0,45	0,08	-0,58	0,03	-0,50	0,03	-0,51	0,01
DPS (H-L)	-	-0,68	0,07	-0,64	0,09	-0,54	0,13	-0,53	0,04	-0,49	0,05	-0,43	0,07

Results of the regressions of the portfolios constructed according to the calendar time approach used by Jegadeesh and Titman (2001) at horizons of 6, 12 and 24 months. The portfolios are based on the book-to-market ratio (BTM), size (SIZE), volatility (VOL) and dividends (DPS). High (H)/large (L) indicate stocks in quintile five and low (L)/small (S) quintile one stocks, Medium (M) indicates stocks in quintile three. The GLOBAL$^{\perp}$ sentiment index is constructed from the common components of the Baker and Wurgler (2006) sentiment index and that of four European countries. RESSENTSP$^{\perp}$ is the residual obtained from orthogonalizing the Spanish sentiment index to the GLOBAL index. Both indexes are constructed orthogonal to the macroeconomic variables (the industrial output index, the consumption of durable and consumer goods and the unemployment index). The column headed SE shows the expected sign of the relationship. The analyses includes the common risk factors: RMRF, SMB, HML and WML. SMB (HML) is not included as a control variable when SMB (BTM) is the dependent variable. Newey and West (1987) standard errors are used to compute t-statistics. Coefficients multiplied by 100.

Table VII. Investor sentiment contagion. 1993-2007

	SENTSP$^{\perp}$		BW07$^{\perp}$		FC		FC*BW07$^{\perp}$	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
BTM (H-L)	0,17	0,47	0,67	0,08	-1,31	0,13	0,34	0,36
BTM (M-L)	0,01	0,98	1,02	0,00	-1,74	0,00	0,34	0,23
BTM (H-L)	0,16	0,39	-0,35	0,18	0,44	0,24	0,01	0,98
SIZE (S-B)	0,01	0,97	0,04	0,91	-0,47	0,50	0,39	0,32
VOL (H-L)	-0,68	0,03	-1,58	0,00	1,98	0,00	0,21	0,78
DPS (H-L)	-0,64	0,05	-1,62	0,00	1,95	0,00	-0,13	0,81

Results of the regression of the sentiment effect and capital flows on returns. BW$^{\perp}$ is the orthogonal sentiment index created by Baker and Wurgler (2007) for the US market and FC is the flow of capital invested in the Spanish stock market by US investors. This is calculated from the standardized cash flows in absolute values normalized by market value. Newey and West (1987) standard errors are used to compute t-statistics. Coefficients multiplied by 100.

Chapter 3

Table VIII. Effect of investor sentiment on analysts' earnings forecast errors

	SIZE					VOL				
	1Q		5Q		DIFF	1Q		5Q		DIFF
	Coef.	*p-value*	*Coef.*	*p-value*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*p-value*
FR	0.243	0.209	-0.001	0.952	0.230	-0.026	0.048	-0.153	0.000	0.049
GE	-0.759	0.168	-0.189	0.013	0.600	-0.041	0.070	-0.549	0.013	0.049
SP	-0.044	0.304	-0.006	0.222	0.523	-0.013	0.036	-0.220	0.001	0.001
UK	-0.122	0.000	-0.034	0.001	0.000	-0.017	0.006	-0.074	0.000	0.081
	BTM					DPS				
	1Q		5Q		DIFF	1Q		5Q		DIFF
	Coef.	*p-value*	*Coef.*	*p-value*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*p-value*
FR	-0.043	0.507	-0.012	0.850	0.632	0.009	0.856	-0.017	0.236	0.264
GE	-0.313	0.000	-0.147	0.244	0.301	-0.432	0.132	-0.044	0.143	0.246
SP	-0.020	0.351	0.001	0.967	0.557	-0.122	0.035	-0.008	0.445	0.134
UK	-0.017	0.440	-0.043	0.207	0.516	-0.118	0.004	-0.055	0.001	0.058

This table shows the results for stocks grouped into quintiles by size (SIZ), volatility (VOL), BTM ratio (BTM) and dividend per share (DPS). 1Q (5Q) is the portfolio of stocks belonging to the first (fifth) quintile. DIFF shows the p-value of the test for the difference between the beta coefficient of the sentiment variable for two extreme quintiles for each stock characteristic. AR (1) model is applied to correct for serial correlation. OLS estimation is used with the Newey-West (1987) standard errors. Results are shown for each market analysed: France (FR), Germany (GE), Spain (SP) and the United Kingdom (UK).

Table IX. Selection bias and investor sentiment

	FR	GE	SP	UK
R^U	0.2640	0.2736	0.2229	0.2252
R^D	-0.0623	0.1580	0.1359	-0.7581
R^U-R^D	0.3263	0.1156	0.0870	0.9833
p-value	0.07	0.92	0.00	0.07
T^U5Q	0.1725	0.1549	1.2222	0.7002
p-value	0.91	0.78	0.08	0.09
T^D5Q	0.0847	0.0627	-0.2406	0.0099
p-value	0.69	0.92	0.52	1.00
T^U1Q	0.09751	-0.04045	1.21465	-0.42504
p-value	0.76	0.91	0.99	0.13
T^D1Q	0.01466	0.32623	-0.03573	-0.10429
p-value	0.70	0.81	0.54	0.85

Results of the Selection Bias Test and the Modified Selection Bias Test in High Sentiment Periods. Each quarter stocks are sorted by their volatility and grouped into quintiles. Then we calculate the percentage of quarters that each stock appears in each of the extreme quintiles, the first and fifth. Finally, the stocks selected as more volatile (less volatile) will be those that, for more than 60% of the quarters, appear in the fifth quintile (first quintile) and for less than 10% of the quarters in the first quintile (fifth quintile). The number of upward and downward EPS revisions is obtained from the FactSet database and we compute the number of revisions issued by the analysts following a firm during the last month of the quarter. The proxy for news is the unexpected stock return (20% extreme). We define news as the unexpected component of returns, $u_t = r_t - \rho_t$, where r_t is the return on a stock from t - 1 to t and ρ_t, is defined as $E(r_t|\Phi_{t-1})$, where Φ_t is the information set at time t. R^U (R^D) is the ratio between the number of upward EPS revisions (the number of EPS downward revisions) and the number of pieces of positive (negative) news on a quarterly basis, R^U-R^D is the result of the Traditional Selection Bias test. $T^U = E(R^U / HS) - E(R^U)$ and $T^D = E(R^D / HS) - E(R^D)$ are the Modified Selection Bias Tests in High Sentiment Periods computed as the differences between the results of the expected R^U and R^D ratios conditional on high level sentiment (HS) to their respective unconditional ratios.

Chapter 4

Table X. Effect of investor sentiment on analysts' consensus recommendations by stock characteristics. 1994-2007

	SentG					$SentG^{\perp}$				
	Q1		*Q5*		*Wald*	*Q1*		*Q5*		*Wald*
	Coef.	*p-value*	*Coef.*	*p-value*	*p-value*	*Coef.*	*p-value*	*Coef.*	*p-value*	*p-value*
Size										
FR	2.73	0.00	0.34	0.15	0.00	2.13	0.00	0.53	0.04	0.00
GE	-1.79	0.00	1.10	0.01	0.00	-0.45	0.41	0.85	0.01	0.04
SP	7.90	0.00	2.45	0.00	0.00	7.03	0.00	2.92	0.00	0.00
UK	1.34	0.00	0.54	0.10	0.05	1.19	0.00	0.66	0.09	0.28
Volatility										
FR	1.49	0.00	5.72	0.00	0.00	2.02	0.00	4.68	0.00	0.00
GE	-0.59	0.05	4.54	0.00	0.00	-0.78	0.01	4.95	0.00	0.00
SP	4.51	0.00	6.10	0.00	0.10	4.93	0.00	5.96	0.00	0.29
UK	1.53	0.00	2.41	0.00	0.13	0.91	0.05	2.39	0.00	0.03
Book to market										
FR	0.25	0.44	-0.11	0.79	0.46	0.43	0.25	0.14	0.72	0.56
GE	0.05	0.85	1.51	0.00	0.03	-0.10	0.76	1.08	0.02	0.05
SP	5.66	0.00	7.44	0.00	0.05	5.70	0.00	7.90	0.00	0.00
UK	1.42	0.00	4.14	0.00	0.00	1.22	0.00	3.77	0.00	0.00
Dividend per share ratio										
FR	3.54	0.00	-0.23	0.34	0.00	3.38	0.00	0.17	0.46	0.00
GE	5.91	0.00	-0.80	0.01	0.00	5.62	0.00	-0.87	0.02	0.00
SP	8.73	0.00	4.80	0.00	0.00	8.57	0.00	4.69	0.00	0.00
UK	1.78	0.00	0.93	0.00	0.01	1.66	0.00	1.27	0.00	0.25

France (FR), Germany (GE), Spain (SP) and United Kingdom (UK). Effect of investor sentiment on analysts' consensus recommendations by stock characteristics. Stocks are sorted into quintiles according to their characteristics of size (SIZ), volatility (VOL), book to market ratio (BTM) and dividend per share ratio (DPS). This table shows the extreme quintiles q_1 and q_5. Analysts' consensus recommendations $C_{i,m}$ is calculated as the weighted average of the recommendations issued and transformed into a dichotomous variable 0,1. The global sentiment index, SentG, is a composite index that captures the common component in SentUS and SentEU and can alternatively be measured without removing the effect of macroeconomic variables (SentG) or orthogonal to this information ($SentG^{\perp}$). The skewness coefficient is orthogonal to global

sentiment ($Skew^{\perp}$). The macroeconomic variables considered are the index of industrial production, consumption of durable and non-durable goods and the rate of unemployment. AR(1) is applied to correct for serial correlation. The system is estimated via GMM. The p-value reflects the significance level of the Wald test for the null hypothesis of the equality of the coefficients of both the HSS and LSS portfolios. $C^{T}_{i,m} = 1$ if $C_{i,m} > 3$ and $C^{T}_{i,m} = 0$ if $C_{i,m} \leq 3$. The coefficients are multiplied by 100.

Table XI. Ranking of portfolios with different exposure to investor sentiment. 1994-2007

	France		Germany		Spain		United Kingdom	
	R	Rank	R	Rank	R	Rank	R	Rank
Benchmark	1.64	8	1.45	9	0.33	9	0.57	10
Short all Negative Recommendations	1.14	11	0.99	11	0.25	11	0.45	11
Short HSS with Neg Rec (First Crit)	2.48	2	1.85	8	0.28	10	1.31	3
Short HSS with Neg Rec (Sec. Crit)	1.46	10	1.36	10	0.49	7	0.77	8
Short HSS with Neg Rec (Third Crit)	1.69	7	2.42	5	0.52	6	1.59	2
Max Sent. Exp.(First Crit)	2.12	4	2.62	4	0.38	8	0.70	9
Negative Skew.(First Crit)	3.12	1	2.63	3	0.60	5	1.62	1
Max Sent. Exp.(Sec. Crit)	2.11	5	2.07	6	0.65	3	1.02	5
Negative Skew. (Sec. Crit)	2.03	6	1.90	7	0.60	4	0.80	7
Max Sent. Exp. (Third Crit)	1.55	9	3.96	1	0.81	2	1.14	4
Negative Skew.(Third Crit)	2.30	3	2.87	2	0.99	1	0.99	6

The returns (R) obtained are adjusted by Fama-French factors. Coefficients are multiplied by 100. These coefficients are obtained from Tables VII and VIII. “Short all Negative Recommendations” takes the short position in all stocks with a negative recommendation. “Short HSS with Neg Rec” takes the short position in HSS stocks with a negative recommendation according to the first, second or third criteria, respectively. The Maximum Sentiment exposure portfolio takes the long position in HSS stocks with a positive recommendation and the short position in HSS stocks with a negative recommendation, according to the first, second or third criteria, respectively. The Negative skewed portfolio takes the long position in LSS stocks with a positive recommendation and the short position in HSS stocks with a negative recommendation, according to the first, second or third criteria, respectively

Chapter 5

Table XII. Impact of investor sentiment. 2001-2011

Panel A Impact on the correlation between spot market and futures market Model 1

			EURSTOXX			
Variable	*CAC40*	*DAX30*	*50*	*FTSE100*	*IBEX35*	*S&P500*
γ_1	-0.005***	-0.007***	-0.010***	-0.011***	-0.004***	-0.003***

Panel B Effect on spot (futures) volatility Model 2

α_6	0.051***	-0.007	-0.039***	-0.009*	0.010	-0.010**
β_6	0.054***	-0.018***	-0.054***	-0.011**	0.005	-0.007*
γ_1	-0.0050.004** in the E***	-0.007***	-0.013***	-0.012***	-0.004***	-0.003***

Panel C Effect on asymmetries in spot (futures) volatility Model 3

α_8	-0.009	-0.005	-0.076***	0.011	0.010	-0.028***
β_8	-0.005	-0.015	-0.093***	0.009	0.006	-0.020**
γ_1	-0.005**	-0.007***	-0.012***	-0.011***	-0.004***	-0.003***

Panel D Impact on volatility spillovers Model 4

α_7	-0.005	-0.647***	-0.090	-0.362***	-1.268***	-0.158*
β_7	-0.066	-0.758***	-0.273**	-0.364***	-1.388***	-0.104
γ_1	-0.005***	-0.009***	-0.012***	-0.013***	-0.007***	-0.003***

Panel E Effect on asymmetries in spot (futures) volatility spillovers Model 5

α_9	-0.006	0.303**	0.084	-0.256***	-0.218**	-0.083*
β_9	-0.314***	-0.004	-0.018	-0.011**	-0.007	0.003
γ_1	-0.005***	-0.007***	-0.010***	-0.011***	-0.005***	-0.003***

$$R_{s,t,i} = A_{0,i} + A_{1,i}R_{s,t-1,i} + A_{2,i}\left(S_{t-1,i} - A_{3,i}F_{t-1,i}\right) + e_{s,t,i}$$

$$R_{f,t,i} = B_{0,i} + B_{1,i}R_{f,t-1,i} + B_{2,i}\left(S_{t-1,i} - A_{3,i}F_{t-1,i}\right) + e_{f,t,i}$$

$$\sigma^2_{s,t,i} = \alpha_{0,i} + \alpha_{1,i}e^2_{s,t-1,i} + \alpha_{2,i}\sigma^2_{s,t-1,i} + \alpha_{3,i}D_{s,t-1,i}e^2_{s,t-1,i} + \alpha_{4,i}\varepsilon^2_{f,t-1,i} + \alpha_{5,i}D^0_{f,t-1,i}\varepsilon^2_{f,t-1,i} + \alpha_{6,i}SENTe^2_{s,t-1} + \alpha_{7,i}SENT\varepsilon^2_{f,t-1} + \alpha_{8,i}D_{s,t-1}SENTe^2_{s,t-1} + \alpha_{9,i}D^0_{f,t-1}SENT\varepsilon^2_{f,t-1}$$

$$\sigma^2_{f,t,i} = \beta_{0,i} + \beta_{1,i}e^2_{f,t-1,i} + \beta_{2,i}\sigma^2_{f,t-1,i} + \beta_{3,i}D_{f,t-1,i}e^2_{f,t-1,i} + \beta_{4,i}\varepsilon^2_{s,t-1,i} + \beta_{5,i}D^0_{s,t-1,i}\varepsilon^2_{s,t-1,i} + \beta_{6,i}SENTe^2_{f,t-1} + \beta_{7,i}SENT\varepsilon^2_{s,t-1} + \beta_{8,i}D_{f,t-1}SENTe^2_{f,t-1} + \beta_{9,i}D^0_{s,t-1}SENT\varepsilon^2_{s,t-1}$$

$$\sigma_{sf,t,i} = \left(\gamma_{0,i} + \gamma_{1,i}SENT\right)\rho\sigma_{s,t,i}\sigma_{f,t,i}; i = 1,6$$

Model 1: model without including the dummy variable (SENT)

Model 2: $\alpha_{7,i} = \alpha_{8,i} = \alpha_{9,i} = 0$ and $\beta_{7,i} = \beta_{8,i} = \beta_{9,i} = 0$

Model 3: $\alpha_{6,i} = \alpha_{7,i} = \alpha_{9,i} = 0$ and $\beta_{6,i} = \beta_{7,i} = \beta_{9,i} = 0$

Model 4: $\alpha_{6,i} = \alpha_{8,i} = \alpha_{9,i} = 0$ and $\beta_{6,i} = \beta_{8,i} = \beta_{9,i} = 0$

Model 5: $\alpha_{6,i} = \alpha_{7,i} = \alpha_{8,i} = 0$ and $\beta_{6,i} = \beta_{7,i} = \beta_{8,i} = 0$

The dummy variable SENT has a value of 1 if sentiment is above the median level and 0 otherwise. We use the Sentix as the sentiment proxy for the European indices and AAII for the US index. ***, ** and *indicate 1%, 5%, and 10% levels of significance, respectively.

Diciembre 2016

La presente obra se adentra en el estudio del potencial efecto del sentimiento del inversor sobre la valoración de activos, su efecto en los pronósticos de beneficios y recomendaciones de los analistas y su impacto sobre los activos derivados. Abarca el efecto del sentimiento del inversor en cuatro de los mercados europeos más importantes, Alemania, España, Francia y Reino Unido, mercados con características diferentes, en cuanto a tamaño, tipología del inversor y funcionamiento, lo que permite extraer importantes conclusiones adicionales.

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