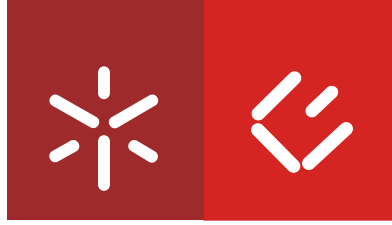


Universidade do Minho
Escola de Economia e Gestão

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Is investor sentiment a missing factor for the explanation of mutual fund performance?



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Master's Dissertation
Master in Finance

Work developed under supervision of
Manuel José da Rocha Armada

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

Será que o sentimento do investidor é um fator em falta para a explicação do desempenho dos fundos de investimento?

RESUMO

Este trabalho de investigação testa a inclusão da medida de sentimento do investidor AAll em modelos de finanças tradicionais, como o modelo de fator q-4 (Hou et al.,2015) e o modelo de 4 fatores de Carhart. Um dos principais objetivos consiste em avaliar se o sentimento do investidor pode representar uma das fontes do alfa dos fundos de investimento, que muitas vezes é visto como desempenho superior/inferior.

Ao nível individual/fundo, a inclusão do sentimento do investidor reduz a probabilidade de ocorrência do alfa (quer seja positivo ou negativo), atribuindo um papel para essa variável comportamental no desempenho individual dos fundos de investimento. Uma validação de robustez, usando o índice composto de sentimento do investidor de Baker & Wurgler (2006), confirma os resultados, sobretudo para explicar o desempenho positivo.

Ao nível das carteiras, os resultados mostram que o sentimento do investidor não é uma variável estatisticamente significativa para explicar as rendibilidades em excesso das carteiras vencedoras/perdedoras de fundos, com um nível de desempenho positivo ou negativo associado, o que evidencia que o sentimento não representa um fator de prémio de risco nos designados modelos tradicionais.

Em geral, o sentimento do investidor é um fator em falta a fim se de avaliar o desempenho dos fundos de investimento, uma vez que é uma das fontes do alfa. Por não ser considerado um fator de risco, também existe algo em falta nos modelos tradicionais de avaliação de ativos. As finanças comportamentais, ao considerar o sentimento do investidor, parecem ser resposta.

Palavras-chave: Desempenho dos fundos de investimento; Finanças Comportamentais; Sentimento do investidor.

Is investor sentiment a missing factor for the explanation of mutual fund performance?

ABSTRACT

This investigation tests the inclusion of the AAll investor sentiment measure into traditional finance models, such as: the q-4 factor model (Hou et al., 2015) and the Carhart 4-factor model. One of the main goals is to evaluate if the investor sentiment might be one of the sources of the mutual fund alphas, which is often seen as superior/inferior performance.

At the individual/fund level, the inclusion of investor sentiment reduces the probability of occurrence of alpha (whether positive or negative), showing that it plays a role in mutual fund individual performance. A robustness check, using the Baker & Wurgler (2006) investor sentiment composite index, seems to confirm the findings, at least to explain positive performance.

At the portfolio level, the results show that, investor sentiment, is not a statistically significant variable to explain winner/loser portfolios of funds' excess returns, with an associated positive or negative level of performance, which provides evidence of sentiment not representing a risk premium factor in the so-called traditional models.

Overall, investor sentiment is a missing factor in mutual fund performance since it is one of the sources of alpha. By not being considered as a risk factor, something is also missing in traditional asset pricing models. Behavioral finance, taking into account the investor sentiment, seems to be the answer.

Keywords: Mutual fund performance; Behavioral Finance; Investor sentiment.

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1. INTRODUCTION

Behavioral finance is a relatively recent field of research which introduces, among others, investor's emotions in the decision-making process. By challenging previous assumptions of rationality and efficiency, as stated in the so-called modern finance (Fama, 1970), this research area became highly relevant because it aims to produce more realistic results, taking into consideration the human being is far more complex than that is assumed in traditional finance models. In fact, investors suffer from multiple cognitive biases, which affect their decisions as far as investments are concerned (Baker & Nofsinger, 2002).

Generally speaking, considering the so-called traditional finance and behavioral finance, the motivation for this research area is obvious. It can, potentially, create synergies between financial economists, psychologists and even neuroscientists, at least to a better understanding of the functioning of the real financial market's world.

Investor sentiment comes as a relatively recent path to explain, for example, potential market anomalies, which arise from investors feelings and intuitions. When investors form expectations, as to future market movements, they tend to misinterpret the relevant information and incorporate their biased beliefs (Barberis et al., 1998; Alti & Tetlock, 2014).

For instance, the well documented representativeness heuristic in the literature (see Tversky & Kahneman, 1974), explains that people usually over extrapolate probability-based results, without previously making a careful analysis to know the possibility of their belief being right. As humans are, most of the time, guided by their intuitive system (Kahneman, 2011), at the extreme point, when executed jointly by many investors, this behavior can lead to market inefficiencies and mispricing, through overreactions or underreactions, affecting return outcomes.

Because many academics and professionals rely on traditional models to calculate mutual fund managers performance, one has to be particularly concerned about what the sources of alpha might represent. Effectively, these return outcomes are sometimes dubious, since economic cycle fluctuations can be influenced by market irrational behavior, which many believe it is not properly accounted for in traditional asset pricing models.

In such a contest does evidence of positive/negative alphas really represent abnormal performance when using traditional models? Or does sentiment play a role as a crucial variable to arbitrage-away those alphas? Indeed, sentiment might be a missing factor in traditional asset pricing models when estimating expected rates of return, for general equity market indexes, mutual funds, and

stocks with an associated level of performance. In accordance with this line of research, this research intends to study the impact of investor sentiment in mutual fund performance, and to provide evidence of the importance of sentiment in performance evaluation models. Concretely, the AAll survey index is used as a proxy for investment general mood and, then, for evaluating its effect on a sample of European mutual funds, that invest, most of their holdings, on the US stock market. So, the research question appears to be simple: Can investor sentiment play a role as to the European mutual fund performance?

Future implications might be important for both academics and practitioners. If sentiment turns out to have a significant explanatory power for mutual fund performance, then one more study, with particular characteristics, is emphasizing the importance of this behavioral variable in the finance theory. Regarding practitioners, mutual fund managers might gain additional control over their portfolio returns, either for hedging or even for speculative purposes, by knowing the evolution of sentiment over time. Therefore, it is extremely important to understand the impacts of aggregate human behavior to implement strategies of risk management in asset allocation.

This investigation starts with a discussion of the main literature findings in the field, followed by the methodology used along with the research hypothesis. Then, data sources and collection, as well as the empirical results are presented. Finally, a section containing the conclusions.

2. LITERATURE REVIEW

2.1 Brief history of traditional performance measurement

Many performance measures have been developed throughout the last decades with the purpose of evaluating portfolio managers' security analysis abilities.

Jensen (1968) proposed a well-known performance measure (alpha), by using the CAPM, to value a sample of mutual funds. Since then, more sophisticated asset pricing models were created, such as the Fama and French (1993), by adding a size factor and a book-to-market factor to the CAPM, the Carhart (1997) which adds the momentum factor and, more recently, Fama and French (2015), also including an investment factor and a profitability factor.

2.2 Efficient market hypothesis and performance persistence

The so-called modern finance states that, different sources of risk, can explain what investors should expect for market returns, which corresponds, precisely, to the previously described risk factors.

Additionally, the Efficient Market Hypothesis supporters argue that prices should follow a random walk, since prices are driven by the arrival of new information, which is unpredictable due to uncertainty (Fama, 1970). Considering that no one has perfect timing capacities, it is very difficult, even for institutional managers, to outperform the market. Because of that, already Malkiel (2003), has suggested a passive management strategy for investors portfolio construction.

Nonetheless, there are a few applied studies which demonstrate that, some mutual fund managers, have the required skills to earn abnormal profits to their clients. For instance, Grinblatt and Titman (1992), Elton et al. (1996) and Ferreira et al. (2019) found evidence of mutual fund performance persistence, which is inconsistent with the EMH, since past winners, or past losers, can remain over time, making investors more prone to opt for an active management strategy that beats the market.

Although active and passive strategies are an ongoing debate on the literature, the fact that some studies report statistically significant alphas that persist over time, which in turn, question market efficiency, leads researchers to the study of the sources of mispricing on asset values.

2.3 Behavioral Finance vs Modern Finance

In modern finance, risk premium interpretations were being identified to accommodate reported alphas. Behavioral finance, considering investor sentiment, might also contribute to the development of an arbitrage pricing theory which is able to predict mutual fund abnormal performance.

In fact, evidence of overperformance might not be due to managers timing or selectivity abilities, but to shifts in market sentiment that makes prices to deviate from their intrinsic values and, consequently, to the occurrence of alpha. For example, if an institutional manager buys a stock that went up in value, because investors are excessively optimists as to the company future growth prospects, the abnormal profit that could be realized is most certainly not a result of the manager skill. It is a matter of luck, explained by a change in sentiment towards that firm in this case. So, investor sentiment comes as a possible missing factor.

Behavioral finance considers that investment behavior is influenced by people's emotions and feelings. It refutes the premises that investors are fully rational and can create optimal mean-variance portfolios, as assumed in modern portfolio theory. Actually, investors are subject to a set of biases which most of the times they are not aware of and that penalize their investment performance. For example, overconfident investors tend to invest in more expensive mutual funds (Bailey et al., 2011).

Along with the same lines, Odean (1999) and Barber and Odean (2013) showed that individual investors financial performance is many times deteriorated because they are overconfident and tend to trade too much, paying higher transaction costs, relying on past experience and social tendencies that are on the basis of herding behavior and, also, that they hold undiversified portfolios, most of the time due to gambling attitudes or due to home bias.

When this kind of behavior is taken massively, market inefficiencies could potentially arise on securities valuation and give room to episodes of overshooting followed by sharp corrections, just like in the Dotcom bubble and the 2006-2007 housing market bubble. Shiller (2015) calls it irrational exuberance.

Traditional viewers often advocate that even if these (noisy) investors exist, efficient markets only require a few skilled investors to correct eventual mispricing and that competition for information between them drives financial markets to an equilibrium fair value. In certain contexts, that might be true, and Pástor et al. (2017) found that, when institutional investors trade more to exploit those arbitrage opportunities, induced by higher levels of sentiment, they create a societal value by trying to keep markets efficiency and contribute to a better allocation of resources in the economy.

However, there are other extreme cases where limits to arbitrage arise and make those opportunities unprofitable because there are transaction and taxes expenses involved or if profitable, not riskless (Shleifer & Vishny, 1997; Barberis & Thaler, 2005). There is, for instance, the risk of the ongoing mispricing worsening, in the short-term, when investors incorporate their biased beliefs and intuitions or simply non-relevant information to stock prices, causing noise traders risk, which can be very costly to arbitrageurs (see De Long et al, 1990).

Theoretically, this gives rise to investor sentiment in financial markets. Empirically, investors' sentiment was chosen as one of the most relevant behavioral factors to include in performance valuation models, since there is evidence which demonstrates that, sentiment, is a source of risk capable of explaining excess returns (Keiber & Samyschew, 2017; Keiber & Samyschew, 2019).

2.4 How to measure investor sentiment?

One of the major literature concerns, regarding investor sentiment, consists of which methods to use in order to measure it. Secondly, the literature concentrates efforts on the evaluation of the respective impacts of sentiment on market returns.

As to the first, there are indirect and direct measures of investor sentiment. Indirect measures are associated mainly with market variables, as it will be shown next, while direct ones correspond to survey indexes. Overall, investor sentiment measures can be classified into three broad categories: market, text, and survey data sentiment measures (Zhou, 2018).

2.4.1 Market data sentiment

Ben-Rephael et al. (2012) uses market data, on mutual fund net flows, from stock funds to bond funds and vice-versa, depending on investors risk appetite, influenced by sentiment. In the previous study, there is evidence of high quantity of money inflows in equity mutual funds, when the market is going up, which translates into a short-term euphoria towards riskier investments, providing initial positive returns. Consistently, Ben-Rephael et al. (2019) also makes use of mutual fund net flows but, this time, to capture foreign sentiment, concluding that investors tend to overreact to non-local news (outside negativity bias), leading to shifts of money across international markets, depending on investors local conditions perceptions.

Furthermore, the put/call ratio and the volatility index are two other ways of measuring investor sentiment by using market variables. The former represents the number of put options over the number call options traded in the market, while the latter analysis implied volatility by also using options to capture

sentiment. The underlying rationale is that, as they increase, both represent fear and pessimistic forecasts about the market, because a higher number of traded put options and a higher level of volatility are usually a signal of a bearish tendency. Reis and Pinho (2020) found that these two measures are strong predictors of sentiment and statistically significant for market returns. Despite that, Bandopadhyaya and Jones (2008) demonstrated that the put/call ratio is a better proxy for investor sentiment than the volatility index, since it captures variations non justified by economic factors more accurately. However, we have to take into account that the first paper uses an European S&P350 index, while the second uses the American S&P 500 index, so one cannot generalize the results, because a given measure could be a better predictor for a certain country or for a specific time period.

An additional market measure, that has been used as a proxy for investor sentiment, is the close-end fund discount (CEFD), which represents the difference between the net asset value (NAV) and the market value of a close-end mutual fund. Lee et al. (1991) points out that CEFD accompanies variations in individual investor sentiment because, just like small stocks, they are more subject to be traded by non-professional investors, which are also the ones more prone to be “victims” of behavioral biases. In general, findings report that the lower is the fund discount in relation to NAV, the more bullish sentiment is, or that, there is a negative correlation between CEFD and investor sentiment (Lee et al., 1991; Neal & Wheatley, 1998). Notwithstanding, some researchers argue that CEFD is not a relevant factor to predict sources of systematic risk in asset pricing (Doukas & Milonas, 2004). Alternatively, Qiu and Welch (2004) found that CEFD is not even a suitable measure of investor sentiment, and so the literature has been abandoning this proxy gradually over time.

Differently, Baker and Wurgler (2006) adopt an interesting method by forming a composite index (BW) with six market variables, acting as investor sentiment proxies: CEFD, market turnover, volume of IPO's, first day returns on IPO's, equity issues over total debt and equity issues, and the dividend premium. Firms have a higher probability of going public when investor sentiment is high in order to get more financing at a lower cost, which induces higher volume and first day of returns become very appetizing for investors, increasing general optimism (Ritter, 1991). Market turnover (or liquidity) is also considered as a proxy for investor sentiment in this framework¹, since the higher the liquidity, the higher the investors' mood, in a world with short-selling constraints, indicating a possible short-term overvaluation (Baker & Stein, 2004).

¹ However, there are recent updates to the BW investor sentiment composite index. The market turnover variable was removed from the index, so now it only contains five market variables.

Baker and Wurgler (2007) complement their initial work, by concluding that there is an inverse relation between investor sentiment and subsequent stock returns and Baker and Wurgler (2006) already stated that, this effect, is higher for small, young, high volatility, non-dividend paying, unprofitable and distressed stocks which, in overall terms, are less liquid and so more likely to present costly and harder arbitrage opportunities to exploit.

2.4.2 Text data sentiment

Now, regarding text data sentiment measures, Breitmayer et al. (2019) collected 14.9 million opinions from ShareWise social platform and found that stock opinions contain valuable information for expected future stock prices, implying a positive correlation with stock returns. No different conclusions were achieved by Renault (2017), which have chosen StockTwits social platform but applying the same methodology as the previous paper, for intra-day stock market returns. They just report, in addition, that after the initial positive returns, generated by a high level of sentiment, in the following trading day the reversal occurs, denoting evidence of noisy investors in the market.

Duz Tan and Tas (2020) and Oliveira et al. (2017) adopt an alternative path by using Twitter as a social media that may unveil people's general mood. For this second approach, positive and negative comments in Twitter are spotted through key words. The authors demonstrated a significant matching correlation between negative (positive) scores based on lexical characteristics and negative (positive) stock returns. McGurk et al. (2020) also demonstrates that positive and negative tweets are associated with investor sentiment, providing statistically significant abnormal returns for investors.

Siganos et al. (2014) uses the Facebook Gross National Happiness (FGNH) index, which has the same underlying idea as of the previous papers, since it separates positive and negative words in Facebook that signal a bullish or bearish investor sentiment. Once again, the results are similar, the index is able to predict daily returns that is followed by a short-term reversal during the next trading weeks.

2.4.3 Survey data sentiment

Additionally, survey data sentiment measures, directly asking people about their prospects regarding market conditions, are also used as a proxy for investor sentiment. For instance, Fisher and Statman (2003) and Schmeling (2009) use an economic type of survey, called the Consumer Confidence Index (CCI), which represents consumption intentions and expectations for inflation and interest rates. It captures sentiment because people's future perspectives are normally shaped according to the recent

experience and, unconsciously, people overestimate the probability for the occurrence of an event when it is still present in an individual memory.

Moreover, economic perceptions are anticipated by financial market movements, since investors take into account the economic cycle when valuing a given market, because it contains important information to discount future anticipated cash flows. In that sense, Chung et al (2012) observed that investors' optimism grows when the economy is expanding, which reflects a higher sentiment level. Inversely, when the economy contracts, investor sentiment tends to decrease, so it can also be seen as "regime dependent". So, when consumers are optimist as to the economy, investor's opinion, towards financial performance, in the next few months, are heavily influenced.

One more relevant sentiment proxy is the American Association of Individual Investors (AAII) index, which consists of a financial type of survey. It has been widely used to analyze general stock market returns (Smales, 2017; He et al., 2019), specific industry stock returns (Sayim et al. 2013) and, even, to differentiate those impacts between distinct types of investors, according to their sophistication (Fisher & Statman, 2000). The AAIL data describes three possible states, considering investors' expectations for future market movements for the next 6 months, in a questionnaire format. They can be either bullish, bearish, or neutral, giving rise to three different investor sentiment proxies measured in percentual terms.

Investor's intelligence (II) survey sentiment index is, again, a financial survey used as a proxy to study the stock market and it basically has the same underlying logic as the AAIL, with bullish, neutral, and bearish investors (Lee et al., 2002; Brown & Cliff, 2005). Kurov (2008) uses both II and AAIL to investigate investor sentiment impacts on future markets, finding "positive feedback", on trading trend. In addition, Chau et al. (2016) use a combination of sentiment proxies including the II and AAIL measures, and they report that sentiment is linked to changes in risk tolerance and investors might take advantage of crowd euphoria/dysphoria by adopting contrarian trading strategies.

Overall, market, text and survey data sentiment measures, have a significant predictive power for stock returns. Despite market and survey data being the most common implemented ones, text data measures are gaining more popularity recently and, in fact, there is a whole world to explore behind them, since the information provided on social media is vast, but it also requires more advanced programming techniques.

For the purpose of this dissertation, the focus will be on the AAIL survey data sentiment index, not only because of its simplicity, direct and relevant use and also, as it will be additionally explained in the methodology section, in order to justify my choice.

2.5 Impacts of investor sentiment on securities returns

When describing investor sentiment measures, I have been already discussing some of the associated impacts on returns. To complement the analysis, I will also mention the most relevant studies which better demonstrate how stock returns predictability, with sentiment, works.

Firstly, Lee et al. (2002) start by providing empirical evidence that investor sentiment is a significant factor to explain equity excess returns and conditional volatility, suggesting a positive correlation between the excess returns and shifts in sentiment level. The magnitude of shifts in sentiment exhibits a significant impact on the formation of conditional volatility of returns and expected returns: changes in sentiment have a negative correlation with market volatility, since when investors become more bearish, volatility increases and vice-versa. These findings are in line with Chau et al. (2016), which shows the importance of sentiment and the idea that, trading activity is more notorious during bear markets, due to increased uncertainty. This leads to a magnified effect of bubbles when the stock market goes up through a positive feedback mechanism (see Shiller, 2002), and then crashes, induced by investors euphoria, followed by fear attitudes, which are represented by a massive selling pressure, and this kind of behavior based on investor sentiment increases the probability of a crisis (Zouaoui et al., 2011)

Secondly, although using different econometric models, both Baker and Wurgler (2006) and Huang et al. (2015) find strong evidence that high (low) beginning of period sentiment, implies subsequent lower (higher) returns. They argue that “noise traders” try to benefit from early momentum bullish tendency, while arbitrageurs face huge costs in order to paddle against the market and correct ongoing mispricing. These results are consistent with Lux (1995), revealing a tendency for investors to overreact due to herding behavior. This leads to overoptimistic perception of future cash flows and, consequently, long-term reversals just like in Ben-Rephael et al. (2012), the initial good performance of equity mutual funds is reversed within ten months. Despite this fact, markets can remain inefficient before future reversals occur, because there are limits to arbitrage that make eventual opportunities unprofitable (Barberis & Thaler, 2005).

There is also significant evidence that within the whole market, small cap and growth firms are the most impacted ones, by changes in sentiment, because they are difficult to arbitrage and so the stock price can remain different from its fundamental value for long periods of time (Baker & Wurgler, 2006; Baker & Wurgler, 2007; Smales, 2017). So, the inexistence of arbitrage opportunities does not mean that the market is efficient, nor that financial securities are fairly priced. Deviations from intrinsic value are, in fact, very common in financial markets, but sometimes not very pronounced and worthwhile

to be exploited. Nonetheless, the reported effects are equivalent to the previously described reversion effect. According to Smales (2017), investor sentiment has a statistically significant impact on stock returns and this relationship tends to be positive for contemporaneous returns and negative for future returns, providing further evidence of overvaluation followed by long-term corrections in stock prices.

Additionally, Schmeling (2009) studied the effects of investor sentiment on international stock markets, concluding that it is a significant variable to predict stock returns for short periods of time. However, this result changes for some countries, in which investor sentiment does not have significant predictive power. At the country level, the impacts of sentiment on stock returns are higher when there is lower market integrity (for example, in a market with poor state and corporate governance), and lack of efficiency in regulatory institutions and for nations that are culturally more predisposed to herd-like behavior, which is consistent with the less liquidity and noise trading arguments, respectively. Similarly, Baker et al (2012) also study the global impacts of investor sentiment for different countries, stating that sentiment is a contrarian indicator of stock market returns, and that investor sentiment is contagious across markets.

In contrast with the standard findings in the literature, Brown and Cliff (2004) show that there is an even stronger relationship between changes in sentiment and large cap stocks return. Moreover, they found predictive power for short-term returns to be quite small, which is also a different conclusion in comparison to previous studies. Conversely, Brown and Cliff (2005) update their conclusions, with new evidence, by finding that there is a positive contemporaneous stock price reaction to investor sentiment, but future returns are negatively correlated with sentiment, which denotes the reversal effect already discussed.

Nevertheless, sometimes market inefficiencies tend to persist, especially for illiquid securities which require high transaction costs, in order to explore eventual arbitrage opportunities. Additional compensation for risk factors is an important feature to explain abnormal returns (Fama & French, 1993), but psychological biases also play a fundamental role (Daniel & Titman, 1999). It all depends on the timing of the analysis since financial markets are dynamic.

Stock market prices might not be at their intrinsic value, in the short term, because of investor's sentiment, but markets tend to become more efficient, in the long run, due to the fact that demand and supply are always acting towards the equilibrium fair value. So, it turns out that, modern finance and behavioral finance, might not be mutually exclusive, but rather complementary for the explanation of deviations from expected rates of return. In the research methodology section, insights will be provided, considering both perspectives.

2.6 Mutual fund performance and investor sentiment

Until now, as previously discussed, the literature had an extensive focus on the effects of sentiment on stock market returns. To the best of my knowledge, there is lack of evidence about how investor sentiment influences mutual fund performance, since very few investigations were done based on that relationship. Ben-Rephael et al. (2012) uses mutual funds but to capture investor sentiment through net flows of money.

As regards, exclusively, to the proposed topic, Bu (2020) is one of the pioneer studies in this emerging field by, precisely, studying the impacts of investor sentiment on mutual funds' alpha. He concludes that both bullish, bearish, and bullish-bearish spread sentiment indexes, extracted by the AAI survey data, are statistically significant to explain the overperformance of mutual funds at the portfolio level, while not relevant at all for underperforming ones. Additionally, the author finds that the occurring probability of positive alphas diminishes when the bullish sentiment is included in the model and decreases, for negative alphas, when the bearish sentiment is added, providing a crucial role for investor sentiment as a power predictor of mutual funds' performance.

Bu and Forrest (2020) also reach the same conclusions by using, once more, the CRPS survivorship-bias-free fund data base. Moreover, they demonstrate that the AAI index presents better explanatory power in relation to the BW index.

In a complementary form, Bu (2021a) further research on mutual fund alpha, provides evidence that the inclusion of sentiment in benchmark models is crucial to predict fund's performance and the results are robust for sub-samples created for the entire period of study between 2000 and 2014, with only two notable exceptions: the 2007-2008 financial crisis and the fact that with the Fama and French 5-factor model the outperforming probabilities don't change with the inclusion of the BW sentiment measure. As the author argued, this result might, in fact, be interpreted as a possible correlation between the selected investor sentiment measure and the risk factors incorporated in the model.

Thus, due to a huge lack of research in this area, this research aims at filling a gap in the literature. Namely, investor sentiment and mutual fund performance has only been studied mainly by Bu, Q. and within the US context. So, this investigation, will be the very first one to conduct a study about investor sentiment and European mutual fund performance, where the selected funds' portfolios invest mainly in US equity.

3. RESEARCH METHODOLOGY

3.1 Why the AAll sentiment measure among others?

There are different ways of measuring investor sentiment, as I have discussed so far. The most recognized ones in the literature are: market, text, and survey data sentiment measures.

Market sentiment measures, such as VIX (implied volatility of the S&P500) and bond yield spreads are, somehow, related to economic fundamentals, and that would possibly imply multicollinearity problems in the regression, due to the high correlation with the market factor.

I also exclude the possibility of using text data sentiment measures because, although they can have a relevant use, most of the studies use them only to predict very short-term fluctuations in securities returns and those proxies are very time-consuming to construct, since it requires a lot of search and complex coding abilities to match lexical characteristics with sentiment.

Because of this, I will choose the AAll sentiment index as a proxy for investor sentiment because this survey has the advantage of, effectively, capturing investors' tendencies through one short and direct question. By measuring the % of bullish, neutral, and bearish investors, one can know the overall market expectations, about the near future in a simple and accurate way, without having concerns about different variables capturing identical phenomena. Moreover, Bu (2021b) shows that a direct measure of sentiment, like the AAll, is better to explain contemporaneous returns, while the BW indirect measure of sentiment has a lagged effect.

3.2 The q-4 factor model

About the regression specification, many academics, doing research in mutual fund performance, have taken, for a long time period, the Carhart 4-factor model as the best model (Otten & Bams, 2002; Hunter et al., 2014; Andrikogiannopoulou & Papakonstantinou, 2019). Once again, I will challenge the previous approaches by, additionally, testing Hou et al. (2015) q-4 factor model, which includes a market factor, a size factor, an investment factor, and a profitability factor based on firms' return on equity (Roe). The authors demonstrated that it is a better model in relation to Fama-French 6-factor model, through spanning tests, since the latter is subsumed by the former in terms of variables explanatory power. The model composition is as follows:

$$R_i - R_f = \beta_{MKT}^i E[MKT] + \beta_{Me}^i E[R_{Me}] + \beta_{I/A}^i E[R_{I/A}] + \beta_{Roe}^i E[R_{Roe}]$$

- $MKT, R_{Me}, R_{I/A},$ and R_{Roe} : Market, size, investment, and Roe factors, respectively
- $\beta_{MKT}^i, \beta_{Me}^i, \beta_{I/A}^i,$ and β_{Roe}^i : Factor loadings

Image 1. Regression specification: Extracted from The Investment CAPM: Latest Developments - [Research \(theinvestmentcapm.com\)](http://theinvestmentcapm.com) Lu Zhang's website.

By implementing this new, and innovative basis model, also known as the Investment CAPM (Zhang, 2017), I am trying to conciliate both the supply and demand of financial markets as equally relevant determinants of returns. While the Investment CAPM takes into consideration a corporate finance point of view, for the explanation of the cost of capital, investor sentiment will be the demand side component to complement the logic of this framework.

On the one hand, the intuition behind the supply perspective of the economy is that managers and their investment decisions, are critical for the company growth, because positive NPV projects are expected to generate higher profitability which will translate into lower future returns, as the market price increases. On the other hand, investors demand for financial instruments will also have an impact on returns, which could potentially be magnified by the fact that human beings are not fully rational, making aggregate sentiment an inevitable component on asset pricing.

However, as Hou et al. (2015) and Zhang (2017) did demonstrate that, their model, better explains certain anomalies documented in the literature, I am aware of the possibility of investor sentiment becoming an irrelevant factor in the model, as sentiment tries precisely to accommodate for those anomalies. Nevertheless, as I have argued, sentiment can be a complement to account for mutual fund specific characteristics, rather than the whole equity market features, as often studied. Additionally, investor sentiment can also be a complement to explain mutual fund performance itself, outside the logic of risk premium factor interpretations that the so-called modern finance has introduced as a paragon.

Besides that, I will also compare the results with the Carhart 4-factor model in order to have a more solid background of comparison.

3.3 Methodological steps to follow

Until here, I have described both the theoretical model and the investor sentiment proxy intended to use as explanatory variables for mutual fund returns. Now the question is: what steps am I taking to achieve my goal? Just to clarify once more, the final objective is: to assess the importance of investor sentiment on mutual fund's (abnormal) performance.

- **H1:** Does the inclusion of investor sentiment reduces the probability of **occurrence of abnormal performance** (e.g: in comparison with Carhart (1997), Hou et al. (2015) and Fama and French (2015) models?)

So, after collecting the data, and regarding the first hypothesis, I use the q-4 factor model, the Carhart 4-factor model, the Fama-French 5-factor model and four different 5-factor sentiment based models (by adding the bullish sentiment and the bearish sentiment to the q-4 factor and Carhart 4-factor model), applying them individually to each mutual fund. The goal is to evaluate the occurring probability of alpha, under these models, to see their explanatory power in terms of arbitraging away the achieved alphas. Here, I expect that the probability of overperformance reduces significantly in the 5-factor bullish models, while the probability of underperformance is expected to decrease in the 5-factor bearish models, providing a role for investor sentiment on mutual funds' performance.

Secondly, for a robustness check, I will use Baker and Wurgler (2006) investor sentiment proxy, to assess if the occurring probability of alpha, also declines comparatively to the traditional finance models.

- **H2:** Is investor sentiment a **statistically significant** variable in order to explain excess returns of European mutual funds, which invest their portfolios in US equity, with an associated level of performance?

Thirdly, and regarding the second hypothesis, I use the q-4 factor model to see which mutual funds presents positive and negative alphas over the sample period. Then, I rank those mutual funds into a "winners' portfolio" separated from a "losers' portfolio" according to their respective positive/negative performance measured by alpha, following Bu (2020) approach. Next, I will apply the chosen model for both portfolios in order to perform a short style analysis, since the characteristics of the categorized fund portfolios might contain fruitful information.

Fourthly, I will add the sentiment proxy into the q-4 factor model and into the Carhart 4-factor model to test its overall significance level, on both winners' and losers' portfolios. As the AAIL index provides three different states of investor sentiment (bullish, neutral, and bearish), I could get several combinations of regression outputs. Despite that, I will not use the neutral sentiment proxy, as it does not capture extremes on investor's investment decisions and so the probability of having an impact on mutual

funds returns becomes lower. Most of the time, being neutral means being skeptical about the market, which makes investors to stay away from trading and to cause any noise on asset prices. Because of that, I will concentrate my analysis on the bullish and bearish proxies for sentiment.

Accordingly, I expect that, the bullish and bearish sentiment indicators, not to show statistically significant results for both winners and losers fund portfolios. The purpose of this second hypothesis is to demonstrate that if investor sentiment is found to be a relevant variable to explain individual fund performance and, at the same time, not significant at all, as a risk factor in an asset pricing perspective, then something is missing in the so-called traditional models.

4. DATA

4.1 Data sources and collection

To begin with, in order to construct the mutual fund sample, I use Eikon with the intended parameters. Thus, 536 European equity funds, from 18 different countries², were selected, with the geographical focus being on United States, since I did choose an American sentiment measure to work with. I did consider all mutual funds with a maximum launch date of 31/12/2009.

Of the initial sample, only 285 funds have, either a complete monthly record or a minimum of 30 observations between 31/12/2009 and 31/12/2019, and, so, only those were extracted from the DataStream database, using the total return index. The remaining funds were removed due to one of the following reasons: not enough data; funds with, at least, 5 initial observations missing; existence of consecutive equal values for the total return index, in different sample periods, making the monthly fund return equal to zero repeatedly; the fund has died/merged before the sample period; if the fund did disappear during the sample period, it didn't present a minimum of 30 observations to be considered as to have enough data.

All mutual funds are denominated in Euro currency, to avoid any exchange rate bias. Additionally, to avoid any survivorship bias, I did include both liquidated and merged funds, as well as the active funds. In total, there are 164 active funds, 45 liquidated funds and 76 merged funds. It's relevant to mention that, for the active funds, no data treatment was needed, since all of them have the required 120 observations. However, for both liquidated and merged funds, I had to firstly identify the fund's dead date and then remove the following end of month values in order to reflect the death of the fund. So, these two categories of funds present less than 120 observations, unless the funds died after the sample period.

Secondly, I use professor's Lu Zhang website to extract the components of the q-4 factor model, which are Zhang's constructed: market, size, investment, and probability factors. Thirdly, from professor's Kenneth French website, I got the specific Fama-French: market, size, book-to-market, momentum and investment model factors. The risk-free rate corresponds to the 1-month Treasury Bill for both sources.

Finally, regarding the investor sentiment proxy, I did use the American Association of Individual Investors (AAII) index website, to obtain the corresponding input. The sentiment index includes: the weekly bullish, neutral and bearish, as well as the bullish-bear spread. Since I am using monthly data, I only

² Austria; Belgium; Denmark; Finland; France; Germany; Greece; Hungary; Italy; Netherlands; Norway; Poland; Portugal; Slovenia; Spain; Sweden, Switzerland; United Kingdom. However, in the database, although Hungary showed 2 mutual funds, they were not included in the final sample due to missing data.

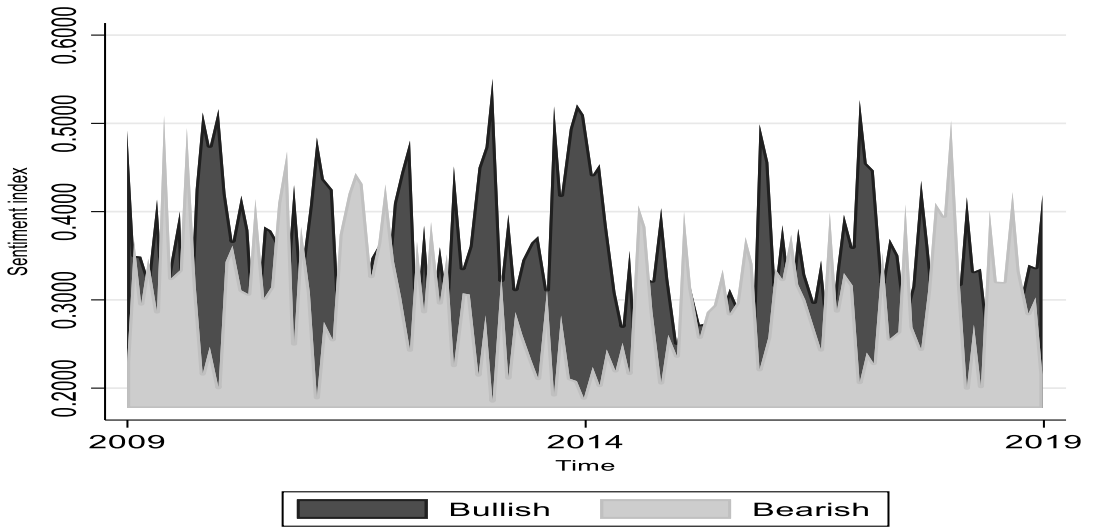
consider the corresponding end of month values for those indexes. Moreover, the BW sentiment measure is collected from professor's Jeffrey Wurgler website.

4.2 Investor sentiment descriptive statistics

Regarding investor sentiment, Figure 1 and Table 1 below, show that the the AAll bearish index peaked in May 2010 near 0.51, while the bullish index peaked in December 2013 approximately at 0.55. This investor sentiment values are consistent with two of the most important events throughout the last 15 years. On the one hand, the 2008/2009 international financial crisis, with financial markets reaching historical low values and, consequently, causing investors to become pessimistic about future market movements, induced by an expectation of negative sentiment and a slow recovery of the economy.

On the other hand, the answer provided by the Federal Reserve, with an expansionary monetary policy, lowering interest rates and, thus, providing incentives to borrow and invest at a lower cost, leveraging the American economy. Obviously, people became more confident about financial markets recovery and a positive sentiment surged, with the respective maximum registered at the end of 2013.

Figure 1 AAll Investor sentiment evolution over the sample period



As one can observe in Figure 1, investor sentiment fluctuates significantly over time, especially in periods of high volatility. This is a stylized fact because both positive and negative information arrive repeatedly in the market, making sentiment a dynamic proxy of people's non-rational based expectations, which are constantly being updated in response to new market information.

Notwithstanding, the 0.36 mean value, for bullish sentiment, is higher than the 0.30 mean value for bearish sentiment. It could be interpreted as a sign that, on average, investors were more optimistic than pessimistic when evaluating future market movements between 2009 and 2019, and I believe that it also applies even in larger periods of time, which include impactful recessions, because, in fact, investors tend to be overoptimistic.

In general, the implied assumption is that, economic growth, will continue despite any fluctuations that might occur, since innovation and productivity are expected to increase over time, as a result of technological developments.

Table 1 Investor sentiment indexes descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Bullish	121	.3603763	.0781934	.177515	.550562
Neutral	121	.3352424	.0635484	.181548	.5286
Bearish	121	.3043768	.0742616	.185393	.5088

5. EMPIRICAL RESULTS

5.1 Investor sentiment and mutual performance at the individual fund level

Starting with the first research question: does the inclusion of investor sentiment reduces the probability of abnormal performance in comparison with the so-called modern finance models?

The goal of this section is to evaluate the occurring probability of alpha under Carhart (1997), Fama and French (2015) and Hou et al. (2015) and compare it to the sentiment-adjusted models. To perform this task, I first run the regressions, using these models, for the 285 funds on the sample. Secondly, I look at the constant term, which is the alpha, and consider the statistically significant alphas only if the model is accepted with the global significance test, also at the 5 % level. The results are in table 2.

Table 2 Mutual fund performance across different models

	Carhart 4-factor	Fama-French 5-	q-4 factor	Bullish q-4	Bearish q-4	Bullish	Bearish
<u>Alpha</u>	model	factor model	model	factor model	factor model	Carhart 4-	Carhart 4-
						factor model	factor model
Positive	13,68%	16,84%	16,14%	0,35%	12,98%	0,35%	12,98%
Negative	5,96%	6,67%	7,02%	1,40%	0,35%	1,75%	0,35%

Occurring probability of alpha, under the Carhart 4-factor model, Fama-French 5-factor model, q-4 factor model and the sentiment adjusted models, where I add the bullish and bearish indexes, from the AAll investor sentiment measure. The results are based on monthly data from 31/12/2009 to 31/12/2019. Statistical significance is considered at the 5% level, with a tolerance margin of +0.5 p.p. The q-4 factor model presents three exceptions to this rule, since those negative performing funds have statistical significance at the 8% level, but they were necessary to be considered to form a more robust portfolio for the second hypothesis.

For instance, 13,68% of the funds have shown a positive abnormal performance, over the market, while 5,96% have shown a negative performance, when the Carhart4-factor model is used. Similarly, based on the Fama-French 5-factor model, 16,84% of the funds outperformed the index and 6,67% underperformed. This result suggests that, removing momentum and adding the Fama-French investment and profitability factors, does not improve the quality of the model, with regards to explaining alpha.

Nonetheless, that's not the main point I am trying to demonstrate. When I look at the right side of the table, I can conclude that the probability of occurrence of a positive alpha, almost disappears when using the bullish Carhart 4-factor model. These findings indicate that the bullish investor sentiment index

sets a higher benchmark to beat the market. In other words, fund managers which are believed to outperform the market, when using traditional models, have in fact neutral performance.

The explanation for positive alpha is not due to the ability of the manager to generate it, but rather to the bullish market, which boosts performance of the mutual fund. And considering that anyone can simply invest money in the market and benefit from a momentum bullish tendency earlier, the performance of the fund, taking into account the bullish sentiment measure, becomes neutral.

The reverse idea applies to the bearish Carhart 4-factor model findings. The bearish investor sentiment index sets a lower benchmark to beat the market. That's why the probability of occurrence of negative performance reduces from 5,96% to 0,35%, by comparing the bearish Carhart 4-factor model with its traditional peer. When investor sentiment is negative, contemporaneous excess returns are also negative since, normally, the market is going down in this scenario, causing panic in investors' minds. The model with bearish sentiment accounts for that, because mutual fund managers might be simply going through an unlucky financial market cycle.

Additionally, I also present the results based on the innovation that I have introduced in my research work: the q-4 factor model and the associated sentiment adjusted models. The first one shows that 16,14% of the funds have a positive performance, while 7,02% of them present a negative performance. Once more, the inclusion of bullish sentiment in the q-4 factor model significantly reduces the probability of occurrence of positive performance to 0,35%.

Moreover, the bearish q-4 factor model also significantly reduces the occurrence of negative performance, from 7,02% in the q-4 factor model to 0,35% in the bearish sentiment adjusted q-4 factor model.

Besides that, I can also conclude that the occurring probabilities of alpha are higher for the q-4 factor model, when compared to the Carhart 4-factor model. Although the q-4 model subsumes the Fama-French 6-factor model, in terms of the risk factors robustness to explain the cross-section excess returns, it seems that regarding mutual fund performance, the Carhart 4-factor model has a superior explanatory power of alphas.

So, based on the reported findings, investor sentiment plays an important role as a missing factor for the explanation of European mutual performance at the individual fund level. Bullish sentiment is able to explain most of the positive fund alpha, while bearish sentiment predicts most of the achieved negative alphas, which makes investor sentiment a crucial variable to arbitrage-away what is considered to be abnormal performance in traditional models.

5.2 Robustness check

In this section, I test the inclusion of the Baker and Wurgler (2006) investor sentiment composite index, in the Carhart 4-factor model and q-4 factor model, in a similar way and with identical conditions as in the previous section.

The BW measure has been modified to contemplate only five economic variables (value-weighted dividend premium, first day IPO returns, IPO volume, close end fund discount and the equity shares in new issues), as market turnover has been dropped as one of the sentiment indicators.

Although the BW is a market data sentiment measure, and so it might have some correlation problems with variables such as the book-to-market factor, which predicts similar economic issues, it is still one of the most accepted and well-known measures in the literature. So, I use it as a robustness check for the first hypothesis in this research.

The results can be seen in the table below. Once again, the goal is to compare the so-called modern finance models with their sentiment-adjusted version, in order to see if the probability of occurrence of alpha is reduced by the inclusion of the BW investor sentiment measure.

Table 3 Mutual fund performance and the BW index

<u>Alpha</u>	Carhart 4- factor model	q-4 factor model	Carhart 4- factor model plus BW	q-4 factor model plus BW
Positive	7,02%	10,18%	3,86%	6,67%
Negative	4,91%	5,61%	4,91%	5,61%

Occurring probability of alpha under the Carhart 4-factor model, q-4 factor model and the sentiment adjusted models where I add the BW investor sentiment measure. The results are based on monthly data from 31/12/2009 to 31/12/2018 due to shortage of data from 2018 onwards on the BW composite index. Statistical significance is considered at the 5% level with a tolerance margin of +0.5 p.p. of difference

In the Carhart 4-factor model, 7,02% of the funds present a positive alpha, which represents a decrease of about 7 p.p. in relation to the result in table 2. This suggests that 2019 was a very good year to invest in financial markets, and, in fact, the S&P500 generated an almost 30% return in that year. Nevertheless, the argument I am trying to show here, is about the effect of sentiment on fund's alphas.

Thus, we can observe that the BW measure makes the probability of alpha to decrease until 3,86%, which seems to confirm the initial reported findings, with the AAll sentiment index. The main logic remains unchanged. On the one hand, it's easier to earn abnormal returns when sentiment is high, so

when the BW value reaches relatively higher levels, compared to its average, a higher performance benchmark is set.

On the other hand, the probability of a loss, in the market, is higher when sentiment is low, which sets a lower performance benchmark. However, this time, the underperforming probability remains unchanged in both models, suggesting that the BW measure is somehow limited to be the source of underperformance. Taking into account this fact, I can also mention that, this particular result is relatively similar to Hou et al. (2015), since despite their BW-adjusted models being able to reduce the probability of underperformance, the magnitude of that change is only, on average, 0,58 p.p.

When I use the q-4 factor model, no different conclusions are reached. About 10,18% of the funds outperform the market in the q-4 model, while in the BW sentiment adjusted q-4 factor model, where the BW sentiment proxy is added to the q-4 factor model, only 6,67% of the funds beat the market, which also represents a considerable reduction.

These robustness checks confirm that investor sentiment is a missing factor in European mutual fund performance evaluation at the individual level, since this behavioral variable is capable of predicting, at least, positive alphas.

5.3 Winner and loser fund portfolio style analysis

Now, regarding the second research question, once again, first I apply the q-4factor model to each mutual fund in order to get the intercept value of the regression, which is the abnormal return. A positive constant means that the fund has outperformed the market index, whereas a negative constant signs underperformance. However, I only consider intercept values statistically significant at the 5% level³. In total, I get 46 winner funds and 20 loser funds, which are used to form an equally weighted winner fund portfolio and loser fund portfolio, respectively. Then, once more, based on the q-4 factor model, I perform a style analysis of these portfolios, in order to gather information about their composition. The results are as follows:

³ There are three loser funds which are only statistically significant at the 8% level, but I decided to include them due to shortage of data to form a robust portfolio.

Table 4 Winner fund portfolio

Source	SS	df	MS	Number of obs	=	120
				F(4, 115)	=	32.98
Model	.072981559	4	.01824539	Prob > F	=	0.0000
Residual	.063618068	115	.000553201	R-squared	=	0.5343
				Adj R-squared	=	0.5181
Total	.136599627	119	.001147896	Root MSE	=	.02352

RiR_F	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
R_MKT	.6105325	.0661899	9.22	0.000	.479423	.741642
R_ME	.151005	.1066534	1.42	0.160	-.0602549	.3622648
R_IA	-.0643296	.1423342	-0.45	0.652	-.3462662	.217607
R_ROE	-.0198776	.1304661	-0.15	0.879	-.2783059	.2385507
_cons	.0056415	.0023154	2.44	0.016	.0010551	.0102279

Regression output for the winner fund portfolio based on the q-4 factor model. R_MKT, R_ME, R_IA and R_ROE stand for the market, size, investment, and profitability factors. The results are based on monthly data from 31/12/2009 to 31/12/2019. Statistical significance is considered at a 5% level.

Table 5 Loser fund portfolio

Source	SS	df	MS	Number of obs	=	120
				F(4, 115)	=	872.82
Model	.127695451	4	.031923863	Prob > F	=	0.0000
Residual	.004206192	115	.000036576	R-squared	=	0.9681
				Adj R-squared	=	0.9670
Total	.131901642	119	.001108417	Root MSE	=	.00605

RiR_F	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
R_MKT	.9028947	.0170195	53.05	0.000	.8691823	.936607
R_ME	-.1006634	.0274239	-3.67	0.000	-.1549849	-.046342
R_IA	.0259116	.0365985	0.71	0.480	-.046583	.0984062
R_ROE	.0007919	.0335469	0.02	0.981	-.065658	.0672418
_cons	-.0034583	.0005954	-5.81	0.000	-.0046376	-.002279

Regression output for the loser fund portfolio based on the q-4 factor model. R_MKT, R_ME, R_IA and R_ROE stand for the market, size, investment, and profitability factors. The results are based on monthly data from 31/12/2009 to 31/12/2019. Statistical significance is considered at a 5% level.

As presented above, Tables 4 and 5 show that the market loading is positive and statistically significant for both portfolios. Nonetheless, the loser fund portfolio has a market excess return loading of about 0.90, which is above the 0.61 value for the winner portfolio. This means that, in terms of aggregated holdings, the loser portfolio is more approximated to the market portfolio, which in traditional theory has a coefficient equal to 1.

In addition, and as expected, the constant term is positive (negative) and statistically significant for the winner (loser) portfolio, which reflects the positive (negative) performance of each individual fund comprising the portfolios. Regarding the remaining three factors (size, investment, and profitability), I can observe that, by comparing the factor loadings on both portfolios, they have contrarian signs: the size factor is positive for the winner fund and negative for the loser fund, whereas the investment and profitability factors are negative for the winner fund and positive for the loser fund. These results also reflect the style of the funds representing the two constructed portfolios.

For example, the size factor in the loser portfolio is negative and statistically significant, meaning that those funds invest mainly in large capitalization stocks. Theoretically, the positive size factor for the winner portfolio means that the portfolio is composed by mutual funds that invest a significant proportion of their holdings in small capitalization stocks. However, I went to check the actual style of some of the mutual funds in both portfolios. I conclude that the loser portfolio is indeed composed by large capitalization firms, and the same applies for the winner portfolio, which confirms the statistical insignificance of the winner portfolio for this particular factor.

Additionally, a positive investment factor loading means that the portfolio is composed by firms with a lower investment/total assets ratio, which is the case of value firms, and, in fact, this factor is negatively correlated with the book-to-market factor used in traditional models (see Hou et al., 2015). Although the investment factor loadings are not statistically significant for both models, the analysis of each fund allows me to conclude that the previous sentence is correct. The loser fund portfolio, presenting a positive investment factor, is mainly composed by value firms, while the winner portfolio, which has a negative investment factor value, has a clear tendency to invest in growth funds. In this latter case, the value is negative since growth firms, at least in the last decade, are perceived to be less risky than value firms, meaning that investors demand a relatively lower risk premium.

Lastly the profitability factor, measured by the firm's ROE also presents consistent results with what would be expected. The winner portfolio shows a negative coefficient for this factor, since the portfolio is composed by profitable firms (who are also the ones which outperform the market index), so a lower risk premium is required. On the other hand, the positive ROE factor for the loser portfolio means that the loser funds invest in lower profitable stocks, and so investors require a higher risk premium to compensate them.

5.4 Inclusion of investor sentiment on the q-4 factor model at the portfolio level

In this section, I test whether the inclusion of investor sentiment is relevant at the performance portfolio level, in an asset pricing perspective, to answer the second research question.

To do that, I add the bullish sentiment index to the q-4 factor model in order to observe its impact on the winner fund portfolio. The same procedure is adopted to the analysis of the loser fund portfolio, but this time with the inclusion of the bearish sentiment index instead. The results can be consulted below in tables 6 and 7.

5.4.1 Winner fund portfolio and bullish investor sentiment

Table 6 Winner fund and AAll bullish sentiment index I

Source	SS	df	MS	Number of obs	=	120
Model	.073241697	5	.014648339	F(5, 114)	=	26.36
Residual	.06335793	114	.000555771	Prob > F	=	0.0000
Total	.136599627	119	.001147896	R-squared	=	0.5362
				Adj R-squared	=	0.5158
				Root MSE	=	.02357

RiR_F	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
R_MKT	.5954288	.0699202	8.52	0.000	.4569174 .7339402
R_ME	.1380831	.1085566	1.27	0.206	-.0769666 .3531329
R_IA	-.0764121	.1437535	-0.53	0.596	-.3611866 .2083624
R_ROE	-.0271598	.1312014	-0.21	0.836	-.2870687 .2327492
Bullish	.0212821	.0311071	0.68	0.495	-.0403409 .082905
_cons	-.001821	.0111518	-0.16	0.871	-.0239127 .0202707

Regression output for the winner fund portfolio based on the bullish sentiment-adjusted q-4 factor model. R_MKT, R_ME, R_IA, R_ROE and Bullish stand for the market, size, investment, profitability and positive investor sentiment factors. The test results are based on monthly data from 31/12/2009 to 31/12/2019. Statistical significance is considered at a 5% level.

5.4.2 Loser fund portfolio and bearish investor sentiment

Table 7 Loser fund and AAll bearish sentiment index I

Source	SS	df	MS	Number of obs	=	120
				F(5, 114)	=	699.36
Model	.127737244	5	.025547449	Prob > F	=	0.0000
Residual	.004164398	114	.00003653	R-squared	=	0.9684
				Adj R-squared	=	0.9670
Total	.131901642	119	.001108417	Root MSE	=	.00604

RiR_F	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
R_MKT	.8938	.0190157	47.00	0.000	.8561301 .9314699
R_ME	-.1045992	.0276526	-3.78	0.000	-.1593789 -.0498196
R_IA	.0285067	.036656	0.78	0.438	-.0441085 .101122
R_ROE	.0011669	.0335277	0.03	0.972	-.0652512 .0675851
Bearish	-.009588	.0089639	-1.07	0.287	-.0273454 .0081694
_cons	-.000436	.0028875	-0.15	0.880	-.0061562 .0052841

Regression output for the loser fund portfolio based on the bearish sentiment-adjusted q-4 factor model. R_MKT, R_ME, R_IA, R_ROE and Bearish stand for the market, size, investment, profitability and negative investor sentiment factors. The test results are based on monthly data from 31/12/2009 to 31/12/2019. Statistical significance is considered at a 5% level.

The underlying intuition to this methodology is that bullish sentiment is a possible factor to explain eventual relatively higher generated excess returns due to market euphoria, while the opposite applies to bearish sentiment.

I can conclude that, although bullish(bearish) sentiment has a positive (negative) coefficient, the results aren't statistically significant. So, it seems that including investor sentiment isn't relevant at all, in the so-called traditional models. However, I cannot immediately conclude that investor sentiment is not considered a risk factor. As I remember from the methodology section, the construction of the factors in the q-4 model is designed in a way to explain many anomalies detected in the literature, such as the value-growth anomaly and momentum (Hou et al., 2015). Investor sentiment tries precisely to explain some of those anomalies, in a behavioral perspective, but as Zhang (2017) as demonstrated, the anomalies become regularities in the q-4 factor model, because the investment and the profitability factors are able to capture most of them.

5.5 Inclusion of investor sentiment on the Carhart 4-factor model at the portfolio

level

Thus, I cannot necessarily conclude straight-away that something is missing in the so-called traditional models because I am using a different from usual regression specification, by implementing the Hou et al. (2015) model. Probably investor sentiment is simply not a statistically significant variable in this q-4 model in terms of asset pricing at an aggregated level due to the model specification. The robustness of the q-4 factor model is so high that, the composing factors can mostly summarize the cross-section of market returns, as the authors of the model have argued.

In order to gain additional comprehension about this issue, I examine the inclusion of investor sentiment in the Carhart-4 factor model, which is a more standard and tested approach in the literature. The results can be seen below in tables 8 and 9.

5.5.1 Winner fund portfolio and bullish investor sentiment

Table 8 Winner fund and AAll bullish sentiment index II

Source	SS	df	MS	Number of obs	=	120
				F(5, 114)	=	28.08
Model	.075384498	5	.0150769	Prob > F	=	0.0000
Residual	.06121513	114	.000536975	R-squared	=	0.5519
				Adj R-squared	=	0.5322
Total	.136599627	119	.001147896	Root MSE	=	.02317

RiR_F	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
R_MKT	.6221252	.0660472	9.42	0.000	.4912862 .7529643
SMB	.1752698	.1033278	1.70	0.093	-.0294219 .3799614
HML	-.0182608	.1032524	-0.18	0.860	-.222803 .1862814
Mom	.1231536	.0747715	1.65	0.102	-.0249683 .2712754
Bullish	.0179927	.0302043	0.60	0.553	-.0418418 .0778272
_cons	-.0013379	.010867	-0.12	0.902	-.0228654 .0201897

Regression output for the winner fund portfolio based on the bullish sentiment-adjusted Carhart 4-factor model. R_MKT, SMB, HML, Mom and Bullish stand for the market, size, book-to-market, momentum and positive investor sentiment factors. The test results are based on monthly data from 31/12/2009 to 31/12/2019. Statistical significance is considered at a 5% level.

5.5.2 Loser fund portfolio and bearish investor sentiment

Table 9 Loser fund and AAI bearish sentiment index II

Source	SS	df	MS	Number of obs	=	120
				F(5, 114)	=	749.54
Model	.128007823	5	.025601565	Prob > F	=	0.0000
Residual	.003893819	114	.000034156	R-squared	=	0.9705
				Adj R-squared	=	0.9692
Total	.131901642	119	.001108417	Root MSE	=	.00584

RiR_F	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
R_MKT	.8861659	.0179237	49.44	0.000	.8506591 .9216727
SMB	-.1185083	.0259095	-4.57	0.000	-.1698348 -.0671818
HML	.0297794	.0260499	1.14	0.255	-.0218253 .0813842
Mom	-.0221568	.0188595	-1.17	0.243	-.0595174 .0152038
Bearish	-.0086372	.0086488	-1.00	0.320	-.0257704 .0084961
_cons	-.000526	.0027852	-0.19	0.851	-.0060435 .0049916

Regression output for the loser fund portfolio based on the bearish sentiment-adjusted Carhart 4-factor model. R_MKT, SMB, HML, Mom and Bearish stand for the market, size, book-to-market, momentum and negative investor sentiment factors. The test results are based on monthly data from 31/12/2009 to 31/12/2019. Statistical significance is considered at a 5% level.

Table 8 and 9 show that the bullish and bearish sentiment indexes present statistically insignificant coefficients. Since the Carhart 4-factor model is a general accepted model in finance theory and has similar foundations in relation to the other well-known modern finance models, I can now state that something is really missing in asset pricing theory. By confronting the two-research hypothesis under which I conducted my investigation, I can observe that investor sentiment is one of the sources of fund performance, but, because it does not have a role as a risk premium factor, the so-called traditional models cannot capture the importance of investor sentiment in mutual fund performance.

6. CONCLUSIONS

Returning to the starting point, it goes again without saying that many investment professionals rely on the so-called traditional finance models to assess the ability of mutual fund managers to earn abnormal returns. The problem is that both the market and funds excess returns are dependable on the economic cycle, which could be favorable or not.

Risk premium factors are a well-established source of explanation to the fluctuations in different financial markets cycles. However, not all those variations can be explained by risk-based rational interpretations. And behavioral finance has showed that asset pricing mistakes can be made when investors incorporate their non-rational based expectations into securities prices, giving raise to what we call behavioral anomalies.

Thus, to conduct this research, we believed since the beginning, that something is missing in asset pricing. Specifically, a behavioral variable which can potentially be capable of improving the financial models, by accounting for investors irrationality in the decision-making process, affecting demand and supply.

The AAll Investor sentiment was the chosen variable to eventually play a role because it is a dynamic proxy of the economic cycle. Investor's bullishness and bearishness gives information about the actual state of a financial market. And, in fact, since the economic cycle is a crucial component of the performance for any security, investor sentiment came as a possible missing factor to be the source of alpha.

So, this investigation aimed to study mutual fund performance by testing the inclusion of investor sentiment in benchmark models. Namely, the bullish and bearish investor sentiment proxies were tested at two different levels: individual/fund and portfolio level.

On the one hand, the bullish sentiment adjusted q-4 factor and Carhart 4-factor model reduce the probability of outperformance, in comparison to their traditional peers, at the individual fund level. On the other hand, the bearish sentiment adjusted models reduce the probability of occurrence of negative performance in comparison to the standard q-4 and Carhart models. The intuition is that bullish sentiment sets a higher benchmark for mutual fund managers to earn positive alpha, while bearish sentiment sets a lower benchmark for managers to underperform. This means that it's easier to beat the market when sentiment is high and easier to underperform when sentiment is low. So, the source of fund alpha, at the individual level, comes, but not exclusively, from investor sentiment, providing this behavioral variable a role into the explanation of European mutual performance, which invest their holdings mainly in US equity.

A robustness check using one additional investor sentiment measure (Baker & Wurgler, 2006) for this first research question confirms these results, at least for the explanation of positive performance. The probability of earning positive alpha diminishes with the inclusion of the BW sentiment measure, while it maintains equal as to the negative performing funds.

Regarding the second hypothesis, a winner fund and loser fund portfolios were constructed based on the q-4 factor model, in order to test investor sentiment in a joint asset pricing perspective. Firstly, the style analysis results reveal that the loser funds stock exposure is similar to the market portfolio benchmark, since both invest primarily in large capitalization and value firms. So, one of the implications of the results, is that to be in the winner funds category, mutual fund managers need to deviate from the market portfolio, by investing, for example, in smaller and growth firms, with potential profitable opportunities in the horizon.

Secondly, and more importantly, the investor sentiment proxy was included, into the q-4 factor model, to analyze the effects on the constructed portfolios. The bullish and bearish indexes are not statistically significant to explain the winner and loser fund portfolio returns when using the q-4 factor model. However, one possible explanation could be that, the q-4 factor model is precisely designed in a way, to accommodate for many anomalies documented in the literature. The use of the profitability and investment factors is proven to be an effective way of summarizing the cross-section of securities returns (see, Horstmeyer et al., 2022, January 10), which gives Hou et al. (2015) a relevant recognition, in relation to the robustness of the q-4 model. Because of that, the inclusion of the same investor sentiment proxy, on the Carhart 4-factor model, was tested. Once more, the bullish and bearish sentiment proxies do not show statistically significant coefficients.

So, is investor sentiment a missing factor for the explanation of European mutual funds' performance, which invest mainly in US equity? At the individual fund level, it seems that investor sentiment is, indeed, a missing factor. And, at the portfolio level, the answer is complementary. From the first research question, we can conclude that investor sentiment is one of the sources of European fund performance. Moreover, from the second research question, one concludes that investor sentiment is not a risk premium factor. So, one might ask why, in the second research question, the so-called traditional asset pricing models do not recognize the importance of investor sentiment, when, in fact, that importance exists, taking into account the first research question? And the answer is that, not only investor sentiment is a missing factor, in mutual fund individual performance, but also that, the traditional finance models fail to capture the effects of sentiment, in an asset pricing perspective, since their factors are constructed to be risk premium interpretations of excess returns. But, as this investigation suggests, what is really

missing, in those traditional models, is the essence of behavioral finance, with investor sentiment. Thus, future research should test other financial models, in different time periods, with data from distinct regions of the planet, to provide more evidence, and, eventually, to find a conclusive answer in this regard.

However, I have also to mention that there are some limitations in my research work. The fact that I have a restrictive European fund sample, since the selected funds have necessarily to invest most of their holdings in US equity, as to establish a coherent match between an American investor sentiment proxy and an American benchmark, it implied that the winner and loser fund portfolios are somehow short-handed. Nonetheless, also Bu (2020) forms a winner portfolio with 34 funds and a loser portfolio with 32 funds, numbers which are not very different from this investigation.

Additionally, this investigation does not distinguish between the magnitude of the sentiment levels, meaning that sentiment can be relatively more or less bullish/bearish, which would imply different impacts on fund alpha. Moreover, I only study mutual fund performance and investor sentiment contemporaneously. I don't use lagged investor sentiment values, as a predictive indicator of future performance, which can also be relevant in an asset pricing analysis. For example, Bu(2021b) shows that the combination of the AAll and the BW sentiment measure, in a single model, is powerful to explain stock performance, since the first one is effective to capture contemporaneous stock returns, while the second one has a lagging effect, which complements the framework, in a temporal dimension. That also might be true to for alpha in mutual performance, and so, future research should test the inclusion of both proxies simultaneously, because as Bu(2021b) demonstrated, they are low correlated.

And, because of that, research should also concentrate efforts into the study on the definition of robust investor sentiment measures. Apparently, different measures, capture distinct phenomena. So, the evolution of behavioral finance depends on the clarifying of an objective concept of sentiment, to be used in asset pricing models. This work serves as a starting point, as it is provided evidence that, those most accepted traditional models, are failing to explain mutual fund performance, by not incorporating behavioral foundations, in asset pricing.

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8. APENDICES

Appendix 1 –Alpha estimates for the first research hypothesis by model

Panel A: European equity mutual fund's alpha							
Mutual fund name	Carhart 4-factor model	Fama-French 5-factor model	Bullish Carhart 4-factor model	Bearish Carhart 4-factor model	q-4 factor model	Bullish q-4 factor model	Bearish q-4 factor model
3 BANKEN AMERIKA	.00374	.00454	-.00945	.02788*	.00458	-.00979	.02864*
ACOMEA AMERICA A1	.00034	-.00056	-.0022	.00533	.00027	-.00339	.00875
ALLIANZ AZIONI AMERICA	.00142	.00182	-1.00e-05	.01484	.00175	-.00049	.01523
ALLIANZ RCM US EQUITY A	.00226	.00248	-.01081	.02558*	.00264	-.01184	.02634*
AMERI GAN D GROUPAMA	.00363	.00438*	-.00874	.02058*	.0039	-.00785	.02102*
AMONIS EQUITY US CANADA	.00565**	.00715***	.00072	.01609	.00692***	.00104	.01453
AMUNDI AKTIEN ROHSTOFFE A	-.00595	-.00822**	-.01237	.01978	-.00569	-.01581	.02657
AMUNDI AZIONARIO	.00127	.00198	-.00514	.0187**	.00152	-.00535	.01826*
ANIMA AMERICA A	.00402*	.00441*	-.00355	.01539	.00413*	-.00319	.01565
ARNIKA ARVEST AM.STARS	.00378	.00285	.00797	.00945	.00355	.00752	.01353
ASI AMER.UCND.EQ. RET	.00284	.00372	-.00339	.02135	.0037	-.00402	.02139
ASI AMERICAN EQUITY	.00277	.00289	-.00604	.01618	.00272	-.00551	.01723
ASI STANDARD LIFE NORTH AMERICA	.00346	.00403	-.00705	.0217	.00405	-.00699	.02222
AVIVA AMERIQUE I	.00334	.00383	.00047	.01333	.00375	.00084	.01341
AXA FRAMLINGTON GLOBAL TECHNOLO	.00418	.00621*	-.01381	.03689**	.00643*	-.01899	.03325*
AXA INDICE USA A C	.00484**	.0052**	-.00133	.01459	.00483**	-.00024	.01534
AXA ROSENBERG AMERICAN	.00402	.00425	-.00934	.0202	.00409	-.00876	.0209
BANKIA BOLSA USA	.00074	.00154	-.01007	.0171	.00091	-.00853	.01741
BANKIA INDICE S&P 500	-.00196***	-.00205***	-.00197	-.00085	-.00226***	-.00176	-.00065
BATI ENTREPRENDRE	.00272	.00336	-.01034	.02944**	.00333	-.01185	.02995**
BBVA BOLSA USA	.00226	.00267	-.00315	.00792	.00257	-.00294	.00856
BBVA INDICE USA PLUS	-.00421***	-.00423***	-.00579**	-.0046**	-.00414***	-.00633***	-.00467**
BCV ENHANCED US	-.00156***	-.00152***	.00009	-.00126	-.00163***	.00021	-.00124
BLACKROCK US DYNAMIC INC	.00345	.00397	-.01225	.02414*	.00319	-.0107	.02475*
BLACKROCK US OPPS.AC	.00294	.00354	-.00889	.0237*	.00348	-.00874	.02522*
BLLE.GIFF.AMER.A AC.	.0053	.00677**	-.00255	.02811*	.00778**	-.00755	.02559
BMO NORTH AMERICAN EQUITY 1	.00407	.00416	-.0109	.02052	.00386	-.00954	.02171
BMO US SMALLER COMPANIES	.00464	.00467	-.00678	.02032	.00473	-.00554	.02288
BNL AZIONI AMERICA	.00226	.00314	-.00554	.0211*	.00315	-.00679	.01925
BNY MELLON US OPPORTUNITIES	.00087	.00238	-.01176	.02423	.00228	-.01459	.0238
BSO AMER(C) SEGIPA	.00115	.00143	.00032	.00505	.00168	-.00059	.00508
C-QUADRAT GLOBAL EQUITY ESG R -	.00164	.00274	-.01776	.01825	.00131	-.01532	.01751
CAIXA ACOES EUA	.00318	.00377	-.00672	.01635	.00345	-.00634	.01734
CAIXABANK BOL SELECCION USA	.00215	.0027	-.00583	.01294	.00249	-.00546	.01371
CAIXABANK BOLSA USA	.00311	.00335	-.00174	.01135	.00304	-.00055	.0123
CAJA INGENIEROS BOLSA	.00193	.00213	-.00085	.00787	.00174	.00042	.00823
CD AMERIQUE STGIS.A	.0027	.00338	.00217	.01425	.00313	.00307	.01498
CLEMED.INV.IOM US EQ	.00436	.00458	-.01142	.02362*	.0043	-.0104	.02478*
CM-AM INDICIEL AMERIQUE 500 C	.00433*	.00484**	.00166	.01508	.00448*	-.00072	.0158
COLUMBUS AMERICAN	-.00191	-.00166	-.01345*	.00541	-.00194	-.01123	.00575
COLUMBUS US MARKET	-.0042*	-.00396	-.00864	-.00361	-.00398	-.00626	-.00235
COVEA ACTIONS AMERIQUE A	.00334	.00383	.00047	.01333	.00375	.00084	.01341
CPR USA ESG - P (C)	.00413*	.00453*	-.00374	.01675	.00407*	-.0025	.01765
DANSKE INVEST BIOTEKNOLOGI	.00674	.00935*	-.00589	.03733	.01224**	-.01535	.03589
DANSKE INVEST TEKNOLOGI	.00512	.00764**	.00351	.02233	.00754**	-.00106	.0183
DANSKE INVEST USA	-.00238**	-.00239**	-.00254	.00177	-.00257**	-.00198	.00309
DANSKE INVEST USA DKK D	.00416	.00454*	-.00265	.01716	.00412	-.00132	.01908
DIT BIOTECHNOLOGIE	.00438	.0065	-.00025	.01662	.01032*	-.01039	.01679
DPAM CAPITAL	.00504**	.00546**	-.00084	.01593	.00517**	-.00007	.0167
DPAM CAPITAL B	.00598**	.00605**	.00134	.0126	.00553**	.0034	.01382
DPAM CAPITAL B EQUITIES US	.00313	.00348	-.00395	.01296	.00285	-.00295	.0145
DPAM DBI-RDT B	.00472	.00482	-.01698	.03334**	.00483	-.01669	.03539**
DWS INV.NORDAMERIKA	.00383	.00472*	-.00891	.03302***	.00533**	-.01184	.03226**
EDMOND DE ROTHSCHILD	.00376	.00495**	.00236	.01499	.00493**	.0013	.01374
EOLE (C)	.00368	.00478*	-.00417	.01521	.00464*	-.00403	.01462
ERSTE BEST OF AMERICA	.00321	.0033	-.01672	.03411**	.00384	-.01848	.03557***
ESPA STOCK AMERICA	.00224	.00259	-.00862	.02528*	.0026	-.00764	.02666**
ESSOR USA OPPORTUNITIES P	.00416	.00496*	-.00208	.01934	.00584**	-.00448	.01874
ETOILE ACTIONS US	.00461**	.00504**	.00011	.01253	.00482**	.00078	.01306
ETOILE MULTI GESTION	.00228	.00294	.00021	.01163	.0027	-.00033	.01183
ETOILE MULTI GESTION ETATS-UNIS	-.00307***	-.0031***	-.00038	-.00305	-.00314***	-.00099	-.00305
EURIZON AM AZIONI	.00065	.00104	-.00862	.02039*	.00067	-.00933	.02109*
EURIZON AZIONI AMERICA	.00277	.0034	-.00134	.01424	.00305	-.00105	.0151
FEDERAL INDICIEL US	.00473**	.00514**	-.00222	.01746	.00483**	-.00106	.01861*
FID.AM.INSTL.FD.	.00406	.00443*	-.01321	.02708**	.00404	-.01207	.02825**
FIDELITY AMERICAN A ACC	.00251	.00334	-.01349	.02151	.0032	-.01286	.02248*
FIDELITY AMERICAN SPECIAL	.00393	.00405	-.01402	.02388*	.00358	-.01172	.02609*
FIDEURAM MASTER SEL.EQ	.00203	.00261	-.01004	.02082*	.0024	-.01032	.02104*

Appendix 1 –Alpha estimates for the first research hypothesis by model (continued)

FONDMAFRE BOLSA AMERICA	.00303	.00317	-.00258	.01165	.00228	-.00024	.01251
FOURPOINTS AMERICA	.00226	.00248	-.00131	.00628	.0025	-.00084	.00745
GAM NORTH AMERICAN GROWTH A	.00564*	.00551*	.00111	.00908	.00542*	.00306	.01109
GROUPAMA US EQUITIES	.00391	.00467*	-.00681	.01999*	.00405*	-.0063	.02026*
GUT.KAPITALANLAGE	.00214	.00241	-.00018	.02076	.0026	-.00033	.02239
GUTZWILLER FON.MAN.ONE	.00203	.00257	-.00059	.0126	.00246	-.00009	.01445
HALIFAX NORTH AMERICAN C	.00451	.00461	-.01064	.02187	.0044	-.00963	.02299
HANDELSINVEST NORDAMERIKA	.0045*	.00547**	-.00273	.0264**	.00506*	-.00381	.02583*
HSBC AMERICAN INDEX	.00518*	.00534*	-.00718	.02258*	.00524*	-.00627	.0236*
IBERCAJA BOLSA USA	.00292	.00293	-.00026	.01065	.00248	.00042	.01192
ING DIRECT FONDO NARANJA	.00438*	.00483*	.0003	.01294	.00443*	.00068	.01314
INVESCO US EQUITY (UK)	.00263	.0023	-.00332	.01734	.00268	-.00426	.02009
INVESTITORI AMERICA	.0036*	.00378*	-.00159	.01343	.00349*	-.0004	.01445
IQAM QUALITY EQUITY	.00475*	.00475*	-.00964	.01849	.0043	-.00715	.01908
JANUS HENDERSON INST	.00417	.00435	-.00506	.0196	.00438	-.00483	.02079
JANUS HENDERSON US GROWTH A	.0025	.00334	-.01726	.02326	.00372	-.01869	.02283
JPM US EQUITY	.00615**	.00597**	-.00631	.0177	.00567*	-.00388	.02006
JPM US SELECT	.00398	.00444	-.01104	.02567*	.00418	-.01112	.02621*
JPM US SMALL CAP GROWTH A	.00394	.00555	-.00711	.02371	.00686*	-.01132	.02189
JUPITER NTH AMERICAN INC	.00403	.00409	-.00595	.01733	.00381	-.00426	.01965
KATHREIN US-EQUITY	.00302	.00365	-.01377	.0307**	.00404	-.01417	.03124**
KBC EQ.FD.BUYBACK AM	.00437*	.00465*	-.00296	.01415	.00437*	-.00117	.01547
KBC EQ.FD.SMALL CAPS	.00454*	.00464*	-.00185	.01136	.00433*	.00052	.01279
KBC EQ.FD.US VALUE CAP	.00488**	.00512**	-.00005	.01334	.00454*	.00218	.0151
KBC EQUITY NORTH AMERICA	.00397	.00463*	.00003	.01261	.00423*	.00115	.01338
KBC INSTL.FD.US EQ. CAP	.00518**	.00588**	.00144	.01284	.0055**	.0022	.01365
KEPLER US AKTIENFONDS A	.0051*	.00522*	-.01765	.02976**	.0047	-.01658	.03078**
KLP AKSJIE USA INDEKS	.00508**	.0055**	-.00209	.01677	.00523**	-.00125	.01772
KLP AKSJIE USA INDEKS II	-.00337*	-.00351**	-.00386	-.00043	-.00285*	-.00488	.00246
KUTXABANK BOLSA EEUU	-.00222***	-.00266***	-.01058***	-.00084	-.00306***	-.00915**	-.00014
LABORAL KUTXA BOLSA	-.00368***	-.00331***	-.00837*	.00333	-.00372**	-.00815*	.00261
LANSFORSAKRINGAR	.00521**	.00559**	-.00757	.0217*	.00528**	-.00619	.0227*
LANSFORSAKRINGAR USA	.00425	.00466*	-.00751	.02184*	.00448	-.00771	.02247*
LAZARD ACTIONS	.00255	.0032	-.00222	.01506	.00269	-.00066	.0161
LBPAM ISR ACTIONS AMERIQUE	.00243	.0031	-.00432	.01669	.00289	-.00399	.01795
LIONTRUST US OPPORTUNITIES A	.00222	.00366	-.00442	.01944	.00431	-.00735	.01885
M&G NORTH AMERICAN	.0034	.00371	-.0096	.02386*	.00273	-.00754	.02593*
M&G NORTH AMERICAN DIVIDEND	.00407	.00435	-.00794	.02128	.00428	-.00706	.02298
MANSARTIS AMERIQUE	-.00024	.00066	.00005	.0152	.00005	-.00108	.01354
MARLBOROUGH US MULTI-CAP	.00453	.00473	-.0095	.01936	.00432	-.00753	.02021
MULTI MANAGER INVEST	.00334	.00375	-.00961	.02573**	.00355	-.00929	.02686**
MULTIFONDO AMERICA A FI	-.00215*	-.00202*	-.00954*	.01288**	-.00218*	-.01076**	.01181**
MUTUAFONDO RENTA	-.00015	-.00011	-.00113	-.00005	.0000	-.00167	.00004
NATIXIS ACTIONS US	.00484**	.00571**	.00411	.01035	.00571**	.00196	.00864
NINETY ONE AMERICAN FRANCHISE	.0033	.00422	-.02205	.03653**	.00343	-.02198	.0376**
NN NORTH AMERICA	.00481**	.00516**	.0015	.01474	.00474**	.00213	.01547
NOBLE FUND	-.00671**	-.0059**	-.01428	-.00442	-.00557**	-.0162	-.00575
NORDEA INVEST NORTH AMERICA	.00385	.0042	-.01789	.02863**	.0035	-.01689	.02929**
OHMAN ETISK INDEX USA A	.00524**	.00586**	-.00237	.01934*	.00547**	-.00187	.01976*
PALATINE AMERIQUE PALATINE	.00379*	.00381	-.00144	.00655	.00358	-.00044	.00788
PEKAO AMERICAN EQUITY	.00002	.00058	-.00527	.00911	.0004	-.00479	.00957
PWM US DYNAMIC	.00392	.00496	-.01395	.03564**	.00492	-.01608	.03444**
ROYAL LONDON US GROWTH	.00304	.00349	-.00943	.02514*	.00404	-.01226	.02596*
SABADELL ESTADOS UNIDOS	.00236	.00316	-.00101	.00921	.00212	.00115	.00943
SANTANDER ACCOES AMERICA A	.00297	.0031	-.00438	.01221	.00257	-.0028	.01401
SANTANDER PF UNITED STATES	.00473	.00496*	-.01113	.0241*	.00498*	-.01099	.02521*
SCHRODER QEP US CORE INST.INC	.00525*	.00535*	-.01116	.02674**	.00495*	-.00993	.02793**
SCHRODER US MID CAP A	.00495*	.00523*	-.00107	.02043	.00513*	-.00082	.02147
SCHRODER US SMALLER COS. A	.0052*	.00556*	-.00512	.02459*	.00537*	-.00444	.02584*
SCWID.AMER.GW.CL.A AC	.00427	.00437	-.0082	.01809	.00418	-.00728	.0194
SEBINVEST NORDAMERIKA	.00465*	.00534*	-.01145	.02361*	.00551*	-.01198	.0248*
SKANDIA FONDER AB SF	.00433*	.00475*	-.00929	.02163*	.00462*	-.00857	.0227*
SMITH & WILLIAMSON NORTH AMERIC	.00333	.00378	-.00651	.01789	.00392	-.00682	.01892
SPARINVEST INDEX USA	.00469*	.00564**	-.01143	.0281**	.00578**	-.01292	.02722**
SPP AKTIEFOND USA A	.00539**	.00581**	-.0076	.02343*	.00562**	-.00677	.02436**
ST JAMES'S PLACE NORTH AMERICAN	.00586*	.00631**	-.00542	.02642*	.00595*	-.00522	.0281*
STATE ST AUT NTH AMERICA	.00499**	.00534**	.00027	.01387	.00507**	.00108	.01474
STRAT INDICE USA(C) LEGAL	.00399*	.00428*	.00092	.01194	.00412*	.00176	.01274
SYDINVEST USA LIGEVAEGT	.00598**	.00582**	-.00034	.01838	.00536*	.00178	.0202
SYNCHRONY US EQUITY A	.00302	.00348	-.0062	.01293	.00329	-.00602	.01329
TBF GLOBAL TECHNOLOGY	.0024	.0049	-.00419	.01736	.00526	-.00572	.01488
THREADNEEDLE AM EXTENDED	.00463	.00547*	-.00552	.02008	.00509*	-.00608	.02012
THREADNEEDLE AMERICAN RETAIL	.00439	.00513*	-.01328	.02756**	.00491*	-.01379	.02782**
THREADNEEDLE AMERICAN SELECT RE	.00339	.00421	-.00823	.02406*	.00395	-.00955	.02412*
THREADNEEDLE AMERICAN SMCOS	.00385	.0044	-.0106	.02624*	.00494	-.01163	.02706*

Appendix 1 –Alpha estimates for the first research hypothesis by model (continued)

UBS (CH) EQUITY FUND	.00291	.00352	-.0031	.02007*	.00328	-.00443	.01946
UBS (CH) INST FD 2-EQ	.0059***	.0063***	-.00065	.01589	.006**	.00023	.01658
UNION INV.PRIVATFONDS	.00308	.00382	-.00217	.01383	.00347	-.00122	.01407
US MULTI-FACTOR EQUITY	.00512*	.0052*	-.01058	.02457*	.00504*	-.0094	.02578*
US NEW TECHNOLOGY	.00257	.00431	-.00232	.01363	.00387	-.00467	.01142
VANGUARD US EQUITY	.0055**	.00593**	-.00079	.01413	.0057**	.00016	.01489
XT USA	.00407	.00419	-.0132	.02662*	.00397	-.01215	.02797**
ZIF AKTIEN USA A1	.00559*	.00649*	.00022	.03319**	.00577*	-.00169	.03209*
ZIF AKTIEN USA PASSIV A1	.00682**	.00754**	.00715	.0289*	.00702**	.00568	.02838*
ALLIANCE TRUST NORTH AMERICAN E	.01651	.00972	-.03298	.01997	.01427	-.01656	.01042
ALLIANZ AMERIKA AANDELEN FONDS	.00153	.00168	-.0038	.01626	.00171	-.00344	.01797
BARCLAYS US ALPHA A ACC DEAD -	.00728*	.00791*	-.02886	.04779***	.00744*	-.01544	.04584**
CF GREENWICH AC. DEAD - Liquidat	.00978*	.01017*	-.02372	.04028	.01019*	-.01498	.03936
CONNECT EQUITY USA GREEN I - TO	.00769***	.0087***	-.00906	.02041	.00861***	-.00628	.01767
CONNECT EQUITY USA RED I DEAD -	.00566**	.00608**	-.00924	.0166	.006**	-.00409	.01613
CS (CH) US QUANT EQUITY FUND LI	.0038	.00479	-.01802	.01194	.00442	.00398	.01148
DEUTSCHE (CH) I US EQUITIES LD	.00643**	.00699**	-.01224	.03164**	.00667**	-.00503	.03085**
DEXIA CLICKINVEST B INDEX LINKE	.0016***	.00192***	.00923***	-.00348	.00177***	.00721**	-.00229
DPAM INVEST B EQUITIES US DIVID	.00434*	.00439*	-.0062	.01051	.00437*	-.00429	.01164
EFG EQ.FUNDS NTH.AM. DEAD - Liq	.00619*	.00717*	-.02042	.04257***	.00681*	-.01296	.04262***
ETHOS EQUITIES NORTH AMERICA RP	-.00599	-.00659	-.11703**	.06444	-.00916	-.09341	.05363
EVLI FONDER ERIK PENSER AKTIEIN	.00338	.00374	.05804*	-.04243	.0036	.04211	-.03115
FF & P US SMALL CAP. EQUITY B I	.00854**	.01065**	-.02673	.0433**	.01153**	-.01672	.04546**
HSBC PPUT NORTH AMERICAN DEAD -	.00584	.0061	-.03183	.03326*	.00562	-.01511	.02787*
JYSKE INVEST US EQUITIES CL - T	.00436	.00508*	-.00834	.02626*	.00448	-.00795	.02634*
KAMES AMERICAN EQUITY B GBP - T	.00213	.00288	-.02371	.02407	.00259	-.016	.0248
KBC EQUIMAX QUALITY STOCKS US 1	-.00078	-.00075	-.01293	-.0102	-.00101	.01448	-.01076
LB.BL.INV.LINGOHR AMERIKA SYST	-.00003	-.0009	-.02474	.02498	-.00033	-.02462	.02899*
MAN GLG AMERICAN GROWTH RETAIL	.00316	.00395	-.01369	.01789	.00492	-.01444	.01884
MITON AMERICAN RET ACC DEAD - L	.00409	.0048	-.02945	.02795	.00496	-.01351	.02779
MULTI MANAGER HEALTH CARE - TOT	.02289**	.02489**	.12522*	.01032	.02004*	.11176*	.02211
MULTI MANAGER HEALTH CARE AKKUM	.01149**	.01088*	.04983	.00747	.00899*	.05055*	.00846
MULTI MANAGER INVEST TEKN AKK -	.00553	.00664	.01261	.01061	.00509	.01167	.01236
MULTI MANAGER INVEST TEKNOLOGI	.01275	.0156*	.06387	.01226	.0121	.05472	.02031
NEPTUNE US MAX ALPHA A DELISTED	.0051	.0029	-.02222	.0539	.00116	.00277	.03876
OBJECTIF AMERIQUE \$ COUV SOCIET	-.00511***	-.00484***	-.00284	.00052	-.00537***	-.00171	.00013
OPPENHEIM KPL.AMER. EQUITIES -	.00286	.00399	-.01352	.03016*	.00496	-.0072	.02781
PIONEER INVESTMENTS AKTIEN DTL.	-.00289	-.00161	-.00885	.00948	-.00233	-.01423	.00443
PUTM NORTH AMERICAN ACC DEAD -	.00385	.00454	-.01547	.02542	.00487	-.01423	.02394
QUILVEST MULTI USA P QUILVEST G	.00111	.00169	-.01043	.01013	.00195	-.00747	.01002
SCOTTISH WIDOWS HIFML US FOCUS	.00378	.00393	-.01707	.01788	.00446	-.01398	.01879
SCOTTISH WIDOWS HIFML US STRATE	.00435	.00474	-.01655	.02683	.006	-.01902	.02964
SIEMENS EQUITY NORTH AMERICA -	.00296	.00313	-.00319	.02395*	.00341	-.00446	.02576*
SNS AM.AANDFDS. DEAD - Liquidat	.00539**	.00598**	-.00044	.01821	.00552**	.00033	.01897
SSGA US ALP.EQ.FD.I EUR STE.STR	.00455	.00324	.00451	.0106	.00193	.01915	.00512
STAR LIBERTY AMERICA DEAD - Liq	.00781**	.00829**	-.01593	.03183**	.00797**	-.00587	.03101**
STOCKINDEX USA DEAD - Liquidate	.00476*	.00507*	-.00822	.00473	.002718*	-.0076	.02801**
UBS US 130 30 EQUITY A DELISTED	.0041	.00301	-.02757	.03911	-.00062	-.0193	.03544
UFF CROISSANCE PME X DEAD - Mer	.00263	.00311	.00199	.02183	.00268	-.00968	.02324
UNIVERSAL INV.GESELL. HOTCHKIS&	.00732	.00864	-.00617	.05638	.00762	-.01115	.05609
US SPECIAL EQUITY A DEAD - Liqu	.00337	.00298	-.01307	.01863	.00222	-.00994	.02052
VOLKSBANK AM.INVEST T DEAD - Li	.00367	.0036	-.00523	.02524	.00419	-.00572	.02778
VVA - AKTIEN USA F DEAD - Liqui	.00543**	.00598**	-.00699	.01523	.00577**	-.00326	.01561
WARBURG INVEST KPL. US DIVERSIF	.0021	.00127	-.03376*	.02266	.0015	-.02341	.0228
ABERDEEN NORTH AMERICAN EQUITY	.00858**	.00912**	-.02316	.02768	.009**	-.00202	.02824
AHORRO CORPORACION USA DEAD - M	-.00139**	-.00168**	-.00354	-.00177	-.00176**	-.00452	-.00093
ALLIANZ ACN.US COUVERT GLOBAL I	-.00319*	-.00384**	.00116	-.01052	-.00372**	.00012	-.00887
ALLIANZ ACTIONS US GLB. INVESTO	.00512	.00499	-.00681	.01486	.00523	.00329	.01655
AMERICA LMM(C) LOUVRE (BANQUE D	-.00193*	-.00162	-.01237**	.01035**	-.00145	-.01173**	.01001**
AMERIQUE RENDEMENT (C) EDM.DE R	.00211	.00246	-.00775	.00388	.00334	-.0101	.00685
AMUNDI AMERIKA BLUE CHIP STOCK	-.00289*	-.00328**	-.01284*	.01002	-.00346**	-.01254*	.01086
AMUNDI EQUITY STRATEGY USA A -	.00272	.00313	-.00887	.0271*	.00269	-.00787	.0275**
AMUNDI FRN.INDEX USA I CAP - TO	.00593*	.00524	.00761	.00613	.00391	.01746	.00161
ANIMA GEO AMERICA A DEAD - Merg	.0033	.00379	-.0033	.01451	.00337	-.00272	.01467
ANIMA NEW YORK MERGED SEE 88143	-.00335	-.0016	.02056	-.01085	-.00473*	.01246	-.0081
APIUS AVENIR AMERIQUE DELUBAC A	-.00759	-.00789	.01694	.00829	-.00833	.00503	.01448
AXA FRAMLINGTON EQ.INC. AC. - T	.0065*	.00736**	.0057	.01897	.00738**	-.0019	.02138
BANCAJA RN.VAR. ESTADOS UNIDOS	.008*	.00627	.00482	.02361	.00128	.01396	.015
BCY.ALPHASTARS US CAP. BARCLAYS	.00319	.00312	.00447	.02279	.00112	.01537	.01729
BCY.AMERIQUE FCP WEALTH MANAGER	.00314	.00312	.0035	.01225	.0017	.01183	.01049
BNP PARIBAS ACTS USA (C) BNP PA	.00403	.00451	-.01852	.0252*	.00407	-.01487	.02443*
BNP PARIBAS B I EQUITY USA CAP	.00482*	.00576*	-.00663	.01898	.00566*	-.00522	.01784
BNP PARIBAS QUANTAMERICA BNP PA	.00489	.0054	-.0036	.02694	.00489	.00223	.02676
CANDRIAM SUSTAINABLE NORTH AMER	.00332	.00307	-.00515	.0095	.00328	-.0043	.01115
CEP GESTORA FONPENEDES BORSA US	.00471*	.00474*	-.00707	.00982	.00481*	-.00293	.00951
CNP ASSUR AMER(D) CAISSE NATION	-.00075	-.00028	.00056	.00513	-.00053	-.00009	.00394

Appendix 1 –Alpha estimates for the first research hypothesis by model (continued)

COLUMBIA SECURITIES DEAD - Merg	-.00169	.00012	-.01178	.03476	-.00036	-.00766	.03093
CPR ACTIVE US (H - EUR) - P - T	-.0031***	-.00319***	-.00884**	.00177	-.00327***	-.00727*	.00111
CSIF NORTH AMERICA INDEX BLUE -	.01015***	.01056***	-.01668	.04089***	.01001***	-.00617	.04006***
DWS INVESTMENT US AKTIEN TYP O	.00251	.00266	-.01877	.02651**	.00186	-.01648	.02824**
ECHIQUE AMERIQUE FINANCIERE D	.00824**	.00883**	-.01103	.02926	.00876**	-.00843	.03286*
EPARAMERIC(C) LA POSTE - TOT RE	.00362	.00388	-.01133	.02467	.00285	.00125	.02337
EQUITY STRATEGY NA.T DEAD - Mer	.00704*	.00736*	-.0241	.03964**	.00706*	-.01643	.04156***
EURIZON AZIONI PMI AMERICA - TO	.00207	.00278	-.02021*	.02026	.00282	-.01821	.022*
EUROVALOR ESTADOS UNIDOS FI - T	.00243	.00305	-.00521	.01519	.00284	-.00496	.0159
FD.MAN.SWITZ.AG CH INST 2 EQUIT	.00672**	.00797**	-.00442	.02618*	.00791**	-.00474	.02532*
FONCAIXA CARTERA BOLSA USA FI (	.00522	.00477	.00968	.01363	.004	.02153	.01285
FONCAIXA I BOLSA USA FI DEAD -	-.002*	-.00211**	-.00588	.00489	-.00285**	-.00289	.00329
FONCAIXA USA FI (IN MER) DEAD -	-.00407	-.00369	.00591	.00625	-.00495*	.01254	.0057
GROUPAMA ACTIONS MID CAP MERGED	.00781	.00768	.00573	.01997	.00484	.01555	.01569
GROUPAMA US STOCK EURO BANQUE F	.00819*	.00801	.00911	.01874	.00422	.01613	.01472
GROUPAMA USACTIONS (C) MERGED S	.00714	.0072	.01225	.01234	.0054	.02043	.0097
HANSAINVEST HANSEATISCHE INV.GE	.00439	.00366	-.00433	.03667	.00159	.00594	.03249
HSBC FSAVC NORTH AMERICA DEAD -	.00516	.00533	-.02971	.02636	.00527	-.01615	.02785
INDOSUEZ ELITE US CREDIT AGRICO	.00539*	.00585*	-.0114	.02835*	.00479	-.00246	.02621*
INVERSEGUROS SEGURFONDO USA - T	.00111	.00111	.00427	-.00233	.00049	.00375	-.00273
IQAM EQUITY US (RT) DEAD - Merg	.00312	.00353	-.00701	.01943	.0028	-.00547	.01999
JPM US A ACC DEAD - Merged	.00374	.00342	-.0225	.02307	.00378	-.01741	.02413
JYSKE INVEST USA AKTIER KL - TO	.00369	.00433*	-.00817	.02472**	.00404	-.00797	.02546**
KBC INDEX FD. USA CAP DEAD - Me	.00549**	.00589**	-.01135	.01706	.00574**	-.00639	.01638
KUTXAVALOR EEUU FI DEAD - Merge	.00607	.0046	.01639	.00946	.00351	.03094	.002
MAITRE AMERICAN EQUITIES ASST.A	.00198	.00304	-.01425	.02538*	.00348	-.01784	.02506*
MAM AMERQUANT DEAD - Merged	.00007	.00063	-.01277	.00176	.0008	-.00944	.00241
MARTIN CURRIE NTH.AMER. CL.A -	.00714*	.00774**	-.01995	.03537**	.00702*	-.00939	.03618**
MARTIN MAUREL COMPOSITION AMERI	.00334	.00392	-.0015	.01787	.00372	-.00163	.01839
MC FDF AMERICA A MERGED SEE 257	-.00686***	-.00556**	-.01348	.00639	-.00754***	-.01084	.0041
MULTI MANAGER INVEST USA	.00327	.00356	-.01036	.02636**	.00351	-.00971	.02772**
NB ACDES AMERICA DEAD	-.00267	-.00158	-.01198	.0053	-.00182	-.01013	.00429
NEUFLIZE USA OPNS. \$ C OBC ASST.	-.00176	.00025	-.00584	.02712	.00064	-.01083	.02842
OBJECTIF GEST VAL AMER. SOC DE	.00181	.00273	-.01108	.01836	.00232	-.00286	.01742
ODDO BHF ACTIONS USA CR-EUR - T	-.00235***	-.00245***	-.00212	-.0005	-.00258***	-.00198	-.00067
OPTIMIX AMERICA FD DEAD - Merge	.00548*	.00479	-.01517	.02236	.00524*	-.01401	.02616*
PKO AKCJI RYNKU AMERYKANSKIEGO	-.00159	-.00146	-.00874	.00556	-.0017	-.00222	.00547
R-CO CONVICTION USA C DEAD - Me	.00063	.00109	-.00434	.01243	.00077	-.00399	.01335
RENTA 4 TECNOLOGIA DEAD - Merge	.00212	.00218	-.00356	.00609	.00213	-.00089	.0078
SCWID.UK.SMCOS.CL.B AC. DEAD -	.00449	.00563*	-.00528	.01048	.00558	-.00721	.01041
SLGP PRIGEST US DEAD - Merged	.00319	.00375	.00373	.00823	.00578	-.00233	.01144
SLI IGNIS AMERICAN GROWTH INC -	.00541	.00724*	-.02657	.02957	.00717*	-.00797	.02716
SOCIETE GENERALE ACTIONS US SEL	.00171	.00233	-.00674	.01123	.00213	-.0058	.01258
SPARINVEST VALUE USA KL DEAD -	.00291	.00309	-.0038	.01259	.00268	-.00242	.01428
SSGA NA.ENH.EQ.FD.I STE.STR.GLB	.00874***	.00907**	-.01437	.03187**	.00848***	-.00213	.03146**
SSGA US IDX.EQ.FD.P USD STE.STR	.00664**	.00734**	-.01566	.02125	.00689**	-.0019	.02122
SWC (CH) INDEX EF MSCI USA A -	.00588	.00409	.01447	.01026	.00245	.022	.00689
SYNERGIA AZIONARIO USA DEAD - M	.00217	.00307	.00825	.00643	.00079	.00407	.01024
Santander Accoes USA	-.00789*	-.00644	.00366	-.01242	-.00761*	.00029	-.01382
THE WESTCHESTER US DOLLAR ACC -	.00693*	.0079*	-.00873	.02445	.00776*	-.00918	.02126
TOBAM ANTI BENCHMARK US EQUITY	.00946**	.00946**	.00000	.04017**	.00976***	.00195	.04009**
UFF CROISSANCE PME X DEAD - Mer	.00263	.00311	.00199	.02183	.00268	-.00968	.02324
WARBURG INVEST KPL. WARBURG AME	.00431	.00271	-.00012	.01448	.00223	.01776	.00815
ALPHA COSMOS STARS USA EQUITIES	.0026	.00337	-.00544	.01744	.00325	-.00596	.01807
ALTA USA DEAD - Merged 9104PL	-.00058	-1.00e-05	-.01018	.01719	-.00031	-.01092	.01633
Aktia America B	.00266	.00287	-.00147	.01598	.00276	-.00115	.01705
BCV SYSTEMATIC PREMIA US EQUITY	.00503**	.00553**	.00032	.01036	.00539**	.00186	.01169
FIM USA - TOT RETURN IND	.00003	.00096	-.00916	.01666	-.0002	-.00844	.01592
FoLocalTapiola ESG USA Mid lha7	.00241	.00297	.00247	.00997	.00219	.00377	.00993
FoleQ USA Indeks 1 Kha4	.00504**	.00544**	-.00175	.01572	.00501**	-.00064	.01635
NN SUB SPOLEK DYWIDENDOWYCH USA	-.00419**	-.00495***	.0133	-.01427*	-.00509**	.01332	-.01422
NORDEA MEDICA KASVU DEAD - Merg	.00916**	.00982**	.03242	.01952	.00891**	.03273	.019
Nordea North American Dividend	.00386	.00412	-.01835	.02718**	.00334	-.01721	.0277**
Piraeus US Equity Fund R	.00235	.00229	.00298	.00718	.00222	.00415	.00831
SEB North America Index B	.00446**	.00481**	.00077	.01406	.00457**	.0015	.01493
TRITON AMERICAN EQUITY INTERNAT	-.00005	.0015	-.00413	.01207	.00066	-.00466	.01232

Note: This appendix contains the alpha estimates across different models for each one of the 285 mutual funds to answer the first research question. It supports the results presented in table 2 and it contains the winner and loser funds divided into two portfolios (the q-4 factor model column), to answer the second research question. *** Indicates statistical significance at the 1% level. **Indicates statistical significance at the 5% level. *Indicates statistical significance at the 10% level.

Appendix 2 –Alpha estimates for the robustness check by model

Panel B: Robustness check mutual fund's alpha				
Mutual fund name	Carhart 4-factor model	q-4 factor model	Carhart 4-factor model plus BW	q-4 factor model plus BW
3 BANKEN AMERIKA	.00302	.00382	.0033	.00428
ACOMEA AMERICA A1	.00016	.0003	.00016	.00074
ALLIANZ AZIONI AMERICA	.00088	.00123	.00089	.00133
ALLIANZ RCM US EQUITY A	.00184	.00223	.00165	.00221
AMERI GAN D GROUPAMA	.00333	.00377	.0037	.00424
AMONIS EQUITY US CANADA	.00505**	.0062**	.00518*	.00617**
AMUNDI AKTIEN ROHSTOFFE A	-.00599	-.00563	-.00742*	-.00626
AMUNDI AZIONARIO	.00055	.00085	.00126	.00157
ANIMA AMERICA A	.00371	.00405	.00389	.00428
ARNIKA ARVEST AM.STARS	.00352	.00361	.00316	.00371
ASI AMER.UCND.EQ. RET	.0021	.0029	.00204	.00292
ASI AMERICAN EQUITY	.00206	.0019	.00199	.00199
ASI STANDARD LIFE NORTH AMERICA	.00288	.00348	.00288	.00361
AVIVA AMERIQUE I	.00266	.00323	.00235	.00293
AXA FRAMLINGTON GLOBAL TECHNOLO	.00383	.00622	.00296	.00516
AXA INDICE USA A C	.00441*	.00456*	.00426	.0045*
AXA ROSENBERG AMERICAN	.00353	.00377	.00362	.00404
BANKIA BOLSA USA	.00019	.00047	.00004	.00038
BANKIA INDICE S&P 500	-.00187***	-.00214***	-.00184***	-.00212***
BATI ENTREPRENDRE	.0023	.00296	.00211	.00289
BBVA BOLSA USA	.002	.00241	.00192	.00242
BBVA INDICE USA PLUS	-.00398***	-.00393***	-.00383***	-.00378***
BCV ENHANCED US	-.00169***	-.00178***	-.00163***	-.00172***
BLACKROCK US DYNAMIC INC	.00306	.00298	.00338	.00341
BLACKROCK US OPPS.AC	.00218	.00314	.00171	.00291
BLLE.GIFF.AMER.A AC.	.00536	.00746**	.00511	.00706*
BMO NORTH AMERICAN EQUITY 1	.00371	.00361	.00356	.00366
BMO US SMALLER COMPANIES	.00439	.0048	.00488	.00565
BNL AZIONI AMERICA	.00178	.0026	.00202	.00273
BNY MELLON US OPPORTUNITIES	.00104	.00252	.00102	.00253
BSO AMER(C) SEGIPA	.00073	.00152	.00072	.00158
C-QUADRAT GLOBAL EQUITY ESG R -	.00134	.0009	.00056	-.00002
CAIXA ACOES EUA	.00306	.00343	.00268	.00314
CAIXABANK BOL SELECCION USA	.00168	.00215	.00162	.00219
CAIXABANK BOLSA USA	.00263	.00271	.00266	.00289
CAJA INGENIEROS BOLSA	.00178	.00168	.00136	.00128
CD AMERIQUE STGIS.A	.00207	.00279	.00195	.00279
CLEMED.INV.IOM US EQ	.00407	.00415	.00425	.00454
CM-AM INDICIEL AMERIQUE 500 C	.00382	.0041	.00374	.00411
COLUMBUS AMERICAN	-.00184	-.00185	-.00104	-.0009
COLUMBUS US MARKET	-.00458*	-.00424	-.00456	-.00403
COVEA ACTIONS AMERIQUE A	.00266	.00323	.00235	.00293
CPR USA ESG - P (C)	.00369	.00379	.00378	.004
DANSKE INVEST BIOTEKNOLOGI	.00754	.01247**	.00604	.01103*
DANSKE INVEST TEKNOLOGI	.00452	.0071**	.00314	.00527
DANSKE INVEST USA	-.00213**	-.00237**	-.00189*	-.00198*
DANSKE INVEST USA DKK D	.0039	.00396	.00405	.00436
DIT BIOTECHNOLOGIE	.00397	.00964*	.00598	.01235*
DPAM CAPITAL	.0046*	.00488*	.00455*	.00494*
DPAM CAPITAL B	.00561**	.00546**	.00593**	.00595**
DPAM CAPITAL B EQUITIES US	.0029	.00287	.00311	.00324
DPAM DBHRTD B	.00438	.00485	.00414	.00488
DWS INV.NORDAMERIKA	.00327	.00467*	.00369	.00518*
EDMOND DE ROTHSCHILD	.00336	.00445*	.00326	.00425
EOLE (C)	.0033	.00415	.00269	.00352
ERSTE BEST OF AMERICA	.00242	.00314	.00195	.00289
ESPA STOCK AMERICA	.00155	.00189	.00042	.00096
ESSOR USA OPPORTUNITIES P	.0034	.00482	.00299	.00447
ETOILE ACTIONS US	.00422*	.00451*	.00418	.00452
ETOILE MULTI GESTION	.00188	.00249	.00177	.00239

Appendix 2 –Alpha estimates for the robustness check by model (continued)

ETOILE MULTI GESTION ETATS-UNIS	-.00282***	-.00285***	-.00265***	-.00266***
EURIZON AM AZIONI	.00062	.00078	.00154	.00179
EURIZON AZIONI AMERICA	.00201	.00239	.00236	.00286
FEDERAL INDICIEL US	.0043*	.00456*	.00437*	.00478*
FID.AM.INSTL.FD.	.00388	.00392	.00396	.00419
FIDELITY AMERICAN A ACC	.00227	.00306	.00195	.00294
FIDELITY AMERICAN SPECIAL	.00455	.00442	.00475	.00495
FIDEURAM MASTER SEL.EQ	.00165	.00206	.00193	.00243
FONDMAPFRE BOLSA AMERICA	.00268	.00215	.00248	.00202
FOURPOINTS AMERICA	.00168	.00188	.00125	.00158
GAM NORTH AMERICAN GROWTH A	.00561*	.00594*	.00552	.00605
GROUPAMA US EQUITIES	.00361	.00388	.00365	.00391
GUT.KAPITALANLAGE	.00152	.00218	.00114	.00206
GUTZWILLER FON.MAN.ONE	.00198	.00244	.00161	.00228
HALIFAX NORTH AMERICAN C	.00423	.00429	.00433	.00458
HANDELSINVEST NORDAMERIKA	.00406	.00449	.00469	.00498
HSBC AMERICAN INDEX	.00462	.00482	.00451	.00489
IBERCAJA BOLSA USA	.00251	.00235	.00251	.00247
ING DIRECT FONDO NARANJA	.00397	.00413	.00417	.00433
INVECO US EQUITY (UK)	.00223	.00254	.00255	.00326
INVESTITORI AMERICA	.00323	.00324	.00344	.00362
IQAM QUALITY EQUITY	.00424	.00383	.00429	.00397
JANUS HENDERSON INST	.00354	.00388	.0032	.00374
JANUS HENDERSON US GROWTH A	.00172	.00289	.00169	.00291
JPM US EQUITY	.00557*	.00533*	.00553	.00559
JPM US SELECT	.00335	.00362	.00357	.00396
JPM US SMALL CAP GROWTH A	.00318	.00597	.00297	.00577
JUPITER NTH AMERICAN INC	.00372	.00358	.00352	.00368
KATHREIN US-EQUITY	.00281	.00388	.00295	.00428
KBC EQ.FD.BUYBACK AM	.0041*	.00423*	.00411	.00443
KBC EQ.FD.SMALL CAPS	.00417	.00418	.00424	.00435
KBC EQ.FD.US VALUE CAP	.00446*	.00437*	.00443*	.00451*
KBC EQUITY NORTH AMERICA	.00344	.00392	.00338	.00394
KBC INSTL.FD.US EQ. CAP	.0046*	.00503*	.00447	.00495*
KEPLER US AKTIENFONDS A	.0046	.00394	.00557*	.00502
KLP AKSJE USA INDEKS	.00462*	.00492*	.00454*	.00498*
KLP AKSJE USA INDEKS II	-.00343*	-.00274	-.00421**	-.00318*
KUTXABANK BOLSA EEUU	-.00197**	-.0026***	-.00197**	-.0026***
LABORAL KUTXA BOLSA	-.00379***	-.00389***	-.00342***	-.0036***
LANSFORSAKRINGAR	.00483*	.00501*	.00487*	.00523*
LANSFORSAKRINGAR USA	.00409	.00451	.00482	.00538*
LAZARD ACTIONS	.00204	.00217	.00194	.0022
LBPAM ISR ACTIONS AMERIQUE	.00172	.0023	.00135	.00208
LIONTRUST US OPPORTUNITIES A	.00139	.00353	.00172	.00392
M&G NORTH AMERICAN	.00333	.00293	.00303	.00279
M&G NORTH AMERICAN DIVIDEND	.00351	.00377	.00273	.00321
MANSARTIS AMERIQUE	-.00112	-.00104	-.0013	-.00141
MARLBOROUGH US MULTI-CAP	.00348	.00325	.00399	.00389
MULTI MANAGER INVEST	.00275	.00305	.00251	.00297
MULTIFONDO AMERICA A FI	-.00211*	-.00225*	-.00193	-.00219*
MUTUAFONDO RENTA	.00011	.00026	-.00013	1.00e-05
NATIXIS ACTIONS US	.00468*	.00569**	.00478*	.00566*
NINETY ONE AMERICAN FRANCHISE	.00276	.00253	.00227	.00207
NN NORTH AMERICA	.0043*	.00448*	.00417	.00443*
NOBLE FUND	-.00656**	-.0054*	-.01074***	-.00991***
NORDEA INVEST NORTH AMERICA	.00334	.00303	.00379	.00355
OHMAN ETISK INDEX USA A	.0048*	.00517**	.0049*	.00536*
PALATINE AMERIQUE PALATINE	.00366	.0036	.00329	.0034
PEKAO AMERICAN EQUITY	-.00043	-1.00e-05	-.00067	-.00016
PWM US DYNAMIC	.00336	.00426	.00346	.00433
ROYAL LONDON US GROWTH	.0023	.00341	.00294	.00428
SABADELL ESTADOS UNIDOS	.00194	.00181	.00217	.00203
SANTANDER ACCOES AMERICA A	.00279	.00263	.00261	.00261
SANTANDER PF UNITED STATES	.00447	.00487	.00478	.00542
SCHRODER QEP US CORE INST.INC	.0049*	.00478	.00476	.00482
SCHRODER US MID CAP A	.00428	.00453	.0043	.00467
SCHRODER US SMALLER COS. A	.00428	.00463	.00423	.00472
SCWID.AMER.GW.CL.A AC	.00394	.00403	.0041	.0044
SEBINVEST NORDAMERIKA	.00417	.00516*	.00419	.0054*
SKANDIA FONDER AB SF	.00411	.0045	.00445	.00507*
SMITH & WILLIAMSON NORTH AMERIC	.00264	.00327	.00246	.00328

Appendix 2 –Alpha estimates for the robustness check by model (continued)

SPARINVEST INDEX USA	.00406	.00514*	.00442	.0055*
SPP AKTIEFOND USA A	.00501*	.00534**	.00508*	.00558*
ST JAMES'S PLACE NORTH AMERICAN	.00515	.00548*	.0053	.00588
STATE ST AUT NTH AMERICA	.00449*	.00471*	.00425*	.00457*
STRAT INDICE USA(C) LEGAL	.00356	.00389	.0032	.00362
SYDINVEST USA LIGEVAEGT	.00563*	.00532*	.00527*	.00514
SYNCHRONY US EQUITY A	.00252	.00292	.00248	.00294
TBF GLOBAL TECHNOLOGY	.00347	.00572	.00189	.00385
THREADNEEDLE AM EXTENDED	.00411	.00487	.00492	.00579*
THREADNEEDLE AMERICAN RETAIL	.00388	.00452	.00414	.00489
THREADNEEDLE AMERICAN SELECT RE	.00278	.00354	.00321	.00406
THREADNEEDLE AMERICAN SMCOS	.0033	.00431	.00258	.00368
UBS (CH) EQUITY FUND	.0022	.00289	.00241	.00308
UBS (CH) INST FD 2-EQ	.00547**	.00571**	.00535**	.00568**
UNION INV.PRIVATFONDS	.0025	.0029	.00272	.00321
US MULTI-FACTOR EQUITY	.0046	.00464	.00466	.00491
US NEW TECHNOLOGY	.00187	.00299	.00175	.00263
VANGUARD US EQUITY	.00506**	.00539**	.00487*	.00531**
XT USA	.00388	.00394	.00445	.00477
ZIF AKTIEN USA A1	.00548	.0059	.00467	.00475
ZIF AKTIEN USA PASSIV A1	.00635*	.00676*	.00541	.00554
ALLIANCE TRUST NORTH AMERICAN E	.01651	.01427	.01004	.00698
ALLIANZ AMERIKA AANDELEN FONDS	.00106	.0013	.00073	.00112
BARCLAYS US ALPHA A ACC DEAD -	.00728*	.00744*	.0073*	.0077*
CF GREENWICH AC. DEAD - Liquida	.00978*	.01019*	.00849	.0092
CONNECT EQUITY USA GREEN I - TO	.00769***	.00861***	.00799**	.0088***
CONNECT EQUITY USA RED I DEAD -	.00566**	.006**	.00533*	.0058**
CS (CH) US QUANT EQUITY FUND LI	.0038	.00442	.00348	.00432
DEUTSCHE (CH) I US EQUITIES LD	.00643**	.00667**	.00634*	.00681**
DEXIA CLICKINVEST B INDEX LINKE	.0016***	.00177***	.00122*	.00143**
DPAM INVEST B EQUITIES US DIVID	.00434*	.00437*	.00449	.0046
EFG EQ.FUNDS NTH.AM. DEAD - Liq	.00619*	.00681*	.00574	.00642*
ETHOS EQUITIES NORTH AMERICA RP	-.00599	-.00916	-.00555	-.00944
EVLI FONDER ERIK PENSER AKTIEIN	.00338	.0036	-.00221	.00195
FF & P US SMALL CAP. EQUITY B I	.00854**	.01153**	.00834**	.01167**
HSBC PPUT NORTH AMERICAN DEAD -	.00584	.00562	.00546	.00549
JYSKE INVEST US EQUITIES CL - T	.00396	.00412	.00421	.0044
KAMES AMERICAN EQUITY B GBP - T	.00213	.00259	.00224	.00316
KBC EQUIMAX QUALITY STOCKS US 1	-.00078	-.00101	-.00073	-.00084
LB.BL.INV.LINGOHR AMERIKA SYST	-.00003	-.00033	-.00054	-.00066
MAN GLG AMERICAN GROWTH RETAIL	.00316	.00492	.00284	.00478
MITON AMERICAN RET ACC DEAD - L	.00409	.00496	.00327	.00438
MULTI MANAGER HEALTH CARE - TOT	.02289**	.02004*	.02828**	.02641**
MULTI MANAGER HEALTH CARE AKKUM	.01149**	.00899*	.01258**	.01086*
MULTI MANAGER INVEST TEKN AKK -	.00553	.00509	.00461	.00423
MULTI MANAGER INVEST TEKNOLOGI	.01275	.0121	.01486*	.01444
NEPTUNE US MAX ALPHA A DELISTED	.0051	.00116	.00401	-.00024
OBJECTIF AMERIQUE \$ COUV SOCIET	-.00511***	-.00537***	-.00476***	-.00504***
OPPENHEIM KPL.AMER. EQUITIES -	.00286	.00496	.00259	.0048
PIONEER INVESTMENTS AKTIEN DTL.	-.00289	-.00233	-.00366	-.00363
PUTM NORTH AMERICAN ACC DEAD -	.00385	.00487	.00401	.00519
QUILVEST MULTI USA P QUILVEST G	.00111	.00195	.00065	.00165
SCOTTISH WIDOWS HIFML US FOCUS	.00378	.00446	.0032	.00413
SCOTTISH WIDOWS HIFML US STRATE	.00435	.006	.0048	.00695
SIEMENS EQUITY NORTH AMERICA -	.0025	.00317	.00224	.00318
SNS AM.AANDFDS. DEAD - Liquidat	.00493*	.00509*	.00524*	.00549*
SSGA US ALP.EQ.FD.I EUR STE.STR	.00455	.00193	.00416	.00201
STAR LIBERTY AMERICA DEAD - Liq	.00781**	.00797**	.00765**	.00791**
STOCKINDEX USA DEAD - Liquidate	.00415	.00424	.0042	.00446
UBS US 130 30 EQUITY A DELISTED	.0041	-.00062	.00305	-.00143
UFF CROISSANCE PME X DEAD - Mer	.00263	.00268	.00154	.00149
UNIVERSAL INV.GESELL. HOTCHKIS&	.00732	.00762	.00951	.00961
US SPECIAL EQUITY A DEAD - Liqui	.00374	.00275	.00404	.00317
VOLKSBANK AM.INVEST T DEAD - Li	.00367	.00419	.00326	.00417
VVA - AKTIEN USA F DEAD - Liqui	.00543**	.00577**	.00521*	.00563**
WARBURG INVEST KPL. US DIVERSIF	.0021	.0015	.00003	-.00032
ABERDEEN NORTH AMERICAN EQUITY	.00858**	.009**	.00822**	.00907**
AHORRO CORPORACION USA DEAD - M	-.00139**	-.00176**	-.00131*	-.00161**
ALLIANZ ACN.US COUVERT GLOBAL I	-.00319*	-.00372**	-.0033*	-.00363**
ALLIANZ ACTIONS US GLB. INVESTO	.00512	.00523	.00435	.00482
AMERICA LMM(C) LOUVRE (BANQUE D	-.00193*	-.00145	-.00183*	-.00133

Appendix 2 –Alpha estimates for the robustness check by model (continued)

AMERIQUE RENDEMENT (C) EDM.DE R	.00211	.00334	.00169	.00313
AMUNDI AMERIKA BLUE CHIP STOCK	-.00273*	-.00314**	-.00221	-.0025
AMUNDI EQUITY STRATEGY USA A -	.00192	.002	.00156	.0017
AMUNDI FRN.INDEX USA I CAP - TO	.00593*	.00391	.00514	.00343
ANIMA GEO AMERICA A DEAD - Merg	.00305	.00333	.00311	.00343
ANIMA NEW YORK MERGED SEE 88143	-.00335	-.00473*	-.00473*	-.00618**
APIUS AVENIR AMERIQUE DELUBAC A	-.00759	-.00833	-.01208**	-.01303**
AXA FRAMLINGTON EQ.INC. AC. - T	.0065*	.00738**	.00572	.00677*
BANCAJA RN.VAR. ESTADOS UNIDOS	.008*	.00128	.00967**	.00257
BCY.ALPHASTARS US CAP. BARCLAYS	.00319	.00112	.00217	.00031
BCY.AMERIQUE FCP WEALTH MANAGER	.00314	.0017	.00209	.00089
BNP PARIBAS ACTS USA (C) BNP PA	.00403	.00407	.00396	.00388
BNP PARIBAS B I EQUITY USA CAP	.00482*	.00566*	.00442	.00535*
BNP PARIBAS QUANTAMERICA BNP PA	.00489	.00489	.00408	.00397
CANDRIAM SUSTAINABLE NORTH AMER	.00286	.00288	.00318	.00347
CEP GESTORA FONPENEDES BORSA US	.00471*	.00481*	.00475*	.00491*
CNP ASSUR AMER(D) CAISSE NATION	-.00071	-.0005	-.00124	-.00124
COLUMBIA SECURITIES DEAD - Merg	-.00169	-.00036	-.00355	-.00238
CPR ACTIVE US (H - EUR) - P - T	-.0031***	-.00327***	-.0028***	-.00291***
CSIF NORTH AMERICA INDEX BLUE -	.01015***	.01001***	.00955***	.00965***
DWS INVESTMENT US AKTIEN TYP O	.00213	.00146	.00218	.00161
ECHIQUIER AMERIQUE FINANCIERE D	.00824**	.00876**	.00767*	.00828*
EPARAMERIC(C) LA POSTE - TOT RE	.00362	.00285	.00222	.00194
EQUITY STRATEGY NA.T DEAD - Mer	.00704*	.00706*	.00665*	.0069*
EURIZON AZIONI PMI AMERICA - TO	.00207	.00282	.00179	.00257
EUROVALOR ESTADOS UNIDOS FI - T	.00206	.00253	.00202	.0026
FD.MAN.SWITZ.AG CH INST 2 EQUIT	.00672**	.00791**	.00666**	.00789**
FONCAIXA CARTERA BOLSA USA FI (	.00522	.004	.00445	.00366
FONCAIXA I BOLSA USA FI DEAD -	-.002*	-.00285***	-.00205*	-.00302***
FONCAIXA USA FI (IN MER) DEAD -	-.00407	-.00495*	-.00479	-.00543*
GROUPAMA ACTIONS MID CAP MERGED	.00781	.00484	.00602	.00295
GROUPAMA US STOCK EURO BANQUE F	.00819*	.00422	.0075	.00385
GROUPAMA USACTIONS (C) MERGED S	.00714	.0054	.00508	.00318
HANSAINVEST HANSEATISCHE INV.GE	.00439	.00159	.00262	.00005
HSBC FSAVC NORTH AMERICA DEAD -	.00516	.00527	.0049	.00532
INDOSUEZ ELITE US CREDIT AGRICO	.00539*	.00479	.00476	.00423
INVERSEGUROS SEGUROFONDO USA - T	.00111	.00049	.00023	-.0005
IQAM EQUITY US (RT) DEAD - Merg	.00276	.0028	.00176	.00185
JPM US A ACC DEAD - Merged	.00374	.00378	.00394	.0042
JYSKE INVEST USA AKTIER KL - TO	.00319	.00361	.00355	.0041
KBC INDEX FD. USA CAP DEAD - Me	.00549**	.00574**	.00538*	.00574*
KUTXAVALOR EEUU FI DEAD - Merge	.00607	.00351	.00507	.00273
MAITRE AMERICAN EQUITIES ASST.A	.00198	.00348	.0017	.00314
MAM AMERIQUEANT DEAD - Merged	.00007	.0008	-.00122	-.00048
MARTIN CURRIE NTH.AMER. CL.A -	.00714*	.00702*	.00675*	.00675*
MARTIN MAUREL COMPOSITION AMERI	.00306	.00353	.0029	.00352
MC FDF AMERICA A MERGED SEE 257	-.00686***	-.00754***	-.00753***	-.00831***
MULTI MANAGER INVEST USA	.00271	.00298	.00246	.00289
NB ACOES AMERICA DEAD	-.00267	-.00182	-.00262	-.00163
NEUFLIZE USA OPNS.\$ C OBC ASST.	-.00176	.00064	-.00379	-.00153
OBJECTIF GEST VAL AMER. SOC DE	.00181	.00232	.00148	.00229
ODDO BHF ACTIONS USA CR-EUR - T	-.00235***	-.00258***	-.00201***	-.00223***
OPTIMIX AMERICA FD DEAD - Merge	.00507	.00504	.00534	.00588*
PKO AKCJI RYNKU AMERYKANSKIEGO	-.00159	-.0017	-.00236	-.00225
R-CO CONVICTION USA C DEAD - Me	.00002	.00019	-.00017	.00012
RENTA 4 TECNOLOGIA DEAD - Merge	.00254	.0025	.00257	.00276

Appendix 2 –Alpha estimates for the robustness check by model (continued)

SCWID.UK.SMCOS.CL.B AC. DEAD -	.00341	.00449	.00342	.00456
SLGP PRIGEST US DEAD - Merged	.00319	.00578	.00246	.00517
SLI IGNIS AMERICAN GROWTH INC -	.00541	.00717*	.00533	.00727
SOCIETE GENERALE ACTIONS US SEL	.00077	.00104	.00032	.00067
SPARINVEST VALUE USA KL DEAD -	.00291	.00268	.00315	.00289
SSGA NA.ENH.EQ.FD.I STE.STR.GLB	.00874***	.00848***	.00841***	.00829**
SSGA US IDX.EQ.FD.P USD STE.STR	.00664**	.00689**	.00618*	.00658**
SWC (CH) INDEX EF MSCI USA A -	.00588	.00245	.00415	.00076
SYNERGIA AZIONARIO USA DEAD - M	.00217	.00079	.00105	-.00019
Santander Accoes USA	-.00755	-.00726	-.00685	-.00665
THE WESTCHESTER US DOLLAR ACC -	.00693*	.00776*	.00643	.00729
TOBAM ANTI BENCHMARK US EQUITY	.00946**	.00976***	.00975**	.01032***
UFF CROISSANCE PME X DEAD - Mer	.00263	.00268	.00154	.00149
WARBURG INVEST KPL. WARBURG AME	.00431	.00223	.00336	.00172
ALPHA COSMOS STARS USA EQUITIES	.00223	.00293	.00205	.00285
ALTA USA DEAD - Merged 9104PL	-.00118	-.00081	-.00096	-.00069
Aktia America B	.00197	.00222	.00147	.00189
BCV SYSTEMATIC PREMIA US EQUITY	.00462*	.00509*	.00437	.00498*
FIM USA - TOT RETURN IND	-.00043	-.0006	-.00052	-.00082
FoLocalTapiola ESG USA Mid lha7	.00154	.00163	.00169	.00181
FoleQ USA Indeks 1 Kha4	.00462*	.00473*	.00453*	.00471*
NN SUB SPOLEK DYWIDENDOWYCH USA	-.0041**	-.00501**	-.00543***	-.00649***
NORDEA MEDICA KASVU DEAD - Merg	.00916**	.00891**	.00931*	.00936*
Nordea North American Dividend	.00347	.00302	.00388	.00349
Piraeus US Equity Fund R	.00184	.00188	.00179	.002
SEB North America Index B	.00392*	.00415*	.00385	.00418
TRITON AMERICAN EQUITY INTERNAT	-.0002	.00075	-.00073	.00024

Note: This appendix contains the alpha estimates across different models for each one of the 285 mutual funds, regarding the robustness check provided for the first research question. It supports the results presented in table 3. *** Indicates statistical significance at the 1% level. **Indicates statistical significance at the 5% level. *Indicates statistical significance at the 10% level.