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Lidia Lobán Acero

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# ACTIVE MANAGEMENT IN MUTUAL FUNDS WITH CONCENTRATED BENCHMARKS: A MAJOR DILEMMA TO FULFILL THE EU DIRECTIVE ON PORTFOLIO CONCENTRATION LIMITS.


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PhD Dissertation

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Dr. Carlos Serrano Cinca

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-July 2021-

**PhD Program in Accounting and Finance**

*"Follow your dreams, believe in yourself and simply just do it".*

*"Para conseguir tus sueños debes creer en ti y ser constante. La clave es trabajar la suerte que tienes todos los días de tu vida".*

*Lidia*

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# Abbreviations

| | |
|---|---|
| aAS | Actual Active Share |
| AEX 25 | Main domestic benchmark of the Dutch stock market |
| AS | Active Share |
| AS-thresholds | Active Share thresholds |
| ATHEX 20 | Main domestic benchmark of the Greek stock market |
| BEL 20 | Main domestic benchmark of the Belgian stock market |
| CAC 40 | Main domestic benchmark of the French stock market |
| DAX 30 | Main domestic benchmark of the German stock market |
| dAS | Dynamic Active Share |
| EFAMA | European Fund and Asset Management Association |
| EMU | European Monetary Union |
| ETF | Exchange-Traded Funds |
| EU | European Union |
| FTSE MIB 40 | Main domestic benchmark of the Italian stock market |
| HHI | Herfindahl-Hirschman index |
| IBEX 35 | Main domestic benchmark of the Spanish stock market |
| ICI | Investment company Institute |
| MIFID II | Markets in Financial Instruments Directive II |
| ISIN | International Securities Identication Numbering |
| NHHI | Normalised Herfindahl-Hirschman index |
| OMXH 25 | Main domestic benchmark of the Finnish stock market |
| PSI 20 | Main domestic benchmark of the Portuguese stock market |
| S&P 500 | Standard & Poor's 500 Index |
| sAS | Spurious Active Share |
| TE | Tracking Error |
| TNA | Total Net Assets |
| UCITS | Undertakings for Collective Investment in Transferable Securities |
| UK | United Kingdom |
| US | United States |

# Motivation

This doctoral thesis is focused on the increasing importance of mutual funds as saving vehicles for the finances of individuals in the economies of developed countries over the last half of the twentieth century. Among them, the equity funds that take the form of open-end funds like mutual funds are becoming one of the most relevant instruments. Mutual funds collect money from investors and invest it in stocks, bonds, other funds, and so on, and their performance depends on the mix of the allocated securities.

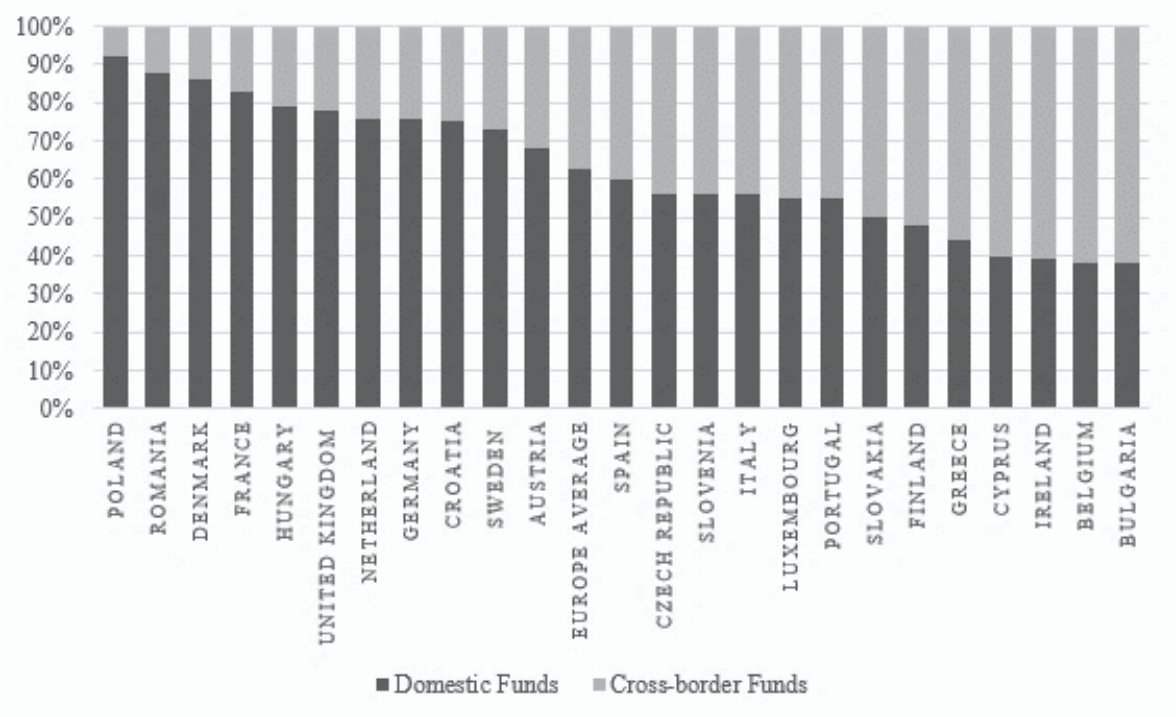
The information about portfolio composition and performance provided by fund managers to investors, supervisors, and policymakers is a line of research in the financial literature that studies the investment strategies of fund managers. The focus of mutual fund research has changed from whether average active fund managers have management skills to whether some active fund managers have skills that provide benefits to investors. In spite of its economic implications, this change in research focus has not been sufficiently studied in the European market. Therefore, this thesis aims to fill the gap in the empirical knowledge of the measure of real active management by managers in the Eurozone mutual fund industry. One of the main goals of this thesis is to determine the actual active share (aAS) obtained by mutual funds in European countries.

The European investment industry has become globalized in the last few decades as a result of the increasing economic integration of Europe. The development of the European Monetary Union (EMU), the deregulation, the removal of cross-border restrictions on banking and securities transactions as well as the increasing recognition of the benefits of diversification by cross-border investment opportunities have accelerated the flow of equity capital between international markets.[1] We focus on domestic mutual

[1] EMU, the European Monetary Union, is an alliance of the 19 European states that belong to the European Union and have introduced a common currency with the euro.

funds due to their relevance in terms of economic factors. First, the total amount held by European investors in investment funds amounted to €11.7 trillion at the end of 2017. Funds with a total of €7.9 trillion of AuM were domiciled in the country of the investors; the remaining €3.8 trillion being managed by funds domiciled in another country (Investment Company Institute, 2018).[2] Moreover, Figure M.1 shows the distribution between domestic funds and cross-border funds at the end of 2017. In terms of average values, 68% of the funds in European countries are domestic funds.

**Figure M.1. Investment fund ownership at the end of 2017**.
For each European country, this figure shows the percentages of funds depending on the ownership type. The black bar chart indicates the percentage of domestic funds. The grey bar chart shows the percentage of cross-border funds.




In addition, the European Union has harmonized the rules and established a broad legislative framework to coordinate laws, regulations, and administrative provisions that are related to collective investment in transferable securities (UCITS). The UCITS directives are considered a trend in EU harmonization of the regulations concerning

[2] Investment Company Institute 2018. Investment Company Fact Book 2017. Available at https://www.icifactbook.org (The latest accessed July 2021).

collective investment. In addition, the significance of the UCITS is important to reinforce market protection and transparency. Several studies are consistent with the position of analyzing factors that lead to differential detections of market abuse with a special interest in the better functioning of financial markets. However, few studies have been conducted to detect how the EU directives influence the composition of mutual funds in a forthright manner rather than analysing their potential consequences on performance.

This thesis aims to contribute to the study of AS in two main ways. First, we expect to contribute methodologically by proposing two new approaches that complement the traditional measures of active management. We initially propose a measure that captures the actual level of activity that considers the effects of concentrated benchmarks in the context of legal restrictions on the portfolio concentration. Second, we identify the determinants of domestic equity funds that provide significant information to investors' protection. Finally, we propose a measure that captures the dynamic effect of active inversion on the portfolio weights that funds actually report as the pure level of AS.

Given the vital role of the equity fund industry in the financial markets, the findings of this thesis show important values for further academic research and industry implications.

The present thesis consists of three chapters. Chapter 1 confirms the evidence that there are significant differences in the actual level of active management in the Eurozone equity fund industry. This chapter develops a new measure that provides statistical significance to the AS that considers the spurious activity levels due to the benchmark concentration. Chapter 2 verifies the impact of multiple determinants that influence the probability failure to comply with the portfolio concentration limits of EU Directive 2009/65/EC and covers a detailed study of industry, fund, and stock characteristics to identify those determinants that better explain the portfolio defaults in the different EU

industries. In addition, Chapter 3 aims to extend the previous analysis of AS by examining the dynamics effects with an alternative measure that examines the variation in these differences in two consecutive periods. This measure provides a large amount of information and allows us to decompose investment decisions into those that cause a higher or lower deviation from the benchmark. Our measure finds those bets in which the manager has confidence, and those in which the manager does not.

# Chapter 1

# Eurozone regulation bias in the Active Share measure

In this chapter, we examine how both the domestic equity benchmark concentration and the Directive 2009/65/EC on risk of portfolio diversification may distort the accuracy of the original Active Share measure of Cremers and Petajisto (2009) in the Eurozone mutual fund industry. The results provide statistical significance to the Active Share measure considering the spurious activity levels due to this benchmark concentration. The empirical application to a comprehensive sample of domestic equity funds provides evidence of significant differences in the actual levels of active management in the Eurozone mutual fund industries.[3]

[3] This chapter has been published in the International Review of Financial Analysis Journal (2020). ISSN 1057-5219. DOI: 10.1016/j.irfa.2020.101564. JCR, $IF_{2020}$: 5.373; D1).

## 1.1 Introduction

Today's investors are increasingly interested in mutual fund selection, thereby demanding detailed information and investment advice. One of the most extensive debates in mutual funds is concerned with the efficiency of actively managed mutual funds, as they are a major component of this industry.[4]

Mutual funds are an important financial institution in the global markets. In Q4 2018, the total net assets (TNA) of worldwide-regulated open-end fund assets were €45.65 trillion. The United States and Europe are the most relevant industries, accounting for 46% and 34% of the worldwide distribution of mutual fund assets, respectively (The European Fund and Asset Management Association EFAMA, 2018).

Since the seminal paper of Sharpe (1966), an extensive body of literature has sought to clarify the performance value of active management. Relevant performance measures have been developed mainly based on portfolio return records (e.g., Jensen, 1968; Fama and French, 1993; Grinblatt and Titman, 1993; Elton *et al.,* 1996) and portfolio holdings (e.g., Grinblatt and Titman, 1989; Daniel *et al.,* 1997). In addition, many papers have focused on the persistence of the results of active management (e.g., Carhart, 1997; Wermers, 2000; Bollen and Busse, 2004; French, 2008; Fama and French, 2010).

Traditionally, the assessment of active management has relied on tracking error (TE), which is the divergence of portfolio returns relative to a benchmark. More formally, Rudolf *et al.* (1999) define TE as the time-series standard deviation of the difference between portfolio and benchmark returns. The objective of active management is to obtain higher returns than the benchmark as well as a low TE.

[4] According to Morningstar statistics, worldwide, non-active funds represented 27% of total funds managed in 2017, up from 16% in 2010.

Cremers and Petajisto (2009) proposed Active Share (AS) to measure the percentage of portfolio holdings of a mutual fund that differ from its benchmark holdings.[5]

$$\text{Active Share } (AS) = \frac{1}{2}\sum_{i=1}^{N}\left|w_{fund,i} - w_{benchmark,i}\right| \quad [1.1]$$

where $w_{fund,i}$ and $w_{benchmark,i}$ are the portfolio weights of stock *i* in the mutual fund and the benchmark, respectively, and *N* is the total number of stocks that is included in either the fund or the benchmark.

According to Cremers and Petajisto (2009) and Petajisto (2013), AS and TE emphasize different aspects of active management. AS is a reasonable proxy to identify security selection, while TE is better suited to measuring the volatility of portfolio returns relative to the benchmark. These two dimensions together cover the level and the sources of active management. AS matters for investors in three ways. First, AS may be helpful in selecting actively managed funds, that is, funds overseen by managers who are willing to beat the benchmark. Second, AS enables one to obtain a proxy of managers' potential stock-picking abilities when they overweight (underweight) stocks that beat (are beaten by) the benchmark. Third, investors with access to AS would be more likely to evaluate the management fees charged by mutual funds with respect to the level of active management.

Since the seminal paper of Cremers and Petajisto (2009), numerous papers have successfully applied AS to US mutual funds. Schlanger *et al.* (2012) show that AS can play a useful role in manager selection. Cremers and Pareek (2016) explain and predict the ability of portfolio managers to use both high active share and patient investment

[5] Recently, Cremers (2017) introduced a new formula for AS. This formula expresses AS as equal to 100% minus the sum of the overlapping weights between the portfolio and its benchmark, thus emphasizing that AS is only lowered by overlapping positions that are in both the fund and the benchmark. Although this new approach tends to facilitate the use of AS in computational terms, AS continues to rely on both the choice of benchmark and the portfolio management style.

strategies to outperform their benchmarks. Other papers support the aforementioned advantages of applying AS in US mutual funds. For example, Jiang *et al*. (2014) find that overweighted positions in funds relative to their benchmarks have outperformed their underweighted positions, showing the shrinking fraction of assets managed by active-fund managers. Currently, Karoui and Patel (2020) suggest that the benefits of Active Share stem from the selection decision rather than the weighting decision.

Muller and Weber (2014), Lee and Morri (2015), Cremers *et al*. (2016) and Frijns and Indriawan (2018) are recent papers confirming that previous results for US mutual funds hold in other markets, such as New Zealand and Europe.

However, not all academics support the aforementioned results. For instance, Muller and Ward (2011), in contrast to previous studies, find no relationship between the level of AS and mutual fund returns in the South African market. More recently, Ang *et al*. (2017) also find that there is no significant evidence that AS identifies skilled active management and predicts future performance. Moreover, AS seems to be far from stable, as Brown and Davies (2017) show that if investors use AS to make decisions, the funds could have incentives to manipulate AS. Further, Huang *et al.* (2011) present that mutual funds significantly change their risk level over time.

The strongest claims against the AS are found in Frazzini *et al*. (2016), who show that mutual funds with the highest AS measures are related to small and mid-cap stock benchmarks and the poor performance records of these benchmarks over the 1990–2009 period. AS is very sensitive to the benchmark characteristics and the AS results will therefore be driven by this measure's strong dependence on the benchmark. The choice of inappropriate benchmarks that do not properly reflect the portfolio's investment style will result in inaccurate AS. However, Petajisto (2016) recently refuted these claims,

noting that the analysis has significant faults and ignores relevant discussion, according to the previous findings included in Cremers and Petajisto (2009) and Petajisto (2013).

In addition to addressing the aforementioned problem, this chapter provides evidence of the potentially misleading results that the application of AS provides when concentrated benchmarks are considered. Specifically, the accumulated weight of equity benchmark constituents in domestic Eurozone markets is highly concentrated in fewer constituents than in US benchmarks. Focusing on US mutual funds, we can observe that in the S&P 500 benchmark, the weight of the top 10 constituents is 20.7% and the largest weight of a constituent is 3.7% (S&P Dow Jones Index, 2019). In the Eurozone, we find domestic benchmarks with heavy concentration levels. For example, the accumulated weight of the top 10 constituents in the IBEX 35 Spanish benchmark is 70.82%, with the largest weight of a constituent being 14.34% (Bolsa de Madrid, 2019). However, we also find domestic Eurozone benchmarks with lower levels of concentration. For example, the accumulated weight of the top 10 constituents in the CAC 40 French benchmark is 54.81%, and the largest weight of a constituent is 11.14% (Euronext, 2019).

Accordingly, 1) the AS obtained in US mutual funds cannot be compared with the AS obtained in mutual funds in the Eurozone, and 2) the AS obtained in the different domestic Eurozone markets are not comparable to each other due to the assorted concentration levels of the domestic Eurozone benchmarks. The main contribution of our chapter is to obtain comparable results given that our approach controls the effect of the different concentration levels of each benchmark in the context of legal restrictions on the portfolio concentration.

In addition to the limitations previously identified, it is necessary to test how the current European directive on the risk of portfolio diversification will influence AS accuracy. The Directive 2009/65/EC sets the rules relating to mutual funds as one of the

major financial instruments included in the Undertaking for Collective Investments in Transferable Securities (UCITS) category.[6] It is the fourth version of UCITS legislation, recasting the seminal UCITS Directive 85/611/EEC.

Because mutual funds are designed to be suitable for retail investors, their rules are based on certain levels of portfolio diversification with the aim of reducing their vulnerability to the performance of a small number of assets. The current Directive 2009/65/EC specifies in article 52 (paragraph 1) that "UCITS shall invest no more than 5% of its assets in transferable securities or money market instruments issued by the same body; or 20% of its assets in deposits made with the same body. Member States may raise the 5% limit laid down in the first subparagraph of paragraph 1 to a maximum of 10%. If they do so, however, the total value of the transferable securities and the money market instruments held by the UCITS in the issuing bodies in each of which it invests more than 5% of its assets shall not exceed 40% of the value of its assets. That limitation shall not apply to deposits or OTC derivative transactions made with financial institutions subject to prudential supervision".[7]

On the one hand, the domestic Eurozone benchmarks show a variety of characteristics in terms of the concentrations of their constituents. On the other hand, there are regulatory issues that prevent portfolio concentration. This framework could involve conflicting patterns in the search for active management based on the AS. That is, the high concentration level detected in the domestic Eurozone benchmarks conflicts with the 10% concentration limit generally included in the regulation. Therefore, for concentrated benchmarks that include constituents weighted close to or above 10%,

[6] UCITS was devised to facilitate cross-border investments within the EU. The aim of the UCITS directive was to remove barriers to the cross-border marketing of units of collective investment funds within the EU by allowing funds to invest in a broader range of financial instruments and streamlining the regulations of different countries.

[7] In terms of investment constraints, Article 52 in the Directive 2009/65/EC is similar to Article 22 in the seminal Directive 85/611/EEC. Thus, this specific part of the EU regulation has not changed since 1985.

mutual funds are not allowed to overweight those constituents in their portfolios. In fact, the only way they can achieve extra AS is by underweighting such constituents. In practice, the aforementioned framework means that there are significant limits to increasing AS, even for actively managed mutual funds.

Our study is the first to evaluate the consequences of both the assorted characteristics of domestic Eurozone benchmarks and the European regulation preventing portfolio concentration in the appropriate estimation of AS. Furthermore, our study identifies truly active management in domestic equity funds (mutual funds that invest principally in domestic stocks) in the Eurozone markets, solving the aforementioned bias.

This chapter has important implications for policymakers and practitioners of the domestic equity fund industries in the Eurozone. In the strongly regulated European markets (Benink and Schmidt, 2014), where policy literature are consistent in the importance of detection of market abuse (Cumming *et al.*, 2018), our unbiased approach allows these market players to identify the accurate levels of active management of each industry after considering both the regulation of portfolio diversification and the concentrated domestic equity benchmarks.[8] Market supervisors will have a better picture of the active management map to develop appropriate regulations of the mutual fund industry. In addition, our approach should help practitioners and investors to effectively find out the level of active management of domestic equity funds and therefore provide information for fund management companies to replace for no actual performing managers (Clare *et al*., 2014). Besides, our results should help to reduce opacity in the

[8] The European Union Member States and their national Competent Authorities. Austria: Financial Market Authority, Belgium: Financial Services and Markets Authority, Finland: Finanssivalvonta, France: Autorité des Marchés Financiers, Germany: Bundesanstalt für Finanzdienstleistungsaufsicht, Greece: Capital Market Commission, Italy: Commissione Nazionale per le Società e la Borsa, Netherlands: Autoriteit Financiële Markten, Portugal; Comissão do Mercado de Valores Mobiliários, and Spain: Comisión Nacional del Mercado de Valores.

management fees charged by the funds are justified by accurate measures of active management (Casavecchia and Hulley, 2018).

The remainder of the chapter is as follows. We describe the data from Eurozone Benchmarks in Section 1.2. Section 1.3 describes the method of obtaining spurious Active Shares. Section 1.4 determines the significant Active Share above the spurious level. Section 1.5 presents the empirical application to domestic equity funds in the Eurozone markets. Finally, in Section 1.6 summary and conclusions.

## 1.2 Data

We select those mutual fund industries that have been present in the constitution of the Eurozone.[9] These markets share at least eighty percent of the total net Assets (TNA) of European mutual funds from 1999 to 2016 (Investment company Institute, 2017) and at least eighty-three percent of domestic equity funds in the European mutual fund industry (EFAMA, 2017).

From Morningstar, we select the most frequent primary prospectus benchmark reported by the domestic equity funds registered in each Eurozone member.[10] Datastream provides comprehensive data of these relevant benchmarks. We obtain the monthly characteristics of each domestic benchmark, such as their constituent identifications (ISIN code) and their constituent weights. Our benchmark sample covers January 2002 to December 2016 and includes 45,735 constituent weights.

Table 1.1 reports descriptive statistics of our final benchmark sample.[11] From the information provided by the maximum weight of a benchmark constituent together with the number of constituents over a 10% weight, we identify the potential conflicts between the benchmarks and the limits of the portfolio concentration established in the Directive 2009/65/EC. In addition, we use the Herfindahl-Hirschman index (HHI) to compare the

[9] This area was created in 1999 by eleven founding states: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain and Portugal. Greece joined the Eurozone in 2001. Coins and banknotes were first used on 1st January 2002 in all twelve Euro member states. Luxembourg and Ireland are excluded from our sample for two different reasons. First, there is not a specific domestic benchmark in Luxembourg and second, Morningstar does not provide a domestic equity category for Irish mutual funds.

[10] We assume a potential benchmark 'gaming' in the selection of our sample (Sensoy, 2009). But even though the primary prospectus benchmark may not match the fund's style, it should be included as funds will likely present high AS figures. Otherwise, this exclusion might influence our further empirical results.

[11] Datastream does not provide information for benchmark constituents for ATHEX 20 (Greece), FTSE MIB 40 (Italy), and PSI 20 (Portugal) for 2002-2005, 2002-2003 and 2002-2006, respectively.

concentration levels of our domestic benchmark sample.[12] All these figures highlight the potential problems in AS accuracy with respect to portfolio concentration limits, especially in the most concentrated benchmarks of our sample, such as ATX 20 (Austria), BEL 20 (Belgium), ATHEX 20 (Greece), PSI 20 (Portugal) and IBEX 35 (Spain). In contrast, CAC 40 (France) and DAX 30 (Germany) are the least controversial domestic Eurozone benchmarks in terms of HHI.[13]

[12] HHI is an index that measures the market concentration of an industry and is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers. The index ranges from zero to 10,000. The relative comparison of the HHI figures of our benchmark sample permits the identification of the level of concentration of each domestic benchmark in relation to the others.

[13] Our domestic sample includes much more concentrated benchmarks than overall Eurozone and European benchmarks such as Eurostoxx 50 (HHI=282.44) and Eurofirst 100 (HHI=371.48), respectively. We get similar conclusions for well-known benchmarks of both the US market (S&P 500, HHI=133.32) and the UK market (FTSE 100, HHI=323.07). Further details are available upon request.

## 1.3 Definition of spurious Active Share

In this section, we assess a spurious AS (sAS) resulting from the divergence between the limits established by the regulation on risk diversification in Europe (by the Directive 2009/65/EC) and the high levels of concentration of the domestic Eurozone benchmarks, which, in many cases, exceed the maximum weight per constituent allowed by the regulation. We develop an algorithm that identifies sAS as the minimum AS driven by both the requirements of the European regulation and the benchmark concentration. That is, sAS is the minimum AS that is not a consequence of active decisions made by the equity fund manager (see details of the whole process of this algorithm in Appendix 1.1).

In our algorithm, we work with the weights $w_i$ of the *i=1..., n* constituents that are part of each domestic Eurozone benchmark on a monthly basis. The weight of each constituent *i* is positive, and the sum of these weights for each benchmark is 100%.

$$w_i > 0 \qquad \forall\, i \qquad [1.2]$$

$$\sum_{i=1}^{n} w_i = 100\% \qquad [1.3]$$

First, we sort the weights of the *n* benchmark constituents from the highest to the lowest into three excluding groups *(j, k, l)* based on the limits of portfolio concentration in article 52 of the Directive 2009/65/EC.

$$If\ w_i > 10\%\ \ then\ \ rename\, w_i\, as\, w_i^j \qquad \forall\, i \qquad [1.4]$$

$$If\ 5\% \leq w_i \leq 10\%\ \ then\ \ rename\, w_i\, as\, w_i^k \qquad \forall\, i \qquad [1.5]$$

$$If\ w_i < 5\%\ \ then\ \ rename\, w_i\, as\, w_i^l \qquad \forall\, i \qquad [1.6]$$

These groups let us identify the weights over the concentration limits that must be truncated to achieve the diversification rules included in the Directive 2009/65/EC. This process is first applied in-group *j* of benchmark constituents by reducing their original weights to 10%.

$$If\ w_i^j > 10\%\ \ then\ \ w_i^{j'} = 10\% \qquad \forall\, i \qquad [1.7]$$

With *J* being the sum of the truncated weights of the constituents in-group *j*.

$$J = \sum_{i=1}^{n} w_i^{j'} \qquad [1.8]$$

After that, we follow the process in-group *k* of benchmark constituents.[14] We must consider both the previously recalculated weights of the constituents of group *j* [1.8] and the original weights of the constituents of group *k* and obtain the sum of both groups, constituent by constituent (from the highest to the lowest weight). If the sum is greater than 40%, then reduce the weights of the constituents in-group *k* from their original weights to 5%.

$$For\ p = 1\ to\ n$$

$$If\left(J + \sum_{i=1}^{p} w_i^k\right) \leq 40\%\ \ then\ w_i^{k''} = w_i^k$$

$$If\left(J + \sum_{i=1}^{p} w_i^k\right) > 40\%\ \ then\ w_i^{k'} = 5\% \qquad [1.9]$$

$$Next\ p$$

We define $w$ as the sum of the previously obtained weights of the benchmark constituents fulfilling the limits of portfolio concentration, i.e., the recalculated weights of group *j*, and *k* and the original weights of group *l*. The sum of these weights will be 100% only if the previous steps [1.7] and [1.9] have modified none of the weights of the constituents.

$$w = (J + \sum_{i=1}^{n} w_i^{k'} + \sum_{i=1}^{n} w_i^{k''} + \sum_{i=1}^{n} w_i^{l}) \qquad [1.10]$$

Finally, we obtain sAS as the difference between 100% minus *w*, and it shows the accumulated excess weights over the concentration limits, which are not a consequence

[14] In unusual cases when the number of constituents with a value over 10% is five or more, the fifth and subsequent constituents in-group *j* are included in group *k*. Then, the weights of all constituents in-group *k* are truncated to 5% following the Directive 2009/65/EC.

of active management. Thus, sAS is the minimum AS that should be found in a portfolio following the diversification rules imposed by the Directive 2009/65/EC.

$$sAS = 100\% - w \qquad [1.11]$$

We apply the algorithm to monthly information on the constituents of all domestic Eurozone benchmarks included in our sample. Table 1.2 shows a summary of the annual values of sAS for each benchmark during 2002-2016 (see details of the quarterly value of sAS in Appendix 1.2). We find assorted evidence due to the EU diversification requirements and the different levels of concentration in the domestic Eurozone benchmarks. PSI 20 (Portugal), ATX 20 (Austria) and IBEX 35 (Spain) obtain the highest average sAS values, with 22.4%, 18.60% and 17.99%, respectively. By contrast, there are benchmarks that present much lower levels of sAS, such as CAC 40 (France), DAX 30 (Germany) and OMXH 25 (Finland), with 3.31%, 5.50% and 5.80%, respectively. These results provide evidence that the Directive 2009/65/EC negatively influences the accuracy of the AS shown for managers who work with very concentrated domestic Eurozone benchmarks. In contrast, the sAS evidence for the least concentrated domestic Eurozone benchmarks shows that AS reported by managers who work in France, Germany and Finland are much more accurate. Therefore, our findings confirm that AS values obtained in different domestic Eurozone markets are not comparable. The next section will further develop a new tool to identify accurate AS estimations.

**Table 1.1 Summary statistics of domestic equity benchmarks (2002-2016).**

This table presents descriptive statistics of the ten domestic equity benchmarks included in our sample from 2002 to 2016 for every year and country. This table shows (1) the maximum weight of a constituent in each benchmark, (2) the number of constituents over a 10% weight in the benchmark and (3) the median value of the Herfindahl-Hirschman index (HHI), which is a proxy for the concentration level of each benchmark.

| | (AEX 25) NETHERLANDS | | | (ATHEX 20) GREECE | | | (ATX 20) AUSTRIA | | | (BEL 20) BELGIUM | | | (CAC 40) FRANCE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2002** | 14.96 | 4 | 758.72 | N/A | N/A | N/A | 23.16 | 3 | 998.55 | 23.22 | 3 | 1138.10 | 16.46 | 1 | 506.50 |
| **2003** | 14.62 | 3 | 732.33 | N/A | N/A | N/A | 21.29 | 4 | 1070.18 | 24.34 | 3 | 1172.94 | 15.78 | 1 | 497.49 |
| **2004** | 11.79 | 4 | 762.24 | N/A | N/A | N/A | 21.14 | 3 | 1123.12 | 24.72 | 3 | 1102.95 | 18.23 | 2 | 546.02 |
| **2005** | 16.60 | 3 | 888.66 | N/A | N/A | N/A | 21.93 | 3 | 1111.75 | 22.72 | 5 | 958.86 | 15.68 | 2 | 556.08 |
| **2006** | 16.51 | 3 | 888.07 | 22.40 | 4 | 1063.40 | 22.44 | 4 | 1061.21 | 18.41 | 4 | 1032.01 | 13.46 | 1 | 498.35 |
| **2007** | 18.90 | 3 | 850.58 | 23.00 | 3 | 1010.90 | 19.69 | 4 | 1037.10 | 18.71 | 5 | 973.77 | 12.95 | 1 | 451.46 |
| **2008** | 23.66 | 4 | 977.16 | 23.19 | 3 | 951.44 | 20.19 | 4 | 1058.73 | 24.21 | 5 | 956.23 | 17.03 | 1 | 516.15 |
| **2009** | 22.63 | 3 | 789.66 | 27.23 | 3 | 1025.26 | 20.14 | 3 | 920.94 | 19.50 | 4 | 809.73 | 17.96 | 1 | 510.64 |
| **2010** | 17.12 | 3 | 812.40 | 23.46 | 2 | 947.00 | 21.58 | 4 | 945.52 | 19.27 | 3 | 731.46 | 12.82 | 1 | 469.62 |
| **2011** | 19.42 | 3 | 859.65 | 20.19 | 4 | 877.85 | 21.83 | 3 | 901.40 | 17.90 | 2 | 732.05 | 14.39 | 2 | 475.32 |
| **2012** | 18.22 | 3 | 829.96 | 23.25 | 4 | 895.87 | 19.93 | 4 | 833.69 | 14.62 | 3 | 754.52 | 14.00 | 2 | 521.46 |
| **2013** | 16.75 | 3 | 772.72 | 24.14 | 3 | 913.24 | 21.34 | 3 | 995.96 | 14.40 | 3 | 771.00 | 13.44 | 2 | 499.09 |
| **2014** | 17.23 | 3 | 835.61 | 18.51 | 4 | 813.38 | 19.92 | 4 | 893.24 | 15.69 | 4 | 788.18 | 12.84 | 2 | 478.64 |
| **2015** | 17.40 | 3 | 838.33 | 30.47 | 3 | 879.03 | 22.10 | 4 | 924.49 | 15.69 | 4 | 782.64 | 11.23 | 2 | 443.79 |
| **2016** | 17.18 | 3 | 818.62 | 22.07 | 3 | 920.17 | 21.86 | 3 | 930.21 | 13.94 | 4 | 788.93 | 17.99 | 1 | 414.13 |
| **Average** | 17.53 | 3 | 827.65 | 23.45 | 3 | 936.14 | 21.24 | 4 | 987.07 | 19.16 | 4 | 899.56 | 14.95 | 1 | 492.32 |

| | (DAX 30) GERMANY | | | (FTSE MIB 40) ITALY | | | (IBEX 35) SPAIN | | | (OMXH 25) FINLAND | | | (PSI 20) PORTUGAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2002** | 12.42 | 3 | 643.79 | N/A | N/A | N/A | 23.38 | 3 | 992.27 | 11.77 | 2 | 625.64 | N/A | N/A | N/A |
| **2003** | 13.12 | 2 | 642.16 | N/A | N/A | N/A | 21.39 | 3 | 965.95 | 12.56 | 4 | 655.12 | N/A | N/A | N/A |
| **2004** | 12.28 | 2 | 622.56 | 17.58 | 2 | 743.27 | 21.94 | 3 | 979.97 | 41.55 | 3 | 649.4 | N/A | N/A | N/A |
| **2005** | 10.82 | 2 | 590.77 | 20.78 | 2 | 827.95 | 19.54 | 3 | 893.17 | 11.49 | 4 | 635.24 | N/A | N/A | N/A |
| **2006** | 11.26 | 2 | 577.32 | 17.77 | 3 | 838.51 | 17.55 | 3 | 869.98 | 52.41 | 2 | 618.89 | N/A | N/A | N/A |
| **2007** | 10.86 | 2 | 580.97 | 17.15 | 3 | 833.89 | 20.22 | 4 | 887.65 | 12.26 | 2 | 615.66 | 20.46 | 4 | 994.70 |
| **2008** | 13.91 | 2 | 581.54 | 18.27 | 5 | 854.40 | 23.89 | 4 | 1058.19 | 31.79 | 3 | 627.26 | 18.59 | 4 | 1001.91 |
| **2009** | 10.85 | 2 | 589.72 | 16.77 | 4 | 824.19 | 25.83 | 3 | 1237.91 | 11.00 | 3 | 603.39 | 20.41 | 5 | 920.94 |
| **2010** | 10.53 | 1 | 562.14 | 16.40 | 4 | 824.02 | 23.74 | 3 | 1224.26 | 10.47 | 2 | 607.79 | 19.88 | 4 | 1025.5 |
| **2011** | 10.44 | 1 | 553.67 | 17.11 | 4 | 765.16 | 21.50 | 3 | 1032.22 | 12.99 | 4 | 625.23 | 20.05 | 4 | 1113.92 |
| **2012** | 10.15 | 1 | 563.90 | 16.56 | 3 | 673.14 | 19.11 | 4 | 974.83 | 13.03 | 3 | 641.00 | 19.41 | 4 | 1177.02 |
| **2013** | 10.25 | 1 | 573.29 | 15.35 | 2 | 650.56 | 18.85 | 4 | 900.63 | 15.84 | 3 | 625.06 | 17.39 | 5 | 1076.45 |
| **2014** | 10.62 | 1 | 571.22 | 15.97 | 4 | 685.55 | 18.76 | 3 | 818.48 | 11.30 | 3 | 645.33 | 19.72 | 5 | 1023.96 |
| **2015** | 10.27 | 1 | 560.72 | 13.76 | 2 | 639.99 | 17.86 | 4 | 788.22 | 10.98 | 3 | 626.93 | 18.22 | 5 | 944.35 |
| **2016** | 10.25 | 1 | 554.47 | 15.52 | 3 | 623.15 | 14.94 | 3 | 697.10 | 10.96 | 2 | 614.17 | 16.55 | 5 | 965.22 |
| **Average** | 11.20 | 2 | 584.55 | 16.85 | 3 | 752.60 | 20.57 | 3 | 954.72 | 18.03 | 3 | 627.74 | 19.07 | 5 | 1024.40 |

**Table 1.2 Spurious Active Share (sAS) from 2002 to 2016.**

This table presents the annual statistics of sAS (in percent terms) of the ten domestic equity benchmarks included in our sample from 2002 to 2016 for every year and country. These average results are computed from the monthly sAS obtained for our sample of domestic Eurozone benchmarks.

| Year | (AEX 25) NETHERLANDS | (ATHEX 20) GREECE | (ATX 20) AUSTRIA | (BEL 20) BELGIUM | (CAC 40) FRANCE | (DAX 30) GERMANY | (FTSE MIB 40) ITALY | (IBEX 35) SPAIN | (OMXH 25) FINLAND | (PSI 20) PORTUGAL | Average | St. Dev. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2002** | 12.69 | N/A | 18.70 | 24.76 | 4.51 | 7.22 | N/A | 19.24 | 5.51 | N/A | 13.23 | 7.28 |
| **2003** | 12.11 | N/A | 19.61 | 24.88 | 3.42 | 9.44 | N/A | 18.56 | 8.44 | N/A | 14.61 | 6.95 |
| **2004** | 12.93 | N/A | 23.58 | 19.59 | 5.68 | 7.84 | 10.16 | 18.64 | 7.20 | N/A | 13.20 | 6.21 |
| **2005** | 17.81 | N/A | 23.47 | 19.19 | 5.10 | 5.68 | 13.39 | 16.21 | 4.87 | N/A | 13.21 | 6.74 |
| **2006** | 17.22 | 20.24 | 19.78 | 20.88 | 2.96 | 3.70 | 15.30 | 16.39 | 4.51 | N/A | 13.44 | 7.09 |
| **2007** | 16.51 | 19.96 | 22.53 | 19.32 | 2.38 | 3.42 | 15.68 | 16.53 | 4.51 | 23.38 | 14.42 | 7.59 |
| **2008** | 19.48 | 18.62 | 20.96 | 17.69 | 5.15 | 5.67 | 15.87 | 20.71 | 5.74 | 21.08 | 15.10 | 6.45 |
| **2009** | 12.61 | 18.75 | 18.24 | 14.70 | 4.07 | 5.65 | 14.72 | 25.03 | 4.61 | 19.36 | 13.77 | 6.71 |
| **2010** | 13.45 | 16.99 | 17.22 | 11.85 | 2.22 | 6.28 | 13.98 | 25.01 | 4.45 | 22.09 | 13.35 | 7.04 |
| **2011** | 14.25 | 14.56 | 16.34 | 11.86 | 3.08 | 5.04 | 10.88 | 21.54 | 5.43 | 24.87 | 12.79 | 6.73 |
| **2012** | 13.54 | 14.73 | 15.75 | 12.55 | 4.61 | 3.42 | 8.46 | 20.71 | 6.24 | 25.21 | 12.52 | 6.68 |
| **2013** | 12.30 | 14.50 | 19.54 | 13.00 | 3.14 | 4.10 | 7.97 | 16.89 | 5.91 | 24.99 | 12.23 | 6.71 |
| **2014** | 14.09 | 14.71 | 15.11 | 13.22 | 2.33 | 4.20 | 8.33 | 13.22 | 5.78 | 21.26 | 11.23 | 5.57 |
| **2015** | 14.11 | 17.31 | 14.05 | 13.32 | 0.70 | 5.45 | 6.88 | 11.52 | 4.29 | 21.83 | 10.95 | 6.17 |
| **2016** | 12.40 | 16.70 | 14.13 | 12.47 | 0.32 | 5.40 | 6.10 | 9.59 | 3.38 | 19.98 | 10.05 | 5.89 |
| **Average** | 14.37 | 16.76 | 18.60 | 16.48 | 3.31 | 5.50 | 11.44 | 17.99 | 5.80 | 22.40 | 13.26 | 6.65 |
| **St. Dev.** | 2.29 | 2.19 | 3.17 | 4.59 | 1.58 | 1.70 | 3.60 | 4.41 | 1.27 | 2.11 | 1.39 | 0.53 |

## 1.4 Determination of the significant AS above the spurious level

To obtain proper valuations of the active management of domestic equity funds in the Eurozone, we first define domestic Eurozone sAS-based benchmarks, which fulfil the portfolio concentration limits of the Directive 2009/65/EC. Then, we propose specific thresholds at 90%, 95% and 99% for each year and market to determine the statistical significance of each AS obtained.

The first step of this process is focused on the distribution of the sAS obtained in the previous section to the benchmark constituents belonging to subgroup $k''$and group *l*, both of which can incorporate additional weights because $w_i^{k''}$ and $w_i^l$ are below the limits of portfolio concentration, such as 10% or 5%, respectively. This distribution is proportional to the original weights of these constituents in the benchmark and should never lead the new weights to exceed such portfolio limits.

From equation [1.11]: $sAS = 100\% - w$, we define $w'$ as the sum of the weights of the constituents, which fulfils the distribution of the EU diversification rules included in sAS.

$$w' = \sum_{i=1}^{n} w_i^{k''} + \sum_{i=1}^{n} w_i^l \qquad [1.12]$$

We identify the proportion of the original weight of each constituent in the benchmark, which may incorporate whatever sAS with respect to the total weight of these constituents.

$$rw_i = {}^{w_i}/_{w'} \qquad \forall\, i \qquad [1.13]$$

In the next step, we first distribute sAS proportionally to $w_i^{k''}$, constituent-by-constituent (from the highest to the lowest weight). The distribution will stop when the sum of the weights of the constituents included in *J* and group *k* is equal to 40%.[15]

$$For\ p = 1\ to\ n$$

$$If\left(J + \sum_{i=1}^{p} w_i^{k'} + \sum_{i=1}^{p} w_i^{k''}\right) < 40\%\ \ then\ \ w_i^{k'''} = rw_i \text{ x } sAS + w_i^{k''}$$

$$\text{Being}\ \ w_i^{k'''} \leq\ 10\% \quad \forall\ i\ \epsilon\ w_i^{k'''}$$

$$If\left(J + \sum_{i=1}^{p} w_i^{k'} + \sum_{i=1}^{p} w_i^{k''}\right) = 40\%\ then\ stop\ loop \qquad [1.14]$$

$$Next\ p$$

Then, we continue with the proportional distribution of sAS to group *l*, constituent by constituent (from the highest to the lowest weight) as long as sAS is higher than zero because step [1.14] has not fully finished distributing sAS.[16]

$$For\ p = 1\ to\ n$$

$$If\left(w + \sum_{i=1}^{p} w_i^{k'''}\right) < 100\%\ \ then\ \ w_i^{l'} = rw_i \text{ x } sAS + w_i^{l}$$

$$Being\ w_i^{l'} \leq 5\% \qquad \forall\ i\ \epsilon\ w_i^{l} \qquad [1.15]$$

$$Next\ p$$

We define $w''$ as the sum of the weights of the benchmark constituents fulfilling the limits of portfolio concentration. If the sum of the constituent weights is 100%, the proportional distribution is complete. If not, it is necessary to repeat step [1.15] until $w''$ is equal to 100%.[17]

$$w'' = \left(w + \sum_{i=1}^{n} w_i^{k'''} + \sum_{i=1}^{n} w_i^{l'}\right) \qquad \forall\ i \qquad [1.16]$$

[15] In unusual cases when the proportional increase leads the new weight of a constituent included in-group *k* to exceed the 10% limit, the algorithm should be initialised in step (1.7) with the recalculated weights.
[16] In unusual cases when the proportional increase leads the new weight of a constituent included in-group *l* to exceed the 5% limit, the algorithm should be initialised in step (1.9) with the recalculated weights.
[17] If the sum of both constituent weights is not 100% and $\left(J + \sum_{i=1}^{p} w_i^{k'} + \sum_{i=1}^{p} w_i^{k''}\right) < 40$, it is necessary to repeat steps (1.14) and (1.15) until $w''$ = 100%.

Now, the constituent weights of each domestic Eurozone benchmark previously obtained are fulfilling the limits of portfolio concentration as stipulated by Directive 2009/65/EC. Next, we perform an analysis to calculate AS-thresholds that represent the minimum values of AS to confirm that the analysed portfolio is significantly active at 90%, 95% and 99% confidence levels. Due to the lack of information about fitted parametric distributions of the benchmark constituent weights, we develop confidence thresholds based on the historical distributions of these constituent weights in our study period. First, we achieve 200,000 monthly simulations with $w''$ using a 60-month fixed rolling window.[18] Second, we normalize up to 100% of the weight obtained in each simulation to assure that the total sum of the weights for each simulation is 100%. Then, we apply steps [1.2] to [1.16] from the algorithm presented in the previous sections to comply with Directive 2009/65/EC. Then, we obtain the differences between the real and the simulated weights of each benchmark constituent. That is, we calculate the original AS, equation [1.1], but we replace $w_{fund,i}$ with the simulated weight of each benchmark constituent fulfilling the EU concentration limits.

Third, we develop AS-thresholds with the monthly simulations of AS for each month and domestic Eurozone benchmark; to do this, we use statistical inference according to the values for the 90th, 95th and 99th percentiles of all AS simulations for each month and benchmark. These three thresholds will be the minimum values of AS required to confirm that the analysed portfolio is significantly active at 90%, 95% and 99% confidence levels.

Table 1.3 presents the monthly average of AS-thresholds for each year in each domestic Eurozone benchmark during the 2007-2016 period.[19] These results are driven

[18] For ATHEX 20 (Greece), FTSE MIB 40 (Italy), and PSI 20 (Portugal) the simulations begin when the sixty first weights are available. Further details about the simulation are not shown for the sake of brevity.
[19] Detailed monthly information is available on request.

by both the level of concentration of the different domestic Eurozone benchmarks and the EU limits on portfolio concentration, as we discussed in the previous section.

The striking differences reported by Table 1.3 confirm our hypothesis that the AS results in the domestic equity funds in the Eurozone being not directly compatible due to portfolio concentration limits defined in Directive 2009/65/EC. For instance, a domestic equity fund in the Portuguese market with an AS of 20% in 2013 shows no significant active management at 90%, 95% and 99% confidence levels. Instead, a domestic equity fund in the French market in the same period with an AS of 20% is significantly active at 90% and 95% but not at the 99% confidence level.

Table 1.3 allows testing for the statistical significance of the original AS obtained by domestic equity funds of the Eurozone for the period 2007-2016. Table 1.3 also shows consistent and stable thresholds across benchmarks and years, which leads us to use them in the empirical analysis included in the following section, (see details of the quarterly value of AS-thresholds in Appendix 1.3).

**Table 1.3 AS-thresholds of domestic equity benchmarks of the Eurozone.**

This table presents the monthly average (in percent terms) of AS-thresholds at 90%, 95% and 99% confidence levels during the period 2007-2016.

| | (AEX 25) NETHERLANDS | | | (ATHEX 20) GREECE | | | (ATX 20) AUSTRIA | | | (BEL 20) BELGIUM | | | (CAC 40) FRANCE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** |
| **2007** | 24.92 | 26.13 | 28.59 | N/A | N/A | N/A | 28.50 | 31.50 | 36.28 | 27.65 | 29.53 | 32.82 | 16.44 | 17.12 | 18.52 |
| **2008** | 28.66 | 30.25 | 33.17 | N/A | N/A | N/A | 28.63 | 35.71 | 40.64 | 29.91 | 31.17 | 33.95 | 19.04 | 19.67 | 20.93 |
| **2009** | 24.38 | 25.99 | 28.97 | N/A | N/A | N/A | 25.23 | 29.19 | 33.14 | 28.44 | 29.84 | 32.37 | 16.82 | 17.55 | 19.02 |
| **2010** | 24.48 | 25.75 | 28.38 | N/A | N/A | N/A | 23.44 | 26.57 | 29.62 | 24.50 | 26.16 | 29.39 | 16.03 | 16.75 | 18.20 |
| **2011** | 25.49 | 26.53 | 28.64 | 30.03 | 31.66 | 34.02 | 23.41 | 27.06 | 30.74 | 25.27 | 26.78 | 29.82 | 18.41 | 19.14 | 20.48 |
| **2012** | 24.03 | 25.17 | 27.23 | 29.76 | 30.80 | 32.87 | 23.49 | 27.73 | 31.27 | 25.01 | 26.72 | 29.70 | 20.33 | 20.99 | 22.21 |
| **2013** | 21.45 | 22.58 | 24.59 | 28.52 | 29.69 | 31.92 | 26.39 | 30.44 | 34.52 | 24.35 | 25.85 | 28.12 | 16.87 | 17.66 | 20.03 |
| **2014** | 21.73 | 22.82 | 24.38 | 28.37 | 29.80 | 32.41 | 22.63 | 26.48 | 30.08 | 23.85 | 24.88 | 26.81 | 12.99 | 13.77 | 17.67 |
| **2015** | 21.08 | 22.01 | 24.15 | 29.72 | 31.02 | 33.50 | 21.24 | 25.32 | 29.03 | 22.85 | 23.68 | 25.26 | 11.54 | 12.25 | 16.12 |
| **2016** | 19.81 | 20.41 | 21.54 | 29.97 | 31.23 | 33.66 | 19.22 | 22.75 | 26.40 | 23.74 | 24.99 | 27.66 | 11.25 | 11.95 | 15.88 |
| **Average** | 23.60 | 24.76 | 26.96 | 29.40 | 30.70 | 33.06 | 24.22 | 28.28 | 32.17 | 25.56 | 26.96 | 29.59 | 15.97 | 16.69 | 18.91 |
| | **(DAX 30) GERMANY** | | | **(FTSE MIB 40) ITALY** | | | **(IBEX 35) SPAIN** | | | **(OMX 25) FINLAND** | | | **(PSI 20) PORTUGAL** | | |
| **Year** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** |
| **2007** | 15.43 | 16.16 | 17.50 | N/A | N/A | N/A | 25.77 | 27.04 | 28.39 | 22.10 | 23.54 | 26.21 | N/A | N/A | N/A |
| **2008** | 16.72 | 17.42 | 18.79 | N/A | N/A | N/A | 29.80 | 31.13 | 33.04 | 23.56 | 25.00 | 27.74 | N/A | N/A | N/A |
| **2009** | 14.68 | 15.23 | 16.31 | 25.48 | 26.55 | 28.89 | 32.68 | 33.55 | 36.00 | 19.34 | 20.54 | 22.90 | N/A | N/A | N/A |
| **2010** | 14.87 | 15.43 | 16.52 | 23.93 | 24.94 | 27.07 | 32.70 | 33.54 | 35.27 | 15.95 | 17.15 | 19.62 | N/A | N/A | N/A |
| **2011** | 17.33 | 17.96 | 19.20 | 22.68 | 23.62 | 25.30 | 29.36 | 30.41 | 32.00 | 15.38 | 16.11 | 17.63 | N/A | N/A | N/A |
| **2012** | 17.25 | 18.15 | 19.70 | 21.75 | 22.61 | 24.13 | 28.01 | 28.7 | 30.22 | 15.60 | 16.34 | 17.78 | 36.62 | 37.66 | 40.61 |
| **2013** | 17.32 | 18.26 | 20.19 | 20.13 | 21.00 | 22.73 | 26.20 | 26.93 | 28.57 | 13.77 | 14.64 | 16.21 | 32.27 | 32.77 | 34.57 |
| **2014** | 15.33 | 16.29 | 18.42 | 18.16 | 18.94 | 20.55 | 22.24 | 23.03 | 24.57 | 11.75 | 12.34 | 13.70 | 30.41 | 31.50 | 32.81 |
| **2015** | 15.01 | 15.86 | 17.75 | 18.29 | 18.96 | 20.35 | 21.52 | 22.41 | 24.08 | 14.39 | 14.94 | 16.11 | 28.90 | 30.14 | 32.75 |
| **2016** | 15.29 | 15.85 | 17.77 | 20.20 | 20.92 | 22.17 | 18.17 | 19.02 | 20.52 | 15.49 | 16.07 | 17.16 | 29.42 | 30.73 | 33.69 |
| **Average** | 15.92 | 16.66 | 18.22 | 21.33 | 22.19 | 23.90 | 26.65 | 27.58 | 29.27 | 16.73 | 17.67 | 19.51 | 31.52 | 32.56 | 34.89 |

## 1.5 Active management in domestic equity funds of the Eurozone

This section aims to measure the level of active management of the domestic equity funds registered in each Eurozone market. We analyse a comprehensive sample of Eurozone open-end mutual funds categorized as domestic equity funds by Morningstar.[20] We obtain the portfolio holdings, the total net assets (TNA), the domicile and the primary prospectus benchmarks. The sample covers the same period as the previous section, from January 2007 to December 2016. The initial sample drawn from Morningstar consists of 570 domestic equity funds. This sample is free of survivorship bias because it includes both active and terminated funds. To avoid potential heterogeneity problems in the fund sample that could lead to non-comparable AS results, we exclude those equity funds from our initial sample whose primary prospectus benchmarks are not clearly defined or are different from those previously included in our domestic benchmark sample. We also exclude Index funds and other categories (e.g., funds of funds) because their investment policy conflicts with the objectives of our analysis.[21]

Our final sample includes 23,749 portfolio holdings from 381 domestic equity funds that have a primary prospectus benchmark included in our domestic benchmark sample. The database used in this analysis relies on monthly portfolio holdings information from January 2007 to December 2016. We work with monthly portfolio holdings when this information is provided and with quarterly portfolio holdings otherwise. Table 1.4 reports descriptive statistics of our final sample. The most relevant

[20] According to Morningstar, domestic equity funds are defined as funds with at least 70% of assets invested in domestic stocks.

[21] We analyse 67% out of all the domestic equity funds registered in the Eurozone domestic fund market during our sample period (Source: Morningstar). Domestic equity funds with a different primary prospectus benchmark (20%) or an unclear benchmark (7%) were excluded, as well as Index Funds and Funds of Funds (6%).

mutual fund industries in the Eurozone, such as France, Germany, Spain and Italy, are also obviously important in our sample. However, the average fund size and the median number of portfolio holdings are assorted across the different Eurozone markets.

Focusing on the original approach of AS by Cremers and Petajisto (2009), we formulate actual active share (aAS) considering the level of concentration existing in the domestic equity funds in the Eurozone markets and the limits of the portfolio concentration on European regulation. We define aAS as the difference between the monthly AS obtained for each domestic equity fund minus its monthly AS-threshold obtained in the previous section at 90%, 95% and 99% confidence levels. That is, aAS is the level of significant active management over the spurious level driven by the benchmark concentration and the EU concentration limits.

$$aAS_{90\%,95\%,99\%} = AS - AS\_Threshold_{90\%,95\%,99\%} \quad [1.17]$$

Table 1.5 shows the average and the standard deviation values of both AS and aAS in each Eurozone market using the AS-threshold of 95%.[22] Each value obtained by each fund and period is not sensitive to the number of funds included in each market because these active management measures are individually applied to each fund.

Table 1.5 provides evidence that aAS significantly corrects the potential bias in the original AS caused by both the benchmark concentration and the EU portfolio diversification rules. This finding is more evident in those markets with the highest AS: the Belgian market, the Greek market and the Portuguese market with AS values of 57.63%, 53.43% and 52%, respectively.[23] These values subside into much lower levels of $aAS_{95\%}$, 29.62%, 22.74%, and 19.45%, respectively.

[22] The results are also consistent when we use the threshold of 90% and the threshold of 99% developed in the previous section. Detailed results per year are available upon request.
[23] The conclusions about the Belgian market should be taken with caution because the monthly portfolio holdings are very limited.

Further, we find diverse results in the dispersion of both AS and aAS measures. There are markets where domestic equity funds with high values in these active management measures are not distinctively different from other funds with low AS and aAS values. However, our novel aAS should not have contradictory performance implications with those obtained by the original AS results (Cremers *et al*., 2016) because the active management range is constant for both measures in each market and period.[24]

Table 1.5 shows assorted results and thus the question arises as to whether the level of active management in the Eurozone markets presents significant differences. Using the Kruskal-Wallis test, we test the significance of actual active management in domestic equity funds across 10 different Eurozone markets. We apply the test with the monthly $aAS_{95\%}$ from January 2007 to December 2016.[25] Table 1.6 shows conclusive results. There are significant differences in the active management between domestic equity funds in the Eurozone markets at a 1% confidence level.[26]

We apply the Nemenyi test – comparing markets pairwise – with the aim of detecting which markets are producing the significant differences in the level of active management. Table 1.6 shows that France, Italy and Spain are the most economically important markets that drive these results. The French market presents significant differences in active management compared with the rest of the domestic equity funds in the Eurozone. The primary implication of this result, together with both the average AS and $aAS_{95\%}$ (Table 1.5), is that domestic equity funds in France are – significantly – the most active in the Eurozone. Next, the Spanish and Italian domestic equity funds present similar active management levels but significant differences with the rest of the Eurozone. Although the Spanish benchmark IBEX 35 obtains a larger spurious AS than does the

[24] The only difference between both AS and aAS is the subtraction of the AS-Threshold, which is constant for each domestic benchmark and period.
[25] The monthly $aAS_{95\%}$ used in this analysis has been standardized to compare the results.
[26] The results are also consistent for $aAS_{90\%}$ and $aAS_{99\%}$. Detailed results are available upon request.

Italian FTSE MIB 40, the actual levels of active management of Spanish and Italian domestic equity funds are similar through the $aAS_{95\%}$ and significantly higher than the rest of the domestic equity funds of the Eurozone, with the exception of French funds.

Similar to the French domestic benchmark, the low levels of concentration of the German DAX 30 should anticipate higher levels of aAS of domestic equity funds in this market. That is, EU diversification rules fulfilled by domestic equity funds registered in Germany should not be in conflict with the well-diversified DAX 30. However, we now have evidence of the contrary. This market does not present significant differences – in terms of active management – from other domestic equity fund industries, whose domestic benchmarks are much more concentrated. Overall, the most economically relevant fund industries in the Eurozone show significant differences in the actual levels of active management.

**Table 1.4 Domestic equity funds. Summary statistics.**
This table shows the number of domestic equity funds registered in each Eurozone market and (1) the number of portfolio holdings analysed, (2) the median number of holdings in each mutual fund portfolio, and (3) the average fund size in millions of euros.

| | NETHERLANDS | | | GREECE | | | AUSTRIA | | | BELGIUM | | | FRANCE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No. domestic equity funds** | 11 | | | 13 | | | 10 | | | 6 | | | 150 | | |
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2007** | 67 | 26 | 406.51 | 65 | 50 | 190.29 | 37 | 50 | 178.31 | 6 | 42 | 30.01 | 298 | 58 | 256.21 |
| **2008** | 61 | 25 | 292.70 | 60 | 45 | 109.47 | 35 | 44 | 111.37 | 19 | 44 | 16.23 | 455 | 51 | 158.67 |
| **2009** | 62 | 27 | 253.90 | 69 | 42 | 68.99 | 56 | 40 | 81.46 | 19 | 51 | 10.75 | 779 | 53 | 156.94 |
| **2010** | 64 | 27 | 482.75 | 60 | 41 | 52.50 | 58 | 41 | 155.08 | 23 | 51 | 20.30 | 731 | 56 | 158.03 |
| **2011** | 73 | 28 | 472.83 | 62 | 35 | 51.00 | 68 | 41 | 143.19 | 13 | 44 | 36.50 | 728 | 55 | 151.70 |
| **2012** | 76 | 27 | 407.41 | 42 | 39 | 37.18 | 66 | 40 | 150.12 | 12 | 55 | 65.23 | 795 | 56 | 138.55 |
| **2013** | 78 | 27 | 407.52 | 44 | 36 | 52.26 | 76 | 35 | 177.48 | 3 | 53 | 69.40 | 841 | 61 | 172.84 |
| **2014** | 61 | 26 | 426.61 | 87 | 42 | 60.89 | 78 | 33 | 181.93 | N/A | N/A | N/A | 902 | 61 | 174.99 |
| **2015** | 48 | 29 | 272.58 | 82 | 41 | 39.63 | 81 | 34 | 197.66 | N/A | N/A | N/A | 895 | 61 | 177.94 |
| **2016** | 51 | 29 | 233.21 | 81 | 39 | 36.08 | 84 | 36 | 219.55 | N/A | N/A | N/A | 972 | 61 | 198.24 |
| **Average** | 64 | 27 | 365.60 | 65 | 41 | 69.83 | 64 | 39 | 159.62 | 14 | 49 | 35.49 | 740 | 57 | 174.41 |
| | **GERMANY** | | | **ITALY** | | | **SPAIN** | | | **FINLAND** | | | **PORTUGAL** | | |
| **No. domestic equity funds** | 65 | | | 34 | | | 45 | | | 32 | | | 15 | | |
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2007** | 379 | 56 | 523.83 | 177 | 81 | 207.68 | 220 | 45 | 111.67 | 139 | 38 | 140.68 | 180 | 34 | 78.19 |
| **2008** | 408 | 51 | 346.28 | 219 | 70 | 131.50 | 240 | 38 | 52.82 | 168 | 35 | 84.45 | 180 | 35 | 40.92 |
| **2009** | 455 | 52 | 329.67 | 273 | 66 | 95.78 | 241 | 38 | 35.47 | 191 | 36 | 92.38 | 150 | 34 | 29.64 |
| **2010** | 422 | 56 | 453.39 | 257 | 66 | 101.29 | 296 | 37 | 35.88 | 227 | 36 | 122.08 | 165 | 33 | 29.58 |
| **2011** | 404 | 58 | 571.60 | 251 | 68 | 90.13 | 307 | 36 | 34.81 | 248 | 34 | 120.69 | 165 | 31 | 19.27 |
| **2012** | 418 | 52 | 558.67 | 244 | 69 | 88.08 | 313 | 36 | 30.34 | 268 | 33 | 109.13 | 171 | 32 | 12.38 |
| **2013** | 382 | 48 | 615.32 | 182 | 73 | 117.47 | 371 | 38 | 52.76 | 276 | 34 | 125.72 | 149 | 31 | 16.55 |
| **2014** | 373 | 46 | 698.86 | 190 | 77 | 155.59 | 403 | 42 | 109.36 | 302 | 34 | 130.04 | 143 | 34 | 25.93 |
| **2015** | 389 | 47 | 776.34 | 191 | 80 | 178.63 | 430 | 41 | 115.37 | 251 | 33 | 154.36 | 125 | 31 | 22.51 |
| **2016** | 388 | 48 | 740.70 | 192 | 75 | 155.65 | 452 | 39 | 92.80 | 243 | 34 | 156.79 | 118 | 29 | 18.65 |
| **Average** | 402 | 51 | 561.47 | 218 | 73 | 132.18 | 327 | 39 | 67.13 | 231 | 35 | 123.63 | 155 | 32 | 29.36 |

**Table 1.5 Actual active management in domestic equity funds in the Eurozone.**
This table presents the monthly average AS (in percent terms) proposed by Cremers and Petajisto (2009), the monthly average aAS95% obtained from equation [1.17] and the monthly average standard deviation of both average AS and aAS95%.

| | NETHERLANDS | | | GREECE | | | AUSTRIA | | | BELGIUM | | | FRANCE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **AS** | **aAS$_{95\%}$** | **St. Dev** | **AS** | **aAS$_{95\%}$** | **St. Dev** | **AS** | **aAS$_{95\%}$** | **St. Dev** | **AS** | **aAS$_{95\%}$** | **St. Dev** | **AS** | **aAS$_{95\%}$** | **St. Dev** |
| **2007** | 36.80 | 10.67 | 11.91 | N/A | N/A | N/A | 48.72 | 17.22 | 4.17 | 39.75 | 10.22 | 36.85 | 50.68 | 33.56 | 16.44 |
| **2008** | 37.17 | 6.91 | 12.26 | N/A | N/A | N/A | 45.87 | 10.16 | 8.16 | 53.32 | 22.16 | 23.56 | 50.18 | 30.51 | 17.15 |
| **2009** | 33.82 | 7.83 | 12.09 | N/A | N/A | N/A | 52.99 | 23.80 | 5.70 | 54.45 | 24.61 | 12.94 | 47.40 | 29.84 | 18.67 |
| **2010** | 34.13 | 8.38 | 14.48 | N/A | N/A | N/A | 45.94 | 19.37 | 8.34 | 47.08 | 20.91 | 17.95 | 49.23 | 32.48 | 18.34 |
| **2011** | 33.56 | 7.03 | 10.88 | 65.68 | 34.03 | 8.26 | 43.98 | 16.92 | 12.19 | 57.31 | 30.52 | 17.33 | 51.20 | 32.07 | 17.26 |
| **2012** | 36.29 | 11.12 | 11.31 | 62.25 | 31.45 | 6.18 | 41.56 | 13.83 | 10.82 | 74.49 | 47.78 | 24.54 | 51.00 | 30.02 | 17.16 |
| **2013** | 35.55 | 12.97 | 11.91 | 52.29 | 22.60 | 4.50 | 41.64 | 11.20 | 10.00 | 76.99 | 51.13 | 19.01 | 48.15 | 30.49 | 18.15 |
| **2014** | 37.63 | 14.81 | 16.93 | 49.34 | 19.54 | 5.58 | 44.64 | 18.16 | 8.05 | N/A | N/A | N/A | 51.87 | 38.10 | 19.17 |
| **2015** | 51.89 | 29.88 | 16.66 | 46.64 | 15.62 | 8.94 | 48.31 | 22.99 | 10.08 | N/A | N/A | N/A | 53.71 | 41.47 | 19.40 |
| **2016** | 57.69 | 37.28 | 6.81 | 44.40 | 13.17 | 14.95 | 45.25 | 22.50 | 11.71 | N/A | N/A | N/A | 52.91 | 40.96 | 19.76 |
| **Average** | 39.45 | 14.69 | 12.53 | 53.43 | 22.74 | 8.07 | 45.89 | 17.62 | 8.92 | 57.63 | 29.62 | 21.74 | 50.63 | 33.95 | 18.15 |

| | GERMANY | | | ITALY | | | SPAIN | | | FINLAND | | | PORTUGAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **AS** | **aAS$_{95\%}$** | **St. Dev** | **AS** | **aAS$_{95\%}$** | **St. Dev** | **AS** | **aAS$_{95\%}$** | **St. Dev** | **AS** | **aAS$_{95\%}$** | **St. Dev** | **AS** | **aAS$_{95\%}$** | **St. Dev** |
| **2007** | 30.74 | 14.58 | 12.48 | N/A | N/A | N/A | 46.92 | 19.88 | 9.79 | 42.36 | 18.82 | 17.83 | N/A | N/A | N/A |
| **2008** | 33.88 | 16.46 | 11.89 | N/A | N/A | N/A | 48.47 | 17.35 | 9.41 | 42.43 | 17.43 | 18.39 | N/A | N/A | N/A |
| **2009** | 33.15 | 17.92 | 11.16 | 48.91 | 22.37 | 16.62 | 52.19 | 18.64 | 13.86 | 39.31 | 18.77 | 17.64 | N/A | N/A | N/A |
| **2010** | 32.41 | 16.98 | 15.60 | 51.42 | 26.48 | 17.66 | 54.52 | 20.98 | 12.83 | 39.10 | 21.95 | 18.43 | N/A | N/A | N/A |
| **2011** | 34.25 | 16.29 | 16.24 | 50.91 | 27.29 | 17.48 | 57.17 | 26.76 | 11.74 | 41.19 | 25.09 | 17.96 | N/A | N/A | N/A |
| **2012** | 34.14 | 15.98 | 16.76 | 48.89 | 26.28 | 15.91 | 52.64 | 23.93 | 16.57 | 40.91 | 24.56 | 17.30 | 57.73 | 20.08 | 5.91 |
| **2013** | 31.84 | 13.58 | 13.40 | 47.91 | 26.91 | 16.06 | 51.55 | 24.62 | 14.72 | 40.95 | 26.30 | 16.52 | 54.06 | 21.30 | 5.17 |
| **2014** | 36.43 | 20.15 | 19.32 | 46.17 | 27.24 | 14.91 | 52.64 | 29.61 | 16.20 | 41.03 | 28.69 | 15.72 | 51.38 | 19.88 | 3.74 |
| **2015** | 38.88 | 23.01 | 19.04 | 47.38 | 28.41 | 14.57 | 50.82 | 28.41 | 17.99 | 39.97 | 25.02 | 16.59 | 48.74 | 18.60 | 3.65 |
| **2016** | 42.33 | 26.48 | 18.42 | 47.58 | 26.66 | 14.10 | 50.88 | 31.86 | 20.33 | 41.42 | 25.35 | 14.53 | 48.09 | 17.37 | 3.41 |
| **Average** | 34.81 | 18.14 | 15.43 | 48.65 | 26.46 | 15.91 | 51.78 | 24.20 | 14.34 | 40.87 | 23.2 | 17.09 | 52.00 | 19.45 | 4.38 |

**Table 1.6 Differences in aAS95% of domestic equity funds of the Eurozone.**

This table shows in column 2, the Kruskal-Wallis test robust chi-squared clustered, p.value reported in parentheses reflects significance at the 10%, 5% and 1% levels, respectively. Columns 3-11 show the results of the Nemenyi test for each country pairwise in the period 2007-2016. The Nemenyi test is a statistical post hoc test with the aim of finding the groups of data that differ after a statistical test of multiple comparisons. If the result is near one, the active management between each domestic fund industry pairwise is similar; instead, if the result is close to zero, the active management is significantly different.

| | | **Nemenyi test** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Kruskal Wallis test** | **NETHERLANDS** | **GREECE** | **AUSTRIA** | **BELGIUM** | **FRANCE** | **GERMANY** | **ITALY** | **SPAIN** | **FINLAND** |
| **NETHERLANDS** | 0.578 (0.000) | - | - | - | - | - | - | - | - | - |
| **GREECE** | 0.722 (0.000) | 1.000 | - | - | - | - | - | - | - | - |
| **AUSTRIA** | 0.538 (0.000) | 1.000 | 1.000 | - | - | - | - | - | - | - |
| **BELGIUM** | 1.269 (0.000) | 0.000 | 0.000 | 0.000 | - | - | - | - | - | - |
| **FRANCE** | 1.306 (0.000) | 0.000 | 0.000 | 0.000 | 0.000 | - | - | - | - | - |
| **GERMANY** | 0.488 (0.000) | 0.715 | 0.999 | 0.948 | 0.000 | 0.000 | - | - | - | - |
| **ITALY** | 0.811 (0.000) | 0.000 | 0.000 | 0.000 | 0.014 | 0.000 | 0.000 | - | - | - |
| **SPAIN** | 0.888 (0.000) | 0.000 | 0.000 | 0.000 | 0.012 | 0.000 | 0.000 | 0.824 | - | - |
| **FINLAND** | 0.422 (0.000) | 0.515 | 0.774 | 0.227 | 0.000 | 0.000 | 0.473 | 0.000 | 0.000 | - |
| **PORTUGAL** | 0.625 (0.000) | 0.996 | 1.000 | 1.000 | 0.000 | 0.000 | 0.999 | 0.000 | 0.000 | 0.659 |

## 1.6 Summary and Conclusions

This chapter is the first to examine how both the domestic benchmark concentration and the Directive 2009/65/EC on risk of portfolio diversification may distort the accuracy of the original AS of Cremers and Petajisto (2009) in the Eurozone mutual fund industry. Our unbiased approach has important implications for policymakers and practitioners in terms of identification of an active management map of the Eurozone fund industry.

We develop an algorithm to capture the spurious AS, defined as the minimum AS, which is not a consequence of active decisions made by equity fund managers. The results provide evidence of the unfeasibility to make direct AS comparisons in the Eurozone and lead us to obtain three AS-thresholds per domestic equity benchmark, which are the minimum values of AS needed to confirm that domestic equity funds are significantly active at 90%, 95% and 99% confidence levels.

Our findings suggest that the high concentration level and the heterogeneity present in the domestic equity funds in the Eurozone prevent the direct comparability of the AS. Therefore, it would be necessary to consider the level of AS over the spurious level and the characteristics of every market, each of which produces significant and different styles of active management.

Further, we assess active management in a comprehensive sample of domestic equity funds registered in the Eurozone for the period 2007-2016. To do that, we define actual AS as the measure used to identify significant active management over the spurious AS level driven by the domestic equity benchmark concentration and the EU concentration limits. Our evidence suggests that the level of actual active management in the Eurozone presents significant differences. Focusing on the most relevant fund industries in the Eurozone, we find that France is the most active domestic equity fund

market. Followed by the Spanish and Italian markets that show high levels of actual active management despite the large concentration in their domestic benchmarks. Conversely, domestic equity funds registered in Germany show lower levels of active management.

Our findings support the hypothesis that our actual AS measure corrects the potential bias in the original AS caused by both the domestic benchmark concentration and the EU portfolio diversification rules.

# Appendix 1.1 Detailed explanation of algorithm

By applying our algorithm, users will obtain domestic Eurozone benchmarks which fulfil the portfolio concentration limits of the Directive 2009/65/EC. In our study, the algorithm was applied on a monthly basis. (Figures in parentheses relate to equations of the algorithm included in the main body of the chapter.)

**Input:** The weights of the constituents that are part of each domestic Eurozone benchmark.

**Output:** The weights of the constituents that are part of each domestic Eurozone benchmark fulfilling the limits of portfolio concentration of the Directive 2009/65/EC.

**Terms**

First: The weight of each constituent, called $w_i$, is positive, and the sum of their weights for each benchmark is 100%. [1.2] [1.3]

Second: Limits of portfolio concentration showed in article 52 on the Directive 2009/65/EC sort $w_i$ into three groups.

Group 1) $Include\ constituents\ with\ \ w_i > 10\%$ [1.4]

Group 2) $Include\ constituents\ with\ 5\% \leq w_i \leq 10\%$ [1.5]

Group 3) $Include\ constituents\ with\ w_i < 5\%$ [1.6]

Third: The sum of the weights of the constituents included in Group 1 and Group 2 shall not exceed 40%.

Fourth: The list of the weights of the constituents is arranged from the highest to the lowest.

**Process**

1. Initialise the process with Group 1: Reduce weights of its constituents from their original weights to 10%. [1.7]

2. Consider jointly the recalculated weights of the constituents of Group 1 (step 1) and the original weights of the constituents of Group 2 and obtain the sum of both groups, constituent by constituent (from the highest to the lowest). [1.8]

If the sum is greater than 40%, then reduce the weights of the constituents in Group 2 from their original weights to 5%. [1.9]

3. Include Group 3 in the process: Define $w$ as the sum of the accumulated weights obtained in step 1, step 2 and the accumulated weights of the constituents in Group 3. [1.10]

4. Define sAS as the difference between 100% minus $w$

$$sAS = 100\% - w \quad [1.11]$$

5. Distribute sAS among the constituents that can incorporate an additional weight following the restrictions included in *Terms* and proportionally to their original weights.

When the proportional increase leads the new weight of a constituent included in Group 2 to exceed the 10% limit then the process should be initialised in step 1 with the recalculated weights. [1.12] [1.13] [1.14]

When the proportional increase leads the new weight of a constituent included in Group 3 to exceed the 5% limit then the process should be initialised in step 2 with the recalculated weights. [1.15]

6. Obtain the sum of the accumulated weights of the constituents in Group 1 (step 1), Group 2 (step 2) and Group 3 (step 5), constituent by constituent (from the highest to the lowest).

While sAS is higher than zero, continue the proportional distribution described in step 5. When sAS is equal to zero, the process concludes. [1.16]

# Appendix 1.2 Quarterly information of spurious Active Share

This table presents the information of quarterly sAS for the ten domestic Eurozone benchmarks during the 2002-2016 period.

| | | (AEX 25) | (ATHEX 20) | (ATX 20) | (BEL 20) | (CAC 40) | (DAX 30) | (FTSE MIB 40) | (IBEX 35) | (OMXH 25) | (PSI 20) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Quarter** | **Year** | **NETHERLANDS** | **GREECE** | **AUSTRIA** | **BELGIUM** | **FRANCE** | **GERMANY** | **ITALY** | **SPAIN** | **FINLAND** | **PORTUGAL** |
| **Q1** | **2002** | 13.47 | N/A | 18.77 | N/A | 3.40 | 5.68 | N/A | 23.81 | 4.87 | N/A |
| **Q2** | **2002** | 11.95 | N/A | 17.59 | 23.48 | 5.27 | 7.00 | N/A | 19.81 | 6.46 | N/A |
| **Q3** | **2002** | 12.91 | N/A | 17.15 | 25.72 | 5.16 | 8.43 | N/A | 15.03 | 5.25 | N/A |
| **Q4** | **2002** | 12.44 | N/A | 21.28 | 25.08 | 4.22 | 7.79 | N/A | 18.31 | 5.44 | N/A |
| **Q1** | **2003** | 12.63 | N/A | 22.34 | 25.57 | 2.83 | 9.25 | N/A | 17.03 | 17.64 | N/A |
| **Q2** | **2003** | 11.87 | N/A | 20.34 | 26.07 | 3.22 | 9.20 | N/A | 17.98 | 14.91 | N/A |
| **Q3** | **2003** | 12.18 | N/A | 17.07 | 24.19 | 2.81 | 9.40 | N/A | 18.38 | 14.58 | N/A |
| **Q4** | **2003** | 11.75 | N/A | 18.71 | 23.68 | 4.83 | 9.91 | N/A | 20.84 | 9.95 | N/A |
| **Q1** | **2004** | 12.19 | N/A | 22.58 | 20.46 | 6.02 | 8.30 | N/A | 19.14 | 5.37 | N/A |
| **Q2** | **2004** | 13.06 | N/A | 22.65 | 19.89 | 8.14 | 8.49 | N/A | 18.70 | 5.74 | N/A |
| **Q3** | **2004** | 13.24 | N/A | 22.99 | 19.38 | 4.96 | 8.24 | N/A | 16.95 | 9.63 | N/A |
| **Q4** | **2004** | 13.23 | N/A | 26.11 | 18.62 | 3.59 | 6.32 | 10.16 | 19.78 | 8.07 | N/A |
| **Q1** | **2005** | 17.29 | N/A | 26.09 | 17.70 | 6.01 | 5.38 | 11.20 | 17.41 | 6.16 | N/A |
| **Q2** | **2005** | 17.74 | N/A | 23.27 | 18.01 | 5.23 | 5.91 | 12.23 | 16.79 | 3.77 | N/A |
| **Q3** | **2005** | 18.27 | N/A | 21.64 | 18.73 | 4.94 | 5.85 | 12.88 | 15.31 | 5.23 | N/A |
| **Q4** | **2005** | 17.95 | N/A | 22.86 | 22.33 | 4.22 | 5.60 | 17.25 | 15.32 | 4.31 | N/A |
| **Q1** | **2006** | 16.76 | N/A | 17.80 | 20.89 | 3.08 | 4.06 | 15.41 | 15.45 | 50.53 | N/A |
| **Q2** | **2006** | 18.38 | N/A | 20.68 | 20.62 | 3.31 | 4.60 | 15.39 | 15.06 | 5.49 | N/A |
| **Q3** | **2006** | 17.26 | N/A | 20.18 | 20.41 | 3.28 | 3.73 | 13.76 | 17.66 | 4.32 | N/A |
| **Q4** | **2006** | 16.47 | 20.24 | 20.44 | 21.60 | 2.16 | 2.41 | 16.63 | 17.41 | 3.71 | N/A |
| **Q1** | **2007** | 16.31 | 22.36 | 21.02 | 19.57 | 1.97 | 3.21 | 14.87 | 14.87 | 3.23 | 27.67 |
| **Q2** | **2007** | 16.46 | 19.72 | 23.01 | 19.08 | 2.95 | 3.30 | 15.59 | 14.33 | 3.84 | 21.90 |
| **Q3** | **2007** | 17.21 | 18.61 | 24.33 | 19.74 | 2.14 | 2.73 | 15.34 | 16.43 | 6.21 | 20.27 |
| **Q4** | **2007** | 16.08 | 19.16 | 21.77 | 18.89 | 2.48 | 4.43 | 16.90 | 20.49 | 4.75 | 23.70 |

Continue to the next page

| Quarter | Year | (AEX 25) NETHERLANDS | (ATHEX 20) GREECE | (ATX 20) AUSTRIA | (BEL 20) BELGIUM | (CAC 40) FRANCE | (DAX 30) GERMANY | (FTSE MIB 40) ITALY | (IBEX 35) SPAIN | (OMXH 25) FINLAND | (PSI 20) PORTUGAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Q1** | **2008** | 18.49 | 16.83 | 21.42 | 18.95 | 3.52 | 3.56 | 17.51 | 19.48 | 2.90 | 21.72 |
| **Q2** | **2008** | 20.81 | 18.83 | 22.82 | 15.24 | 4.14 | 3.88 | 15.41 | 20.83 | 4.49 | 20.33 |
| **Q3** | **2008** | 19.74 | 20.82 | 22.16 | 19.37 | 5.89 | 8.18 | 15.85 | 21.85 | 9.83 | 20.56 |
| **Q4** | **2008** | 18.90 | 18.00 | 17.44 | 17.22 | 7.03 | 7.06 | 14.72 | 20.70 | 28.28 | 21.70 |
| **Q1** | **2009** | 11.90 | 16.73 | 17.99 | 12.79 | 5.70 | 4.90 | 12.72 | 21.70 | 4.87 | 19.60 |
| **Q2** | **2009** | 13.63 | 16.70 | 18.77 | 14.73 | 4.30 | 5.51 | 14.26 | 24.33 | 5.36 | 19.50 |
| **Q3** | **2009** | 12.22 | 22.23 | 18.44 | 15.49 | 3.24 | 6.34 | 16.40 | 26.39 | 4.75 | 19.56 |
| **Q4** | **2009** | 12.67 | 19.35 | 17.75 | 15.78 | 3.05 | 5.85 | 15.49 | 27.68 | 3.44 | 18.77 |
| **Q1** | **2010** | 14.21 | 18.06 | 16.07 | 10.87 | 2.45 | 5.80 | 14.56 | 23.72 | 4.25 | 20.41 |
| **Q2** | **2010** | 12.54 | 15.77 | 16.69 | 11.94 | 2.33 | 6.19 | 15.23 | 25.92 | 4.64 | 21.78 |
| **Q3** | **2010** | 13.69 | 17.83 | 18.55 | 12.92 | 1.78 | 5.72 | 13.90 | 26.03 | 4.04 | 23.44 |
| **Q4** | **2010** | 13.37 | 16.28 | 17.56 | 11.65 | 2.33 | 7.42 | 12.24 | 24.38 | 4.88 | 22.73 |
| **Q1** | **2011** | 11.80 | 15.54 | 16.63 | 10.67 | 2.19 | 6.14 | 12.62 | 21.40 | 5.01 | 22.20 |
| **Q2** | **2011** | 13.83 | 12.55 | 19.20 | 10.17 | 1.99 | 5.04 | 11.71 | 21.51 | 5.64 | 23.80 |
| **Q3** | **2011** | 15.84 | 14.57 | 14.99 | 13.15 | 3.45 | 4.72 | 11.46 | 22.31 | 5.62 | 26.91 |
| **Q4** | **2011** | 15.53 | 15.59 | 14.55 | 13.44 | 4.67 | 4.27 | 7.74 | 20.93 | 5.44 | 26.56 |
| **Q1** | **2012** | 13.79 | 17.63 | 14.45 | 11.00 | 4.00 | 3.59 | 9.22 | 21.11 | 6.86 | 23.95 |
| **Q2** | **2012** | 14.70 | 15.96 | 15.27 | 12.75 | 5.45 | 3.46 | 7.68 | 20.85 | 7.43 | 25.62 |
| **Q3** | **2012** | 13.21 | 15.64 | 15.93 | 13.13 | 5.11 | 2.90 | 8.45 | 20.54 | 4.95 | 27.29 |
| **Q4** | **2012** | 12.46 | 9.69 | 17.35 | 13.31 | 3.88 | 3.71 | 8.50 | 20.35 | 5.73 | 24.00 |
| **Q1** | **2013** | 14.85 | 15.62 | 19.04 | 13.71 | 4.46 | 3.78 | 7.48 | 18.90 | 5.43 | 29.12 |
| **Q2** | **2013** | 11.90 | 13.11 | 19.83 | 12.43 | 3.69 | 4.74 | 7.58 | 16.98 | 5.69 | 25.05 |
| **Q3** | **2013** | 11.22 | 14.84 | 19.98 | 13.36 | 2.70 | 4.21 | 8.84 | 17.40 | 8.08 | 23.14 |
| **Q4** | **2013** | 11.21 | 14.43 | 19.32 | 12.50 | 1.70 | 3.68 | 7.98 | 14.27 | 4.43 | 22.63 |

Continue to the next page

| Quarter | Year | (AEX 25) NETHERLANDS | (ATHEX 20) GREECE | (ATX 20) AUSTRIA | (BEL 20) BELGIUM | (CAC 40) FRANCE | (DAX 30) GERMANY | (FTSE MIB 40) ITALY | (IBEX 35) SPAIN | (OMXH 25) FINLAND | (PSI 20) PORTUGAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Q1** | **2014** | 14.18 | 11.49 | 16.95 | 13.57 | 2.91 | 3.64 | 8.47 | 13.00 | 5.50 | 18.95 |
| **Q2** | **2014** | 14.65 | 15.16 | 17.07 | 12.56 | 3.24 | 4.36 | 8.29 | 13.33 | 5.32 | 20.53 |
| **Q3** | **2014** | 14.23 | 16.09 | 14.16 | 12.69 | 2.10 | 4.56 | 8.35 | 14.01 | 6.36 | 21.88 |
| **Q4** | **2014** | 13.30 | 16.11 | 12.26 | 14.06 | 1.08 | 4.24 | 8.20 | 12.52 | 5.92 | 23.71 |
| **Q1** | **2015** | 14.29 | 11.81 | 13.78 | 13.25 | 0.86 | 4.52 | 7.34 | 12.27 | 4.64 | 20.08 |
| **Q2** | **2015** | 14.31 | 14.67 | 14.05 | 12.99 | 1.23 | 4.93 | 7.34 | 12.29 | 3.70 | 22.05 |
| **Q3** | **2015** | 15.12 | 19.34 | 13.49 | 13.09 | 0.73 | 6.36 | 6.35 | 10.98 | 4.47 | 21.65 |
| **Q4** | **2015** | 12.72 | 20.79 | 14.89 | 13.97 | 0.00 | 6.00 | 6.49 | 10.54 | 4.36 | 23.55 |
| **Q1** | **2016** | 12.90 | 18.76 | 14.06 | 12.35 | 0.06 | 6.13 | 7.27 | 10.04 | 3.32 | 21.82 |
| **Q2** | **2016** | 12.65 | 16.47 | 13.65 | 12.68 | 0.00 | 4.85 | 7.39 | 8.65 | 3.34 | 21.02 |
| **Q3** | **2016** | 12.46 | 15.32 | 13.33 | 11.88 | 0.52 | 5.30 | 5.67 | 9.02 | 3.87 | 20.21 |
| **Q4** | **2016** | 11.60 | 16.23 | 15.50 | 12.95 | 0.68 | 5.33 | 4.08 | 10.66 | 2.99 | 16.86 |

# Appendix 1.3 Quarterly information of AS-thresholds at 90%, 95% and 99% confidence levels of domestic equity benchmarks of the Eurozone

This table show in Panels A and B quarterly AS-Thresholds at 90%, 95% and 99% confidence levels of domestic equity benchmarks of the Eurozone. Panel A includes information of Netherlands, Greece, Austria Belgium and France. Panel B presents information of Germany, Italy, Spain, Finland and Portugal.

| **Panel A** | | **(AEX 25)** | | | **(ATHEX 20)** | | | **(ATX 20)** | | | **(BEL 20)** | | | **(CAC 40)** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **NETHERLANDS** | | | **GREECE** | | | **AUSTRIA** | | | **BELGIUM** | | | **FRANCE** | | |
| **Quarter** | **Year** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** |
| **Q1** | **2007** | 24,55 | 25,48 | 27,28 | N/A | N/A | N/A | 30,97 | 26,11 | 35,75 | N/A | N/A | N/A | 17,05 | 17,89 | 19,27 |
| **Q2** | **2007** | 24,92 | 25,77 | 27,97 | N/A | N/A | N/A | 32,52 | 28,20 | 37,38 | 26,89 | 28,91 | 33,03 | 16,56 | 17,28 | 18,78 |
| **Q3** | **2007** | 25,01 | 25,73 | 27,02 | N/A | N/A | N/A | 33,47 | 28,93 | 38,54 | 28,12 | 30,05 | 33,40 | 15,76 | 16,35 | 17,54 |
| **Q4** | **2007** | 24,81 | 26,85 | 31,58 | N/A | N/A | N/A | 32,69 | 34,07 | 36,82 | 27,85 | 29,21 | 32,50 | 16,56 | 17,14 | 18,66 |
| **Q1** | **2008** | 26,34 | 27,61 | 30,95 | N/A | N/A | N/A | 31,83 | 27,57 | 36,83 | 28,21 | 30,21 | 33,59 | 17,91 | 18,55 | 19,47 |
| **Q2** | **2008** | 28,94 | 30,24 | 33,53 | N/A | N/A | N/A | 34,17 | 29,33 | 39,25 | 27,61 | 29,02 | 32,32 | 18,82 | 19,33 | 20,45 |
| **Q3** | **2008** | 31,96 | 33,37 | 35,52 | N/A | N/A | N/A | 32,50 | 28,05 | 37,14 | 32,74 | 33,68 | 35,55 | 19,03 | 19,74 | 21,09 |
| **Q4** | **2008** | 31,06 | 32,61 | 35,39 | N/A | N/A | N/A | 31,34 | 26,95 | 35,02 | 34,46 | 35,30 | 37,18 | 21,12 | 21,88 | 23,55 |
| **Q1** | **2009** | 22,92 | 24,48 | 27,23 | N/A | N/A | N/A | 31,30 | 26,85 | 36,03 | 28,30 | 29,75 | 32,67 | 17,77 | 18,55 | 20,14 |
| **Q2** | **2009** | 23,21 | 25,18 | 28,69 | N/A | N/A | N/A | 29,95 | 26,17 | 33,58 | 28,31 | 29,71 | 32,55 | 15,99 | 16,78 | 18,23 |
| **Q3** | **2009** | 23,67 | 25,62 | 28,30 | N/A | N/A | N/A | 28,01 | 23,99 | 31,71 | 25,88 | 27,12 | 30,18 | 15,35 | 16,06 | 17,42 |
| **Q4** | **2009** | 23,89 | 25,51 | 28,84 | N/A | N/A | N/A | 27,23 | 23,45 | 30,77 | 26,93 | 28,09 | 30,55 | 14,78 | 15,49 | 17,12 |
| **Q1** | **2010** | 24,58 | 26,00 | 28,35 | N/A | N/A | N/A | 26,30 | 23,16 | 30,02 | 22,81 | 24,64 | 27,61 | 14,95 | 15,60 | 17,18 |
| **Q2** | **2010** | 24,13 | 25,04 | 27,11 | N/A | N/A | N/A | 25,49 | 22,62 | 28,43 | 23,70 | 25,81 | 29,05 | 15,54 | 16,22 | 17,68 |
| **Q3** | **2010** | 24,53 | 25,75 | 28,55 | N/A | N/A | N/A | 27,12 | 24,02 | 29,65 | 24,21 | 25,85 | 29,52 | 16,86 | 17,72 | 19,06 |
| **Q4** | **2010** | 24,60 | 25,71 | 28,34 | N/A | N/A | N/A | 27,69 | 24,12 | 29,83 | 24,60 | 25,88 | 29,95 | 15,73 | 16,38 | 17,64 |
| **Q1** | **2011** | 23,21 | 24,23 | 26,19 | N/A | N/A | N/A | 26,38 | 22,87 | 30,47 | 24,54 | 25,79 | 29,00 | 16,12 | 16,78 | 18,26 |
| **Q2** | **2011** | 24,60 | 25,60 | 27,49 | N/A | N/A | N/A | 29,22 | 25,73 | 32,92 | 24,72 | 26,22 | 28,78 | 17,70 | 18,52 | 20,03 |
| **Q3** | **2011** | 26,58 | 27,80 | 29,96 | N/A | N/A | N/A | 26,13 | 22,34 | 29,94 | 25,41 | 26,85 | 29,98 | 19,84 | 20,55 | 21,79 |
| **Q4** | **2011** | 26,55 | 27,86 | 29,90 | 30,73 | 31,85 | 34,36 | 25,72 | 21,95 | 29,66 | 25,48 | 27,23 | 30,24 | 20,76 | 21,56 | 22,73 |

Continue to the next page

| Panel A | | (AEX 25) NETHERLANDS | | | (ATHEX 20) GREECE | | | (ATX 20) AUSTRIA | | | (BEL 20) BELGIUM | | | (CAC 40) FRANCE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Quarter** | **Year** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** |
| **Q1** | **2012** | 23.87 | 25.13 | 27.26 | 30.97 | 32.14 | 34.44 | 26.00 | 22.05 | 29.61 | 24.55 | 26.23 | 29.59 | 21.73 | 22.46 | 23.54 |
| **Q2** | **2012** | 24.96 | 26.12 | 28.21 | 30.75 | 31.73 | 33.79 | 26.77 | 22.91 | 30.06 | 24.76 | 26.46 | 29.84 | 21.63 | 22.31 | 23.68 |
| **Q3** | **2012** | 24.24 | 25.38 | 27.14 | 28.00 | 29.08 | 31.01 | 28.25 | 23.84 | 32.02 | 25.37 | 27.51 | 30.31 | 19.66 | 20.24 | 21.42 |
| **Q4** | **2012** | 22.95 | 23.91 | 25.40 | 25.52 | 26.43 | 28.80 | 30.37 | 25.59 | 33.91 | 23.88 | 25.64 | 28.39 | 18.12 | 18.77 | 20.24 |
| **Q1** | **2013** | 23.11 | 24.23 | 26.29 | 32.10 | 33.17 | 35.62 | 30.08 | 25.96 | 33.85 | 24.54 | 26.70 | 29.28 | 18.65 | 19.34 | 20.54 |
| **Q2** | **2013** | 21.92 | 23.05 | 24.67 | 27.23 | 28.32 | 31.24 | 30.82 | 26.33 | 35.12 | 23.47 | 24.50 | 26.33 | 17.34 | 18.08 | 20.57 |
| **Q3** | **2013** | 19.86 | 21.09 | 23.64 | 27.82 | 29.03 | 31.02 | 29.66 | 25.92 | 34.07 | 24.75 | 25.97 | 27.85 | 15.29 | 16.33 | 19.64 |
| **Q4** | **2013** | 19.72 | 20.67 | 22.95 | 27.66 | 28.99 | 31.29 | 28.42 | 25.00 | 33.36 | 24.01 | 25.22 | 27.37 | 14.61 | 15.54 | 18.55 |
| **Q1** | **2014** | 22.03 | 22.72 | 24.33 | 25.69 | 26.98 | 28.97 | 26.60 | 22.93 | 30.17 | 23.67 | 24.72 | 26.68 | 14.12 | 15.16 | 19.18 |
| **Q2** | **2014** | 22.53 | 23.18 | 25.09 | 27.58 | 29.24 | 32.07 | 27.53 | 23.71 | 30.94 | 24.21 | 25.27 | 27.19 | 13.07 | 14.00 | 17.77 |
| **Q3** | **2014** | 21.88 | 23.74 | 25.04 | 28.53 | 30.04 | 33.30 | 25.24 | 21.31 | 29.09 | 23.52 | 24.57 | 26.77 | 11.67 | 12.45 | 16.25 |
| **Q4** | **2014** | 20.82 | 22.32 | 24.31 | 28.39 | 29.52 | 32.24 | 24.50 | 20.19 | 28.26 | 23.54 | 24.54 | 26.23 | 11.63 | 12.38 | 16.56 |
| **Q1** | **2015** | 21.39 | 22.28 | 24.68 | 26.97 | 28.30 | 31.35 | 24.77 | 20.78 | 28.26 | 22.01 | 22.75 | 24.74 | 11.45 | 12.12 | 15.74 |
| **Q2** | **2015** | 21.75 | 22.71 | 24.85 | 25.81 | 26.90 | 29.35 | 25.46 | 21.34 | 29.69 | 22.28 | 23.20 | 25.00 | 11.77 | 12.54 | 16.50 |
| **Q3** | **2015** | 21.75 | 22.61 | 24.23 | 32.31 | 33.66 | 36.10 | 24.67 | 20.78 | 29.25 | 22.65 | 23.40 | 24.82 | 11.69 | 12.35 | 16.76 |
| **Q4** | **2015** | 19.74 | 20.53 | 22.35 | 31.42 | 32.67 | 35.65 | 26.21 | 22.16 | 30.16 | 23.77 | 24.64 | 25.82 | 11.74 | 12.33 | 15.98 |
| **Q1** | **2016** | 19.94 | 20.65 | 21.52 | 31.07 | 32.53 | 35.07 | 25.69 | 21.14 | 29.45 | 24.03 | 25.26 | 28.09 | 11.67 | 12.43 | 16.89 |
| **Q2** | **2016** | 19.92 | 20.46 | 21.59 | 30.81 | 32.04 | 34.83 | 22.00 | 18.51 | 25.79 | 24.36 | 25.42 | 28.39 | 11.13 | 11.69 | 16.17 |
| **Q3** | **2016** | 19.09 | 19.66 | 20.57 | 29.42 | 30.67 | 32.64 | 20.99 | 18.02 | 24.45 | 23.59 | 24.99 | 27.81 | 10.59 | 11.32 | 14.67 |
| **Q4** | **2016** | 18.99 | 19.61 | 20.65 | 28.75 | 29.88 | 31.88 | 22.72 | 19.41 | 25.93 | 23.43 | 24.51 | 27.25 | 10.58 | 11.24 | 15.25 |

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| Panel B | | (DAX 30) | | | (FTSE MIB 40) | | | (IBEX 35) | | | (OMXH 25) | | | (PSI 20) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GERMANY | | | ITALY | | | SPAIN | | | FINLAND | | | PORTUGAL | | |
| **Quarter** | **Year** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** |
| **Q1** | **2007** | 14.61 | 15.44 | 17.19 | N/A | N/A | N/A | 22.77 | 23.29 | 24.44 | 22.31 | 23.65 | 26.27 | N/A | N/A | N/A |
| **Q2** | **2007** | 14.88 | 15.60 | 16.78 | N/A | N/A | N/A | 24.24 | 25.43 | 26.73 | 23.26 | 24.66 | 27.15 | N/A | N/A | N/A |
| **Q3** | **2007** | 16.39 | 17.26 | 19.04 | N/A | N/A | N/A | 26.00 | 27.65 | 28.97 | 23.65 | 25.05 | 27.30 | N/A | N/A | N/A |
| **Q4** | **2007** | 15.80 | 16.60 | 18.01 | N/A | N/A | N/A | 30.09 | 31.75 | 33.46 | 21.68 | 23.12 | 25.69 | N/A | N/A | N/A |
| **Q1** | **2008** | 15.49 | 16.21 | 17.77 | N/A | N/A | N/A | 28.81 | 30.38 | 32.35 | 21.94 | 23.50 | 25.69 | N/A | N/A | N/A |
| **Q2** | **2008** | 15.29 | 16.17 | 17.73 | N/A | N/A | N/A | 29.52 | 30.53 | 32.39 | 23.65 | 25.60 | 28.03 | N/A | N/A | N/A |
| **Q3** | **2008** | 22.00 | 22.60 | 24.05 | N/A | N/A | N/A | 30.13 | 31.42 | 33.11 | 21.93 | 23.22 | 26.29 | N/A | N/A | N/A |
| **Q4** | **2008** | 18.29 | 18.81 | 19.91 | N/A | N/A | N/A | 30.20 | 31.48 | 33.72 | 25.19 | 26.83 | 29.47 | N/A | N/A | N/A |
| **Q1** | **2009** | 14.38 | 15.08 | 15.93 | N/A | N/A | N/A | 31.50 | 32.53 | 34.99 | 19.78 | 20.84 | 23.06 | N/A | N/A | N/A |
| **Q2** | **2009** | 14.45 | 14.98 | 15.62 | N/A | N/A | N/A | 31.88 | 32.79 | 35.00 | 19.43 | 20.52 | 22.79 | N/A | N/A | N/A |
| **Q3** | **2009** | 14.12 | 14.72 | 15.90 | N/A | N/A | N/A | 33.38 | 34.24 | 36.80 | 18.40 | 19.40 | 22.10 | N/A | N/A | N/A |
| **Q4** | **2009** | 14.20 | 14.68 | 15.82 | 24.88 | 25.98 | 28.04 | 34.62 | 35.46 | 37.98 | 18.58 | 20.10 | 22.78 | N/A | N/A | N/A |
| **Q1** | **2010** | 13.41 | 13.91 | 14.86 | 24.59 | 25.53 | 27.82 | 31.71 | 32.61 | 34.76 | 17.17 | 18.64 | 21.05 | N/A | N/A | N/A |
| **Q2** | **2010** | 13.89 | 14.32 | 15.11 | 24.67 | 25.60 | 28.00 | 33.18 | 34.13 | 35.49 | 17.25 | 18.85 | 21.90 | N/A | N/A | N/A |
| **Q3** | **2010** | 15.54 | 16.07 | 17.43 | 23.31 | 24.31 | 26.71 | 33.35 | 34.22 | 35.60 | 14.37 | 15.28 | 17.38 | N/A | N/A | N/A |
| **Q4** | **2010** | 15.96 | 16.58 | 17.72 | 22.58 | 23.67 | 25.78 | 32.03 | 32.78 | 34.16 | 13.55 | 14.40 | 16.34 | N/A | N/A | N/A |
| **Q1** | **2011** | 17.02 | 17.60 | 18.63 | 22.44 | 23.44 | 25.21 | 29.83 | 30.69 | 31.84 | 14.52 | 15.25 | 16.91 | N/A | N/A | N/A |
| **Q2** | **2011** | 17.90 | 18.49 | 19.85 | 22.36 | 23.30 | 25.26 | 29.47 | 30.49 | 31.98 | 15.74 | 16.29 | 17.72 | N/A | N/A | N/A |
| **Q3** | **2011** | 17.45 | 18.18 | 19.56 | 23.11 | 23.93 | 25.59 | 29.05 | 30.31 | 31.92 | 16.44 | 17.25 | 18.83 | N/A | N/A | N/A |
| **Q4** | **2011** | 17.88 | 18.56 | 20.08 | 23.54 | 24.44 | 25.83 | 27.30 | 28.44 | 30.87 | 15.26 | 16.01 | 17.26 | N/A | N/A | N/A |

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| Panel B | | (DAX 30) GERMANY | | | (FTSE MIB 40) ITALY | | | (IBEX 35) SPAIN | | | (OMXH 25) FINLAND | | | (PSI 20) PORTUGAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Quarter** | **Year** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** | **$AS_{90\%}$** | **$AS_{95\%}$** | **$AS_{99\%}$** |
| **Q1** | **2012** | 17.83 | 18.46 | 19.93 | 23.17 | 23.81 | 24.85 | 27.24 | 27.78 | 28.86 | 16.56 | 17.16 | 18.52 | 35.99 | 37.15 | 39.44 |
| **Q2** | **2012** | 17.51 | 18.50 | 20.02 | 22.74 | 23.57 | 24.96 | 28.37 | 29.20 | 30.70 | 16.94 | 17.74 | 18.83 | 37.19 | 38.24 | 41.57 |
| **Q3** | **2012** | 16.19 | 17.23 | 18.68 | 21.63 | 22.66 | 24.23 | 28.77 | 29.41 | 30.92 | 15.39 | 16.31 | 17.81 | 37.54 | 38.52 | 41.72 |
| **Q4** | **2012** | 17.83 | 18.94 | 20.64 | 20.41 | 21.33 | 23.44 | 28.14 | 28.82 | 30.51 | 15.91 | 16.78 | 18.43 | 34.35 | 34.99 | 38.03 |
| **Q1** | **2013** | 17.81 | 18.78 | 20.53 | 20.02 | 20.94 | 22.70 | 27.38 | 28.11 | 29.93 | 15.36 | 16.20 | 17.58 | 35.14 | 35.78 | 37.80 |
| **Q2** | **2013** | 17.68 | 18.60 | 20.61 | 20.68 | 21.49 | 22.99 | 25.54 | 26.28 | 27.81 | 14.80 | 15.63 | 16.88 | 31.82 | 32.29 | 33.65 |
| **Q3** | **2013** | 16.72 | 17.83 | 19.87 | 20.28 | 21.21 | 23.28 | 26.13 | 26.82 | 28.46 | 15.66 | 16.57 | 18.51 | 29.96 | 30.45 | 31.58 |
| **Q4** | **2013** | 15.98 | 16.91 | 18.94 | 18.18 | 18.83 | 20.40 | 24.23 | 25.03 | 27.05 | 10.61 | 11.37 | 12.48 | 30.13 | 30.58 | 33.49 |
| **Q1** | **2014** | 15.95 | 16.97 | 19.02 | 18.49 | 19.22 | 21.50 | 22.31 | 23.15 | 24.89 | 11.83 | 12.36 | 13.91 | 28.22 | 29.08 | 30.49 |
| **Q2** | **2014** | 15.38 | 16.30 | 19.04 | 18.41 | 19.26 | 20.66 | 21.79 | 22.54 | 23.88 | 11.23 | 11.84 | 13.80 | 29.85 | 30.85 | 33.04 |
| **Q3** | **2014** | 14.97 | 15.90 | 18.07 | 17.77 | 18.48 | 19.97 | 22.42 | 23.16 | 24.47 | 12.63 | 13.27 | 14.48 | 31.86 | 32.08 | 33.16 |
| **Q4** | **2014** | 14.87 | 15.75 | 18.04 | 18.05 | 18.92 | 20.35 | 21.60 | 22.50 | 24.05 | 12.88 | 13.40 | 14.73 | 33.19 | 36.35 | 36.88 |
| **Q1** | **2015** | 14.36 | 15.20 | 16.94 | 18.25 | 18.94 | 20.28 | 22.10 | 22.85 | 24.66 | 12.96 | 13.43 | 14.59 | 27.71 | 28.14 | 31.60 |
| **Q2** | **2015** | 14.00 | 14.93 | 16.70 | 18.63 | 19.34 | 20.68 | 21.85 | 22.55 | 24.39 | 14.06 | 14.65 | 15.82 | 29.23 | 29.87 | 32.64 |
| **Q3** | **2015** | 16.20 | 16.90 | 18.84 | 17.91 | 18.64 | 20.22 | 21.15 | 22.09 | 23.77 | 16.18 | 16.80 | 18.15 | 27.90 | 29.42 | 31.85 |
| **Q4** | **2015** | 16.21 | 16.79 | 18.24 | 19.05 | 19.60 | 20.58 | 20.80 | 21.93 | 23.77 | 15.59 | 16.10 | 16.99 | 30.72 | 32.21 | 34.49 |
| **Q1** | **2016** | 14.75 | 15.43 | 17.18 | 19.77 | 20.55 | 21.62 | 18.79 | 19.73 | 21.19 | 15.99 | 16.60 | 17.60 | 29.65 | 30.21 | 33.64 |
| **Q2** | **2016** | 15.80 | 16.63 | 18.35 | 21.53 | 22.28 | 23.47 | 17.67 | 18.51 | 19.89 | 15.48 | 15.99 | 17.28 | 29.52 | 31.12 | 33.63 |
| **Q3** | **2016** | 15.10 | 15.72 | 17.21 | 19.81 | 20.55 | 21.98 | 17.40 | 18.36 | 19.62 | 16.47 | 17.12 | 18.15 | 30.12 | 31.59 | 34.84 |
| **Q4** | **2016** | 14.16 | 14.98 | 17.00 | 18.25 | 19.04 | 20.21 | 17.93 | 18.52 | 19.86 | 15.11 | 15.63 | 16.89 | 28.66 | 30.10 | 32.52 |

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# Chapter 2

# Determinants of non-compliant equity funds with EU portfolio concentration limits

In this chapter, we identified the determinants of domestic equity funds' failure to comply with the portfolio concentration limits of EU Directive 2009/65/EC. This study also determines the characteristics of the stocks subject to these non-compliant portfolios. The empirical application of the analysis to a comprehensive sample of domestic equity funds registered in the Eurozone provides significant information that can help to improve market supervision in terms of investor protection.[27]

[27] This chapter has been published in the Journal of Multinational Financial Management (2021). ISSN: 1042-444X. DOI: 10.1016/j.mulfin.2021.100707 (JCR, $IF_{2020}$: 3.945; Q1).
A former draft of this chapter was presented at the 28th Annual Global Finance Conference and was recognized as top paper awards. Furthermore, this chapter was presented at the 30th Annual Meeting European Financial Management Association 2021. At the 19th Annual International Conference on Finance and at the 11th Portuguese Finance Network Conference.

## 2.1 Introduction

During the past few decades, one of the most significant developments in financial intermediation has been the effective use of mutual funds as a vehicle to implement the preferred investment strategies of retail investors. European asset management has notably increased in recent decades, reaching EUR 17.7 trillion of total net assets (TNA) in 2019 (The European Fund and Asset Management Association EFAMA, 2020). Due to these funds' economic relevance, government policies in Europe have provided a legal framework to provide transparency in open-end funds and higher levels of investor protection.

The Undertakings of Collective Investments in Transferable Securities (UCITS) directives provides legislative uniformity for these collective investment schemes throughout the European Union (EU). The significance of the UCITS directives is particularly important for the harmonization of the regulations concerning collective investment in the member states of the EU (Cumming *et al.*, 2011). The UCITS directives can be considered a trend in EU regulations toward reinforcing market protection and increase transparency (Anderberg and Bolton, 2006).[28]

Mutual funds are structured to allow retail investors to access sophisticated active strategies that comply with liquidity and transparency restrictions protected by regulatory oversight. Their rules are based on certain levels of portfolio diversification with the aim of reducing their vulnerability to portfolio risk. This rationale is fully consistent with modern portfolio management. There is some evidence that greater portfolio diversification is associated with better performance (see Pollet and Wilson, 2008). Thus, EU regulations allow mutual fund managers to follow diversified portfolios.

[28] All UCITS directives have been transposed into the legal framework of each member state of the EU.

Nevertheless, rising competition could affect active management strategies to create profitable investment opportunities and thereby influence portfolio diversification (Cremers *et al.*, 2019). Additionally, Kacperczyk *et al.* (2005) find that within certain industries, the level of portfolio concentration tends to affect performance. Huij and Derwall (2011), Hiraki *et al.* (2015), Choi *et al.* (2017) and Fulkerson and Riley (2019) support the predictive power of portfolio concentration for performance. Goldman *et al.* (2016) find that when managers include the largest market capitalization company within each industry sector, performance is better. Thus, managers following concentrated portfolio strategies should be more likely to overweight positions against the UCITS regulations. In terms of investment constraints, UCITS IV (article 52) in force presents portfolio concentration limits. A UCITS shall invest no more than 10% of its assets in transferable securities. In addition, the total value of the UCITS holdings representing more than 5% of its assets shall not exceed 40% of the value of its assets (see more details in Appendix 2.1).

Both the economic relevance and the very significant role of retail investors in the ownership structure of the European mutual fund industry (EFAMA, 2020) lead us to analyse how concentrated portfolios could involve conflicting patterns with EU regulations that protect investors by setting portfolio concentration limits. Thus, our chapter documents the controversy between the prevention of portfolio concentration by the UCITS directives and the evidence of domestic equity funds in the Eurozone that do not fulfil these portfolio concentration limits. Furthermore, our study is the first to identify both the characteristics of mutual funds that are most likely to overweight their portfolio positions and the characteristics of these overweighted stocks in the current context of EU legal restrictions on portfolio concentration.

In discussing the different potential reasons for failing to fulfil these legal requirements, we first note that the current financial markets are far different from the context and portfolio concentration limits at the time of the original UCITS I. This portion of EU regulations has not changed since 1985.[29] Rising competition in challenging financial markets could lead to the rationale that the "one size fits all" approach is not useful in mutual fund industries with skilled fund managers applying their knowledge and expertise to form more concentrated portfolios to enhance their performance records.

Second, traditional portfolio management in the mutual fund industry uses a primary prospectus benchmark, which is the benchmark that best matches a fund's actual investment strategy (Cremers *et al.*, 2021). According to Loban *et al.* (2020), the accumulated weight of equity benchmark constituents in domestic Eurozone markets is highly concentrated in fewer constituents than in US benchmarks. This benchmark concentration could create a problem in managing an appropriate diversification level for traditional portfolio management. That is, the high concentration level detected in the domestic Eurozone benchmarks conflicts with the 10% concentration limit included in the EU regulations. This framework could conflict with traditional portfolio management in the mutual fund industry, and such characteristics could increase managers' likelihood of default. Therefore, EU concentration limits could conflict with fund management strategies focused on concentrated primary prospectus benchmarks.

The main objective of this chapter is to investigate an unexplored topic within the extensive literature on portfolio concentration. We expand upon how concentrated strategies could lead to non-compliance with market UCITS, such as the EU directives. Accordingly, the contributions of our chapter are 1) to identify both market- and fund-specific characteristics that play a significant role in explaining the portfolio

[29] More recently, Directive 2014/91/EU (UCITS V) governs depositary functions, remuneration policies and sanctions. UCITS V does not amend the portfolio concentration limits of the previous directives.

concentration default specified in the EU regulations and 2) to determine the main characteristics of the stocks subject to these defaults. Therefore, our study deepens the analysis of the potential conflict between rising competition in the mutual fund industry (see Dyck *et al.,* 2013; Cremers *et al.,* 2016; Hoberg *et al.,* 2018), portfolio concentration limits and concentrated primary prospectus benchmarks (see Loban *et al.,* 2020).

This chapter has important implications for market supervisors and policymakers in the mutual fund industry in the Eurozone. In the strongly regulated European markets (Benink and Schmidt, 2014), where policy implications are consistent with the importance of analysing factors that lead to the detection of market abuse, as an important tool to protect investors (Cumming *et al*., 2018), our approach allows market supervisors with limited resources to identify and control non-compliant domestic equity funds by monitoring only some fund-specific characteristics. The improvement of this monitoring process should contribute to the financial stability of the EU asset management industry in terms of investor protection and market transparency. That is, mutual fund unitholders should be completely certain that their money is allocated in portfolios fulfilling the concentration limits required by the EU.

Our chapter also develops a tool to assist EU market supervisors in identifying some explanatory mechanisms for stock weights that are over the EU concentration limits. Thus, our results may help supervisors identify what kind of domestic equity funds are more inclined to default and what kind of stocks are likely overweighted by these funds. Market supervisors could especially monitor these stocks to verify that domestic equity funds are fulfilling the concentration limits. Market supervisors should focus their limited resources on these types of stocks held by domestic equity funds to prevent portfolio concentration defaults. The examination of a whole list of disclosed portfolio holdings in each individual fund prospectus might not be an efficient tool to monitor the portfolio

diversification defaults of a huge number of funds registered in the Eurozone mutual fund industry. Our results could lead to a more efficient supervision process by reducing the total number of the potentially monitored stocks to those that show a high probability to be subject to defaults. From our understanding, this multidimensional monitoring process based on both fund and stock specific characteristics should be more efficient in terms of computational resources and costs than looking at each fund prospectus to see whether or not there is a violation of the directive. However, the computational design of this monitoring process is beyond our knowledge and research objectives to estimate properly the gains in efficiency.

Further, our approach should also help retail investors control their risk profiles in terms of exceeding portfolio concentration limits. This application is in line with the reinforcement of investor protection of portfolio concentration. Investors should be sure that domestic equity funds fully follow the diversification requirements and market transparency provided by the UCITS directives.

In this chapter, we develop detailed hypotheses to test whether market characteristics, fund characteristics or stock characteristics increase the probability of domestic equity funds showing levels of portfolio concentration higher than the limits defined by article 52 (UCITS IV). Our findings provide evidence that should lead market supervisors to pay attention to concentrated fund industries with concentrated domestic benchmarks to prevent EU concentration limit defaults. In these markets, the most experienced funds that are solo-managed should be especially monitored to prevent portfolio weights over the 10% limit. We also find that those overweighted stocks are liquid and large-cap stocks with low volatility.

The remainder of the chapter is as follows. Section 2.2 identifies the fund and domestic market characteristics that are significant in explaining portfolio holdings over the concentration limits. Section 2.3 evaluates the significant characteristics of these overweighted stocks. Section 2.4 presents robustness analyses. Finally, Section 2.5 summary and conclusions.

## 2.2 Fund and market determinants of portfolio diversification default

In this section, we analyse a set of fund and market characteristics that may influence non-compliance with EU legal restrictions on portfolio concentration. We first describe our sample of domestic equity funds registered in the Eurozone. Then, we describe the specific variables included in our logit panel data model. Finally, we present the results and identify the significant determinants of domestic equity funds' non-compliance with EU portfolio concentration limits.

### 2.2.1 Sample description

Our comprehensive sample includes data on open-end mutual funds categorized as domestic equity funds by Morningstar. Our sample period is from 2002 to 2018.[30] Although the UCITS directives described in the previous section are applicable to the EU, we focus our study on European countries that share the Euro as a single currency (Eurozone fund industries).[31] The database is free from survivorship bias because it includes both active and terminated funds. We exclude offshore funds (e.g., funds domiciled in Luxembourg or Ireland), closed-index funds, index funds, exchange-traded funds (ETF), enhanced index funds, funds of funds, international funds, industry sector funds, real estate funds, and other non-equity funds to avoid conflicts with the objective of our analysis.[32] That is, according to their mandates, our sample does not include

[30] Morningstar defines domestic equity funds as mutual funds that invest principally in domestic stocks.
[31] The countries analysed were involved in the constitution of the Eurozone. This area was created in 1999 by eleven founding states: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain and Portugal. In 2001, Greece joined the Eurozone. These industries represent 70% of the European mutual funds from 2002 to 2019 and at least 68% of domestic equity funds in the European mutual fund industry (Investment Company Institute, 2020).
[32] Luxembourg and Ireland are excluded from our sample because Morningstar does not provide a domestic equity category for these mutual fund industries.

domestic equity funds following indexed strategies. Our final sample includes 39,096 portfolios for 536 domestic equity funds. Morningstar provides 84.33% of these portfolios on a monthly basis. The rest of the portfolios are also obtained from Morningstar using quarterly information according to the fiscal year definition of each fund.[33]

Table 2.1 presents information about the number of portfolios analysed, the average number of holdings by portfolio and the average fund size by each Eurozone market in our sample period. The most relevant mutual fund industries in the Eurozone, such as France, Germany, Italy and Spain, have 28,480 portfolios and manage EUR 16.06 billion on average. French funds represent 30% of the sample in terms of the number of portfolios analysed, but on average, their fund size is smaller than those of other relevant fund industries. German funds represent 15% of the sample in terms of the number of portfolios analysed and feature the largest average fund size. Other relevant fund industries with a large number of portfolios are Spain and Italy, which account for 18% and 10% of the total number of portfolios in our sample, respectively. Italian funds present, on average, the greatest number of holdings in each portfolio (71 holdings). In contrast, countries such as Netherlands, Portugal, and Finland present much more concentrated portfolios (28, 30, and 37 holdings, respectively). Thus, Table 2.1 shows various characteristics in terms of both economic relevance and portfolio concentration for the domestic equity funds registered in the Eurozone.

[33] The weights of each portfolio constituent are computed from the portfolio holdings information provided by Morningstar.

**Table 2.1 Summary statistics for domestic equity funds registered in the Eurozone (2002-2018).**
This table shows (1) the number of portfolios analysed, (2) the average number of holdings in each mutual fund portfolio, and (3) the average portfolio size in million EUR by country and year.

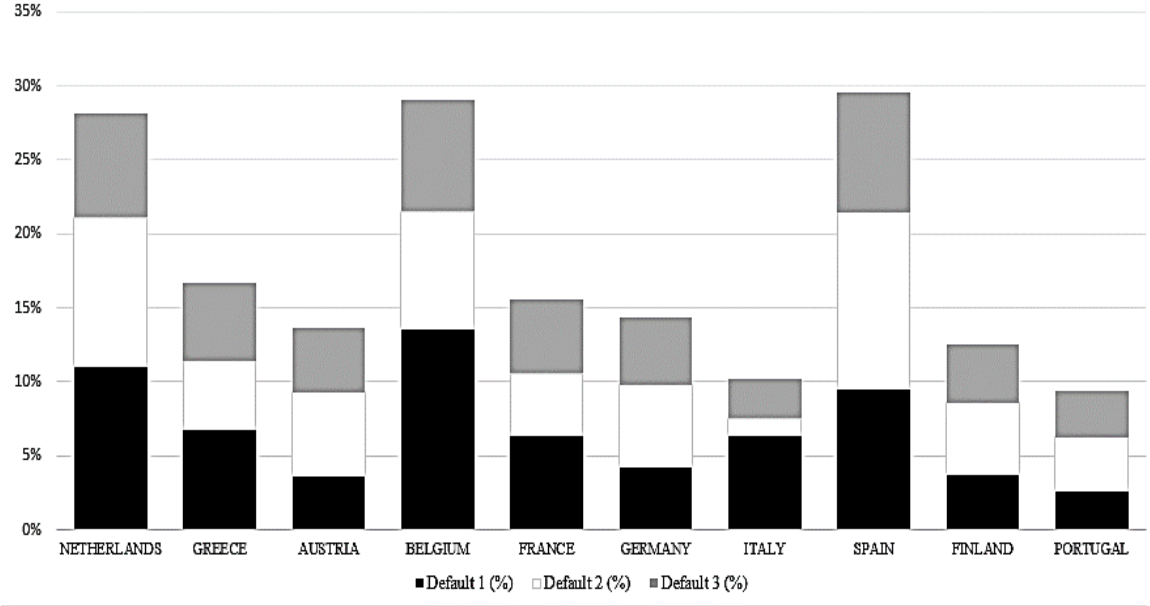
| | NETHERLANDS | | | GREECE | | | AUSTRIA | | | BELGIUM | | | FRANCE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2002** | 13 | 27 | 261 | 20 | 42 | 47 | 1 | 44 | 78 | 2 | 34 | 47 | 19 | 57 | 137 |
| **2003** | 77 | 26 | 277 | 20 | 43 | 48 | 2 | 43 | 40 | 4 | 37 | 50 | 156 | 57 | 135 |
| **2004** | 94 | 29 | 315 | 21 | 43 | 37 | 9 | 35 | 129 | 3 | 36 | 38 | 239 | 60 | 172 |
| **2005** | 91 | 27 | 323 | 54 | 41 | 28 | 18 | 37 | 96 | 9 | 44 | 47 | 201 | 57 | 136 |
| **2006** | 120 | 31 | 362 | 67 | 49 | 23 | 76 | 46 | 122 | 13 | 47 | 43 | 267 | 61 | 163 |
| **2007** | 137 | 26 | 412 | 85 | 50 | 79 | 86 | 50 | 134 | 11 | 42 | 31 | 413 | 58 | 298 |
| **2008** | 125 | 25 | 247 | 72 | 45 | 86 | 86 | 44 | 68 | 26 | 44 | 23 | 601 | 51 | 166 |
| **2009** | 118 | 27 | 212 | 75 | 42 | 57 | 132 | 40 | 64 | 26 | 51 | 16 | 946 | 53 | 139 |
| **2010** | 125 | 27 | 325 | 63 | 41 | 46 | 126 | 41 | 92 | 27 | 51 | 25 | 900 | 56 | 142 |
| **2011** | 136 | 28 | 349 | 63 | 35 | 30 | 129 | 41 | 122 | 13 | 44 | 51 | 961 | 55 | 112 |
| **2012** | 133 | 27 | 311 | 43 | 39 | 39 | 117 | 40 | 111 | 12 | 55 | 65 | 991 | 56 | 115 |
| **2013** | 136 | 27 | 304 | 44 | 36 | 48 | 136 | 35 | 143 | 13 | 53 | 66 | 984 | 61 | 132 |
| **2014** | 96 | 26 | 345 | 88 | 42 | 46 | 132 | 33 | 160 | N/A | N/A | N/A | 942 | 61 | 137 |
| **2015** | 70 | 29 | 251 | 83 | 41 | 32 | 144 | 34 | 155 | N/A | N/A | N/A | 930 | 61 | 131 |
| **2016** | 75 | 29 | 209 | 82 | 39 | 26 | 156 | 36 | 147 | N/A | N/A | N/A | 936 | 61 | 144 |
| **2017** | 80 | 29 | 199 | 79 | 31 | 32 | 107 | 34 | 184 | N/A | N/A | N/A | 1111 | 56 | 281 |
| **2018** | 72 | 30 | 211 | 78 | 32 | 39 | 107 | 46 | 221 | N/A | N/A | N/A | 1067 | 55 | 279 |
| **Average** | 100 | 28 | 289 | 61 | 41 | 44 | 92 | 40 | 122 | 13 | 45 | 43 | 686 | 57 | 166 |
| | **GERMANY** | | | **ITALY** | | | **SPAIN** | | | **FINLAND** | | | **PORTUGAL** | | |
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2002** | 29 | 54 | 321 | 23 | 65 | 181 | 33 | 36 | 41 | 29 | 37 | 48 | 9 | 31 | 43 |
| **2003** | 321 | 51 | 322 | 143 | 68 | 191 | 289 | 39 | 50 | 90 | 39 | 54 | 19 | 32 | 45 |
| **2004** | 323 | 52 | 408 | 260 | 70 | 292 | 257 | 40 | 91 | 90 | 42 | 72 | 28 | 24 | 45 |
| **2005** | 313 | 51 | 404 | 302 | 69 | 268 | 275 | 42 | 109 | 108 | 40 | 98 | 55 | 26 | 41 |
| **2006** | 343 | 55 | 504 | 285 | 67 | 248 | 277 | 46 | 123 | 135 | 39 | 87 | 204 | 32 | 51 |
| **2007** | 413 | 56 | 458 | 276 | 81 | 191 | 301 | 45 | 118 | 188 | 38 | 103 | 211 | 34 | 69 |
| **2008** | 437 | 51 | 304 | 252 | 70 | 119 | 325 | 38 | 61 | 231 | 35 | 83 | 180 | 35 | 35 |
| **2009** | 461 | 52 | 260 | 293 | 66 | 87 | 310 | 38 | 44 | 237 | 36 | 94 | 198 | 34 | 24 |
| **2010** | 458 | 56 | 411 | 265 | 66 | 99 | 396 | 37 | 40 | 285 | 36 | 143 | 187 | 33 | 24 |
| **2011** | 430 | 58 | 528 | 260 | 68 | 79 | 416 | 36 | 39 | 315 | 34 | 122 | 182 | 31 | 17 |
| **2012** | 442 | 52 | 520 | 260 | 69 | 95 | 429 | 36 | 33 | 340 | 33 | 105 | 161 | 32 | 12 |
| **2013** | 387 | 48 | 642 | 195 | 73 | 117 | 480 | 38 | 56 | 383 | 34 | 127 | 155 | 31 | 17 |
| **2014** | 314 | 46 | 695 | 202 | 77 | 160 | 543 | 42 | 105 | 413 | 34 | 124 | 134 | 34 | 24 |
| **2015** | 297 | 47 | 821 | 207 | 80 | 181 | 578 | 41 | 110 | 366 | 33 | 143 | 118 | 31 | 22 |
| **2016** | 265 | 48 | 651 | 214 | 75 | 157 | 628 | 39 | 96 | 272 | 34 | 137 | 110 | 29 | 18 |
| **2017** | 389 | 48 | 877 | 330 | 76 | 183 | 585 | 36 | 111 | 327 | 38 | 159 | 85 | 20 | 27 |
| **2018** | 397 | 47 | 883 | 317 | 79 | 202 | 591 | 37 | 124 | 306 | 39 | 163 | 73 | 22 | 32 |
| **Average** | 354 | 51 | 530 | 240 | 72 | 168 | 395 | 39 | 80 | 242 | 37 | 110 | 124 | 30 | 33 |

## 2.2.2 Model and variables

The objective of this analysis is to provide evidence of several market and fund characteristics that may influence the probability of a fund manager failing to meet the portfolio concentration limits. Three potential types of default can be determined according to the portfolio concentration limits presented in article 52 of UCITS IV. We define three excluding groups of portfolios. Default 1 includes portfolios with at least one holding with a portfolio weight higher than 10%. Default 2 includes portfolios in which there are holdings with a weight within the range (5%-10%] and together exceed 40% of the total portfolio weight (i.e., over 40% of holdings have weights higher than 5% and not higher than 10%). Default 3 includes portfolios with holdings that incur both default 1 and default 2 at the same time.

For each country, Figure 2.1 reports the distribution of portfolios by type of default. On average, 13.20% of portfolios of domestic equity funds registered in the Eurozone show experience default, except for Dutch, Belgian and Spanish funds, which present a higher percentage.

**Figure 2.1 Distribution of portfolios by default 1, default 2 or default 3.**
For each country, this figure shows the excluding percentages of portfolios sorted by each type of default. The black bars indicate the percentage of those portfolios with at least one holding whose weight is higher than 10% (default 1). The white bars show the percentage of those portfolios with holdings whose weights are higher than 5% and whose accumulated sum is over 40% (default 2). The grey bars indicate the percentage of those portfolios with holdings that incur both default 1 and default 2 at the same time (default 3).




We formulate several alternate hypotheses in our empirical analysis to test whether both market and fund characteristics and funds characteristics influence the probability that portfolios incur defaults 1, 2 or 3. To test the hypotheses, we compute model [2.1] using a logit panel data model (fixed effects)[34] to estimate the probability of incurring defaults 1, 2, or 3. The logistic probability function of a fund *p* incurring each default for period *t* is

$$\Pr(Default\ 1, 2\ or\ 3)_{\mathrm{p}} = \frac{e^{\beta' X_p}}{1+e^{\beta' X_p}}, \qquad \beta' X_p = \alpha_{p,0} + \beta_p X_{p,t} + \varepsilon_{p,t} \qquad [2.1]$$

where $X_{p,t}$ is a vector of time-varying fund- and market-specific variables.

We begin by testing whether market characteristics influence the probability that portfolios incur defaults. Regarding the justification of the market-specific variables to be included in the model, we find that the different domestic equity benchmarks in the

[34] We use Hausman specification test to choose fixed or random effects following Hahn *et al.* (2011). We test whether the unique errors (ui) are correlated with the regressors. The results are available upon request.

Eurozone market tend to present excessive weights in some of their constituents (Loban *et al*., 2020). This conflict with the limits of portfolio concentration specified by UCITS IV, and it could be a problem to appropriately manage portfolio diversification with active management strategies based on concentrated benchmarks. Formally, our first hypothesis H1 is as follows:

*H1: A high level of concentration in the domestic benchmark is positively related to the likelihood of incurring defaults 1, 2, or 3.*

The level of concentration of the domestic benchmark of market *m* at the end of month *t*, $HHI_{m,t}$, is measured by the Herfindahl-Hirschman Index (HHI), which is a common indicator of the level of concentration within an industry, market, or sector. We adapt this concentration measure to obtain the monthly benchmark HHI as the sum of the squared weights of each benchmark constituent.[35] We include this variable in our model [2.1] to test whether the level of concentration in the benchmark could affect the probability of incurring the previously defined types of defaults because of the conflict between portfolio concentration limits and highly concentrated benchmarks.

Kacperczyk *et al.* (2014) find that the abilities of active management are not the same during a bearish market as those in a bullish market. Fund managers could develop different management strategies during an upward market trend and during a downward market trend. For that, our second hypothesis is as follows:

*H2: Market state affects the likelihood of incurring defaults 1, 2, or 3.*

We include $RB_{m,t-1}$ in model [2.1] as the average monthly return obtained by the domestic benchmark of market *m* during the previous 12-month period at the end of month *t-1*.

[35] HHI is an index that originally measures the concentration of an industry and is calculated by squaring the market share of each firm competing in the industry and then summing the resulting numbers. The index ranges from zero to 10,000. High values of the HHI indicate high levels of market concentration. Cremers *et al*. (2008) uses HHI as a proxy for the level of portfolio concentration.

We also consider the level of concentration of each domestic fund industry as a potential factor to explain the different defaults. Dyck *et al.* (2013) find that in a competitive industry, hard competition with other funds should be a suitable environment for managers to feel pressure to perform better than others. Thus, the level of fund industry concentration as a proxy for fund competition could be considered as an explanatory variable to exceed the limits expressed in UCITS IV. The third hypothesis is as follows:

*H3: A high level of concentration of the domestic fund industry is positively correlated with the likelihood of incurring defaults 1, 2, or 3*.

In this paper, we follow Cremers *et al.* (2008) and Feldman *et al.* (2020) and use the normalised Herfindahl-Hirschman Index (NHHI) as the concentration of fund market *m* at the end of month *t*, $NHHI_{m,t}$.[36]

After the description of the market-specific variables in model [2.1], let us define the fund-specific factors. Firstly, we examine how the fund excess return over the benchmark could cause fund managers to incur defaults 1, 2, or 3. Positive and significant returns could increase the propensity to rely more on winner portfolio holdings irrespective of the limits of portfolio concentration. This propensity could be explained by overconfidence bias. Consistent with this possibility, Puetz and Ruenzi (2011) find evidence of self-serving attribution bias as a cause of overconfidence. Polkovnichenko (2005) shows that investors who appear confident with the positive outcome of their strategy tend to underdiversify their portfolios. Furthermore, Fuertes *et al.* (2014) conclude that overconfidence could explain poor diversification levels in portfolio holdings. Thus, overconfidence as a result of good excess return records could generate

[36] NHHI is a normalised version of HHI to measure fund market concentration, which is not related to the number of funds competing in an industry. NHHI takes a value near to zero for an industry in which all funds have equal market shares or near one in the opposite situation.

more concentrated portfolios and conflict with EU concentration limits. However, the existing literature has not resolved whether portfolio concentration clearly emerges from behavioural biases that may be consistent with this overconfidence approach. Further, Choi *et al.* (2017) find, in support to information advantage theory, that concentrated portfolios in international markets from both rational and learned decision-making can be optimal in terms of risk-adjusted performance. Both motivations are robust for the inclusion of lagged fund returns as an independent variable in our approach.[37] For that, our fourth hypothesis is as follows:

*H4: Fund excess returns over the benchmark affect fund managers to incur defaults 1, 2, or 3.*

We compute $ERB_{p,t-1}$ as the excess return of fund *p* during the previous 12-month period at the end of month *t-1* and include it in model [2.1].[38]

In addition, mutual fund size is one of the most controversial and studied variables in the mutual fund literature. Cremers and Petajisto (2009) find that small funds are more active than 80% of large funds, which are similar to index funds. More recently, Ferreira *et al*. (2013) conclude that the positive effect of fund size on performance is pervasive around the world. While small funds can concentrate on a few investment positions, large funds could benefit from investment opportunities that are not available to smaller funds. This evidence leads us to suppose that small funds could present higher active share values (AS) than large ones as a result of having more concentrated portfolios

[37] The future performance implications of the highest concentrated positions in our sample is a noteworthy analysis. It could be a brilliant starting point for further research. However, the results of a preliminary analysis do not lead us to accept the hypothesis that stocks subject to defaults obtain a good subsequent performance in terms of alphas for the periods t+1, t+6 and t+12. Detailed results are available upon request.
[38] The use of a representative domestic benchmark for each industry avoids potential benchmark gaming to obtain excess fund returns (Sensoy, 2009).

(overweighting some holdings over the regulatory limits).[39] Our fifth hypothesis is as follows:

*H5: A smaller domestic fund is positively related to the likelihood of incurring defaults 1, 2, or 3.*

We test whether the size of fund *p* in month *t*, $TNA_{p,t}$, could increase the likelihood of incurring defaults 1, 2, or 3. To do so, we use the monthly total net assets (TNA) of all share classes as a measure of each fund size. This variable is normalised in model [2.1] for each domestic fund market to obtain comparable values within each market.

Continuing with fund-specific variables, Pollet and Wilson (2008) find that when the fund receives inflows, it tends to scale up its positions instead of diversifying into new holdings. Very important flows could lead to management decisions that could affect the portfolio concentration. For that, our sixth hypothesis is as follows:

*H6: Big flows are positively related to the likelihood to incur defaults 1, 2, or 3.*

According to Sirri and Tufano (1998), we compute $Flow_{p,t-1}$ as the percentage growth in total assets under the management of fund *p* between the beginning and the end of the previous 12-month period at the end of month *t-1* net of fund returns (assuming the reinvestment of dividends and distributions). This variable is normalised in model [2.1] for each domestic fund market to obtain comparable values within each market.

In addition to fund size and flows, fund age can have a significant impact on our model. Previous literature presents controversial findings about fund age and portfolio concentration. On the one hand, Kacperczyk *et al.* (2014) find that younger funds hold more concentrated portfolios and have better selection abilities. Recently, Hung *et al.* (2020) provide similar evidence for Taiwan's equity fund industry. Furthermore, Cremers *et al.* (2016) show that younger funds present higher levels of tracking error and active

[39] The active share measures the portfolio weights of a mutual fund that differ from its benchmark constituents' weights (Cremers and Petajisto, 2009).

share, which are potentially consistent with higher levels of portfolio concentration. On the other hand, Amihud and Goyenko (2013) suggest that older funds are more active and more selective, which in turn enhances their performance and contributes to their longevity. Thus, the commitment to increase their idiosyncratic risk relative to their total risk levels could lead to more concentrated portfolios that could have significant effects on portfolio holdings and increase the likelihood of incurring defaults 1, 2, or 3. Our seventh hypothesis is as follows:

*H7: The age of the domestic fund is positively related to the likelihood of incurring defaults 1, 2, or 3.*

We define $Age_{p,t}$ as the number of months since the launch date of fund *p* at the end of month *t.* This variable is normalised in model [2.1] for each domestic fund market to obtain comparable values for each market.

Finally, we consider management structure as a potential determinant of incurring defaults 1, 2 or 3. The management team is defined when there is more than one person involved in fund management and they manage together (Karagiannidis, 2010). On the one hand, following Stein (2002), if a fund is managed by a team, managers may spend too much effort convincing others to implement their own ideas. On the other hand, while individual managers could be free from group difficulties, management teams develop connections that could help in making decisions about portfolio composition. Thus, portfolio decisions could be made consensually or unilaterally, depending on the management structure. Extensive literature has analysed the relationship between fund management structures with diverse findings. Chen *et al.* (2004) and Massa *et al.* (2010) find that the organizational structure influences the decision-making process of the fund, which may help to explain fund construction. In addition, Goldman *et al.* (2016) show that individual managers have much more concentrated portfolios than management

teams. We analyse how management structure could increase the likelihood of incurring defaults 1, 2 or 3. Our eighth hypothesis is as follows:

*H8: The management structure affects the likelihood to incur defaults 1, 2, or 3.*

We include $Man_{p,t}$ in the model [2.1] as a dummy variable that takes a value of one when fund *p* is managed by one person and zero otherwise at the end of month *t*.

Table 2.2 presents detailed definitions of the variables included in model [2.1].

**Table 2.2 Variables in model [2.1].**
This table shows the definition of the time-varying fund- and market-specific variables included in the logit panel data model [2.1] to estimate the probability of incurring defaults 1, 2, or 3.

| Variable | Definition | Data source |
|---|---|---|
| $HHI_{m,t}$ | Natural log of HHI, which measures the concentration of the market *m* at the end of month *t*. $HHI_{m,t} = \sum_{i=1}^{n} W_i^2$, where $W_i$ is the weight of each benchmark constituent, and *n* is the number of benchmark constituents at the end of month *t*. | (Datastream) |
| $RB_{m,t-1}$ | Lagged return obtained by the domestic benchmark of market *m* during the previous 12-month period at the end of month *t-1*. | (Datastream) |
| $NHHI_{m,t}$ | NHHI measures the concentration of the mutual fund industry as a normalised version of HHI by the stock market capitalization of fund *p* at the end of month *t*. $NHHI_t = \frac{HHI_i - \frac{1}{m_t}}{1 - \frac{1}{m_t}}$ where *HHI* is the sum of the squared market share of each fund, and $m_t$ is the number of funds at the end of month *t*. | (Datastream; Morningstar) |
| $ERB_{p,t-1}$ | Lagged excess return of fund *p* during the previous 12-month period at the end of month *t-1*. | (Datastream; Morningstar) |
| $TNA_{p,t}$ | Total net assets in EUR millions of fund *p* at the end of month *t*. This variable is normalised for each domestic fund market. | (Morningstar) |
| $Flow_{p,t-1}$ | Lagged percentage growth of total net assets of fund *p* during the previous 12-month period at the end of month *t-1*. Following Sirri and Tufano (1998), this growth is net of fund returns (assuming reinvestment of dividends and distributions). This variable is normalised for each fund market. | (Datastream; Morningstar) |
| $Age_{p,t}$ | Number of months of fund *p* since the launch date at the end of month *t*. This variable is normalised for each fund market. | (Morningstar) |
| $Man_{p,t}$ | Dummy variable that equals one when the fund *p* is managed by one person and zero otherwise at the end of month *t*. | (Morningstar) |

Table 2.3 shows assorted market and fund characteristics across the Eurozone fund industries analysed. These differences between the domestic fund markets highlight the different scenarios in which unique EU concentration limits are applied.

**Table 2.3 Summary statistics for the variables included in model [2.1].**
This table presents (1) the mean values, (2) the median values and (3) the standard deviation values of all variables included in model [2.1]. The variables TNA, Flow, and Age are included in model [2.1] in normalised terms, but this table provides additional information regarding the average portfolio size (in million EUR) and the number of months. This information is reported for each country included in our sample from 2002 to 2018. See Table 2.2 for variable' definitions.

| | HHI(Log) | | | RB | | | NHHI | | | ERB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **NETHERLANDS** | 2.92 | 2.92 | 0.03 | 0.07 | 0.01 | 0.05 | 0.13 | 0.12 | 0.10 | 0.00 | 0.00 | 0.06 |
| **GREECE** | 2.98 | 2.98 | 0.04 | -0.07 | -0.01 | -0.01 | 0.17 | 0.16 | 0.21 | 0.06 | 0.00 | 0.12 |
| **AUSTRIA** | 2.98 | 2.98 | 0.04 | 0.05 | 0.01 | 0.01 | 0.04 | 0.12 | 0.27 | -0.01 | -0.01 | 0.07 |
| **BELGIUM** | 2.94 | 2.95 | 0.07 | 0.02 | 0.00 | 0.00 | 0.39 | 0.34 | 0.45 | -0.06 | 0.01 | 0.06 |
| **FRANCE** | 2.68 | 2.69 | 0.04 | 0.06 | -0.01 | -0.01 | 0.02 | 0.02 | 0.05 | 0.01 | 0.00 | 0.05 |
| **GERMANY** | 2.76 | 2.75 | 0.07 | 0.09 | 0.03 | -0.01 | 0.02 | 0.04 | 0.10 | 0.01 | 0.00 | 0.06 |
| **ITALY** | 2.87 | 2.88 | 0.06 | 0.03 | -0.01 | -0.01 | 0.01 | 0.05 | 0.07 | 0.00 | -0.01 | 0.06 |
| **SPAIN** | 2.95 | 2.95 | 0.08 | 0.08 | 0.02 | -0.01 | 0.02 | 0.03 | 0.03 | -0.04 | 0.00 | 0.06 |
| **FINLAND** | 2.80 | 2.80 | 0.04 | 0.08 | 0.03 | -0.01 | 0.01 | 0.04 | 0.12 | 0.00 | -0.01 | 0.06 |
| **PORTUGAL** | 3.01 | 3.01 | 0.04 | 0.02 | 0.00 | 0.00 | 0.02 | 0.08 | 0.10 | -0.01 | 0.00 | 0.07 |
| | **TNA** | | | **FLOW** | | | **AGE** | | | **MAN** | | |
| **Country** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **NETHERLANDS** | 302.91 | 289.73 | 3.02 | 18.20 | 10.05 | 3.58 | 163 | 149 | 103 | 0.49 | 0.00 | 0.50 |
| **GREECE** | 83.65 | 44.21 | 40.91 | 5.09 | -3.17 | 9.01 | 170 | 169 | 71 | 0.55 | 1.00 | 0.50 |
| **AUSTRIA** | 125.11 | 110.66 | 26.17 | 18.36 | 2.98 | 18.37 | 127 | 113 | 80 | 0.82 | 1.00 | 0.38 |
| **BELGIUM** | 55.00 | 42.49 | 4.46 | 13.32 | 3.25 | 11.33 | 148 | 117 | 102 | 0.00 | 0.00 | 0.06 |
| **FRANCE** | 172.31 | 152.77 | 13.03 | 59.40 | 30.10 | 21.09 | 171 | 160 | 100 | 0.67 | 1.00 | 0.47 |
| **GERMANY** | 513.08 | 463.51 | 66.28 | 22.46 | 13.24 | 12.66 | 283 | 226 | 196 | 0.51 | 1.00 | 0.50 |
| **ITALY** | 174.74 | 175.90 | 7.23 | 53.84 | 16.17 | 19.00 | 141 | 131 | 85 | 0.68 | 1.00 | 0.47 |
| **SPAIN** | 77.21 | 74.25 | 20.20 | 38.09 | 20.64 | 23.66 | 118 | 108 | 80 | 0.70 | 1.00 | 0.46 |
| **FINLAND** | 122.64 | 119.83 | 4.30 | 29.88 | 7.45 | 26.04 | 149 | 144 | 87 | 0.74 | 1.00 | 0.44 |
| **PORTUGAL** | 22.84 | 27.67 | 6.27 | 2.41 | -1.98 | 7.01 | 199 | 200 | 46 | 0.63 | 1.00 | 0.48 |

## 2.2.3 Empirical results

Table 2.4 reports the results for model [2.1]. The regressions allow us to identify the market- and fund-specific characteristics that could be considered by policymakers and market supervisors when monitoring fund manager defaults on the limits of the portfolio concentration included in the EU regulations. We examine the odds ratios of the coefficients minus one to explain the variables in terms of the likelihood that the default will occur with a small change in the independent variable.

We find that the level of concentration of the domestic equity benchmarks significantly increases the probability of incurring defaults 1, 2 or 3. That is, the higher the level of concentration of the benchmark is, the greater the likelihood of finding non-compliant domestic equity funds. This positive significance is robust for the different model specifications and for the different types of defaults. Specifically, concentrated benchmarks would make the defaults almost twice as likely to occur, (i.e., if the level of concentration of domestic equity benchmark increases one log-unit, 1.81 will multiply the odds of incurring default 1. The same interpretation is valid for model specifications in terms of defaults 2 or 3). Thus, market supervisors should especially monitor domestic equity funds domiciled in countries with highly concentrated domestic benchmarks.

The level of concentration of the domestic fund industry also has positive and significant effects on the likelihood of incurring defaults 1, 2 or 3. This evidence is consistent with previous findings in the literature that link competition with active management strategies such as concentrated portfolios. According to the different model specifications, defaults are approximately 12%-17% more likely to occur when the level of concentration of the domestic fund industry increases one unit (this variable is normalized per industry). Therefore, the promotion of competition in the mutual fund industry should reduce the likelihood of default on EU portfolio concentration limits.

Market supervisors should especially monitor domestic equity funds registered in highly concentrated industries in which the market share of a few large funds is significantly higher than the market share of the remaining small competitors. Consequently, there is evidence of a positive and robust relation between the level of concentration of the benchmark, the level of the concentration of the industry and the likelihood of portfolio weights over the EU concentration limits.

Considering the fund characteristics, we find that fund age has a positive and significant influence on the likelihood of defaults 1, 2, and 3. This positive significance is robust to the different model specifications and to the different types of defaults. That is, the probability of incurring defaults is approximately 18%-26% when the fund age increases one-month unit (this variable is normalized per industry). Thus, this evidence could be consistent with the previous literature that links older funds with higher levels of idiosyncratic risk as a consequence of having more concentrated portfolios.

Finally, if we consider the management structure, we find both diverse and significant results. That is, the effects of the organisational structure on the decision-making process are different in terms of the different types of defaults. Market supervisors should monitor solo-managed funds in which decisions are made without team consensus to prevent portfolio weights over a 10% limit. In contrast, when the defaults involve a higher number of portfolio holdings, i.e., defaults 2 or 3, team consensus plays a significant role. In terms of the interpretation of the results, the probability to incur default 1 increases approximately 3% when funds are solo managed. On the other hand, the probability to incur defaults 2 or 3 is reduced 7% and 3.5% for solo managers respectively. These potentially contradicting results may be explained by the fact that the types of defaults are different and require different decision-making processes.

To prevent defaults in EU portfolio concentration limits, the results in this section should lead market supervisors to pay more attention to concentrated fund industries with concentrated domestic equity benchmarks. The most experienced funds that are solo-managed should be especially monitored to prevent portfolio weights over a 10% limit. Since a large number of funds violate the UCITS directive, the analysis of the effects of these diversification defaults on mutual fund shareholders should be analysed to recommend the revision of these portfolio concentration limits.[40]

[40] Although the potential revision of the portfolio concentration limits is beyond the objectives of our research, we have preliminary analysed the future performance implications of all the documented defaults. Our exploratory results support that the violation of the UCITS directive in our sample has no clear negative effects on mutual fund shareholders in terms of Jensen's alphas. Further research should contribute to these very first results. Details are available upon request.

**Table 2.4 Results for several specifications of model [2.1].**

This table reports the results of several specifications for the logit panel data model [2.1] using fixed effects. In Panel A, Panel B and Panel C, the dependent variable is one when we detect defaults 1, 2 or 3, respectively, and zero otherwise. The odds ratios of the coefficients minus one are given for each model specification. Robust z-test statistics are in brackets underneath each value. *, **, and *** indicate significance at the 5%, 1% and 0.1% levels, respectively.

| | **Panel A** | | | | | | **Panel B** | | | | | | **Panel C** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(1)** | | **(2)** | | **(3)** | | **(1)** | | **(2)** | | **(3)** | | **(1)** | | **(2)** | | **(3)** | |
| **Constant** | -0.0014 | *** | -0.0283 | *** | -0.0013 | *** | -0.0019 | *** | -0.0249 | *** | -0.0016 | *** | -0.0012 | *** | -0.0292 | *** | -0.0016 | *** |
| | [-17.683] | | [-23.427] | | [-17.838] | | [-16.053] | | [-20.836] | | [-16.934] | | [-17.717] | | [-23.577] | | [-17.786] | |
| **$HHI_{m,t}$ (Log)** | 1.8100 | *** | | | 1.8089 | *** | 1.2466 | *** | | | 1.2542 | *** | 1.7207 | *** | | | 1.7616 | *** |
| | [9.136] | | | | [8.837] | | [9.146] | | | | [8.062] | | [12.151] | | | | [11.865] | |
| **$RB_{m,t-1}$** | -0.3086 | ** | | | -0.3127 | ** | -0.0842 | ** | | | -0.0825 | ** | 0.0660 | | | | 0.0642 | |
| | [-4.027] | | | | [-2.110] | | [-3.336] | | | | [-2.245] | | [0.316] | | | | [1.418] | |
| **$NHHI_{m,t}$** | 0.1459 | *** | | | 0.1351 | *** | 0.1194 | *** | | | 0.1196 | *** | 0.1678 | *** | | | 0.1577 | *** |
| | [7.558] | | | | [8.758] | | [18.500] | | | | [10.306] | | [7.469] | | | | [8.611] | |
| **$ERB_{p,t-1}$** | | | -0.0155 | ** | -0.0116 | ** | | | -0.0673 | | -0.0516 | | | | -0.0151 | | -0.0166 | |
| | | | [-1.661] | | [-1.130] | | | | [-2.752] | | [-1.378] | | | | [-1.605] | | [-1.917] | |
| **$TNA_{p,t}$** | | | 0.0074 | | 0.0076 | | | | 0.0098 | | 0.0092 | | | | 0.0007 | | 0.0004 | |
| | | | [1.146] | | [1.659] | | | | [1.876] | | [1.302] | | | | [1.085] | | [1.643] | |
| **$Flow_{p,t-1}$** | | | 0.0000 | | 0.0000 | | | | 0.0000 | | 0.0000 | | | | 0.0000 | | 0.0000 | |
| | | | [0.274] | | [0.324] | | | | [0.534] | | [0.421] | | | | [0.057] | | [0.080] | |
| **$Age_{p,t}$** | | | 0.2404 | *** | 0.2452 | *** | | | 0.2579 | *** | 0. 2609 | *** | | | 0. 1817 | *** | 0.1850 | *** |
| | | | [8.300] | | [9.112] | | | | [3.322] | | [3.937] | | | | [7.006] | | [8.975] | |
| **$Man_{p,t}$** | | | 0.0350 | *** | 0.0360 | *** | | | -0.0744 | *** | -0.0725 | *** | | | -0. 0350 | *** | -0.0354 | *** |
| | | | [1.540] | | [2.253] | | | | [-2.727] | | [-4.058] | | | | [-1.672] | | [-2.346] | |
| **AIC** | 50440 | | 54235 | | 53601 | | 67665 | | 69509 | | 67445 | | 53473 | | 54050 | | 53426 | |
| **Observations** | 53647 | | 54239 | | 54962 | | 69518 | | 69518 | | 69518 | | 54054 | | 54058 | | 54058 | |
| **Wald test $\chi^2$** | 9535 | | 4675 | | 5100 | | 1640 | | 2007 | | 1264 | | 9623 | | 4723 | | 5142 | |
| **$\chi^2$ ( p-value)** | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0008 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | |
| **Pseudo $R^2$** | 0.1098 | | 0.1737 | | 0.1202 | | 0.0267 | | 0.0315 | | 0.0299 | | 0.1091 | | 0.1400 | | 0.1194 | |
| **Pseudo $R^2$ (p-value)** | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | |

## 2.3 Stock determinants of portfolio diversification default

The evidence provided in the previous section on the existence of domestic equity funds that fail to fulfil EU regulations leads us to explore some features of this phenomenon in greater depth. Given these portfolio diversification defaults, this section identifies the stock characteristics that are especially subject to more concentrated strategies and, therefore, more vulnerable to mutual funds' investment policies. In this section, we test how stock characteristics influence the probability of the stock being subject to defaults.

Thus, we first describe our sample of stocks included in the portfolios of our set of domestic equity funds. Then, we describe the specific variables included in our multinomial logit panel data model. Finally, we present the hypotheses and the results and identify the characteristics of the portfolio holdings that exceed the EU concentration limits.

### 2.3.1 Sample description

Our data contain a comprehensive sample of stocks with a portfolio weight over 5% held by the domestic equity funds previously analysed in Section 2. Our sample includes more than 195,000 holdings of 6,306 stocks that are contained at least once in the portfolios of the 536 domestic equity funds analysed during our sample period (December 2002–December 2018). The final sample includes 1,605 stocks with a portfolio weight over 5% that incur defaults 1, 2 or 3. The distribution by type of default is as follows: default 1 includes 562 stocks, default 2 includes 1,183 stocks and default 3 includes 446 stocks. Detailed information is available upon request.

Table 2.5 presents the number of holdings with a portfolio weight over 5% in our fund sample. The most economically important mutual fund industries in the Eurozone,

such as those of France, Germany, Italy and Spain, have a total of 134,086 holdings, representing 68.76% of our sample. Table 2.5 also shows the number of stocks in which at least one fund on a concrete date has reported a portfolio weight greater than 5%. French funds present more than 130 different stocks per year on average. In contrast, funds in countries such as Belgium, Portugal, and Austria have fewer stocks with a portfolio weight over 5%, likely due to the lower number of stocks listed in these domestic markets. In addition, Table 2.5 shows the average number of holdings with a portfolio weight over 5% per portfolio analysed. Excluding the information in 2002, which is affected by the number of months available in this year, all countries show stable patterns in the average number of holdings with a portfolio weight over 5%.

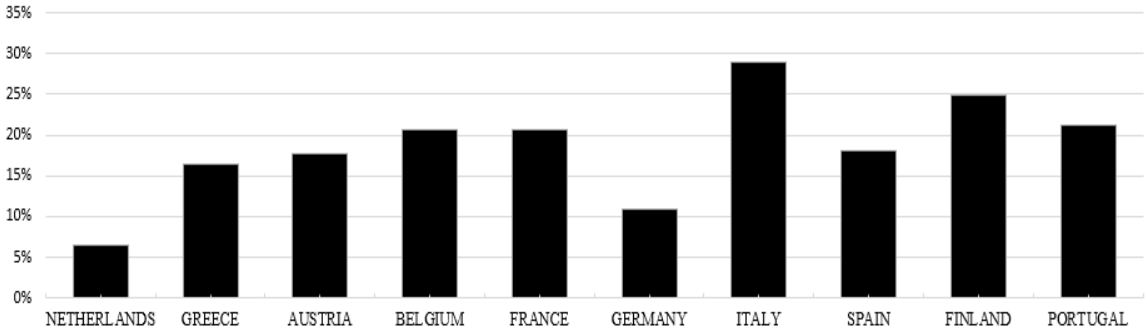
We calculate a variation of the HHI to detect the potential concentration of the default holdings of a small number of stocks. Figure 2.2 shows the results for this measure of default 1 in each country. Domestic equity funds registered in Italy concentrate their bets in fewer stocks than other domestic equity fund industries, such as Germany and Netherlands. The descriptive evidence for our sample highlights the interest in the stock characteristics of holdings exceeding EU portfolio concentration limits.

**Table 2.5 Number of holdings and stocks with a portfolio weight over 5% (2002-2018).**
This table shows, for each country and year, (1) the number of holdings with a portfolio weight over 5%, (2) the number of stocks in which at least one fund on a concrete date has reported a portfolio weight greater than 5%, and (3) the average number of holdings with a portfolio weight over 5% per portfolio analysed.

| | NETHERLANDS | | | GREECE | | | AUSTRIA | | | BELGIUM | | | FRANCE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2002** | 68 | 14 | 5.23 | 38 | 8 | 19.00 | 9 | 1 | 9.00 | 2 | 1 | 1.00 | 135 | 10 | 7.11 |
| **2003** | 395 | 30 | 5.13 | 137 | 14 | 6.85 | 21 | 3 | 10.50 | 17 | 4 | 4.25 | 477 | 47 | 3.06 |
| **2004** | 428 | 29 | 4.55 | 165 | 15 | 7.86 | 34 | 7 | 3.78 | 14 | 3 | 4.67 | 655 | 57 | 2.74 |
| **2005** | 532 | 36 | 5.85 | 221 | 21 | 4.09 | 78 | 16 | 4.33 | 19 | 9 | 2.11 | 592 | 62 | 2.95 |
| **2006** | 745 | 38 | 6.21 | 297 | 22 | 4.43 | 300 | 20 | 3.95 | 26 | 10 | 2.00 | 812 | 92 | 3.04 |
| **2007** | 819 | 45 | 5.98 | 408 | 31 | 4.80 | 357 | 20 | 4.15 | 21 | 10 | 1.91 | 934 | 90 | 2.26 |
| **2008** | 673 | 42 | 5.38 | 275 | 30 | 3.82 | 351 | 28 | 4.08 | 69 | 22 | 2.65 | 1692 | 170 | 2.82 |
| **2009** | 657 | 40 | 5.57 | 309 | 28 | 4.12 | 525 | 25 | 3.98 | 65 | 16 | 2.50 | 2816 | 185 | 2.98 |
| **2010** | 763 | 44 | 6.10 | 240 | 27 | 3.81 | 509 | 21 | 4.04 | 51 | 7 | 1.89 | 2279 | 175 | 2.53 |
| **2011** | 787 | 43 | 5.79 | 332 | 29 | 5.27 | 565 | 23 | 4.38 | 12 | 5 | 0.92 | 2157 | 145 | 2.24 |
| **2012** | 753 | 38 | 5.66 | 188 | 23 | 4.37 | 462 | 16 | 3.95 | 12 | 2 | 1.00 | 2859 | 164 | 2.88 |
| **2013** | 831 | 45 | 6.11 | 166 | 19 | 3.77 | 493 | 20 | 3.63 | 12 | 1 | 0.92 | 2826 | 169 | 2.87 |
| **2014** | 637 | 38 | 6.64 | 319 | 23 | 3.63 | 400 | 21 | 3.03 | N/A | N/A | N/A | 2562 | 206 | 2.72 |
| **2015** | 461 | 35 | 6.59 | 336 | 24 | 4.05 | 487 | 25 | 3.38 | N/A | N/A | N/A | 2396 | 170 | 2.58 |
| **2016** | 464 | 37 | 6.19 | 377 | 22 | 4.60 | 448 | 23 | 2.87 | N/A | N/A | N/A | 2492 | 175 | 2.66 |
| **2017** | 420 | 40 | 5.25 | 409 | 20 | 5.18 | 468 | 24 | 4.37 | N/A | N/A | N/A | 2798 | 178 | 2.52 |
| **2018** | 412 | 34 | 5.72 | 399 | 18 | 5.12 | 453 | 28 | 4.23 | N/A | N/A | N/A | 3222 | 164 | 3.02 |
| **Mean** | 579 | 37 | 5.76 | 272 | 22 | 5.57 | 351 | 19 | 4.57 | 27 | 8 | 2.15 | 1865 | 133 | 3.00 |

| | GERMANY | | | ITALY | | | SPAIN | | | FINLAND | | | PORTUGAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2002** | 119 | 25 | 4.10 | 84 | 15 | 3.65 | 118 | 31 | 3.58 | 59 | 21 | 2.03 | 12 | 1 | 1.33 |
| **2003** | 1286 | 40 | 4.01 | 545 | 43 | 3.81 | 1002 | 49 | 3.47 | 323 | 29 | 3.59 | 85 | 5 | 4.47 |
| **2004** | 1328 | 38 | 4.11 | 976 | 39 | 3.75 | 870 | 27 | 3.39 | 377 | 28 | 4.19 | 137 | 9 | 4.89 |
| **2005** | 1263 | 33 | 4.04 | 1026 | 55 | 3.40 | 918 | 33 | 3.34 | 390 | 35 | 3.61 | 180 | 10 | 3.27 |
| **2006** | 1344 | 38 | 3.92 | 1015 | 69 | 3.56 | 1040 | 44 | 3.75 | 557 | 47 | 4.13 | 215 | 16 | 1.05 |
| **2007** | 1591 | 46 | 3.85 | 894 | 58 | 3.24 | 1112 | 45 | 3.69 | 720 | 48 | 3.83 | 922 | 25 | 4.37 |
| **2008** | 1785 | 63 | 4.08 | 783 | 45 | 3.11 | 1360 | 64 | 4.18 | 899 | 50 | 3.89 | 869 | 23 | 4.83 |
| **2009** | 1964 | 59 | 4.26 | 732 | 49 | 2.50 | 1147 | 67 | 3.70 | 977 | 46 | 4.12 | 781 | 23 | 3.94 |
| **2010** | 1802 | 48 | 3.93 | 801 | 42 | 3.02 | 1623 | 55 | 4.10 | 1296 | 44 | 4.55 | 786 | 21 | 4.20 |
| **2011** | 1545 | 38 | 3.59 | 684 | 32 | 2.63 | 1712 | 58 | 4.12 | 1450 | 52 | 4.60 | 813 | 20 | 4.47 |
| **2012** | 1508 | 41 | 3.41 | 655 | 28 | 2.52 | 1860 | 71 | 4.34 | 1637 | 48 | 4.81 | 807 | 19 | 5.01 |
| **2013** | 1487 | 47 | 3.84 | 522 | 24 | 2.68 | 2067 | 55 | 4.31 | 1698 | 53 | 4.43 | 701 | 19 | 4.52 |
| **2014** | 1247 | 51 | 3.97 | 539 | 20 | 2.67 | 1908 | 68 | 3.51 | 2028 | 62 | 4.91 | 692 | 19 | 5.16 |
| **2015** | 1368 | 48 | 4.61 | 593 | 33 | 2.86 | 2055 | 61 | 3.56 | 1777 | 52 | 4.86 | 590 | 19 | 5.00 |
| **2016** | 1322 | 41 | 4.99 | 550 | 29 | 2.57 | 2267 | 66 | 3.61 | 1658 | 51 | 6.10 | 527 | 17 | 4.79 |
| **2017** | 1296 | 59 | 3.33 | 594 | 38 | 1.80 | 2568 | 62 | 4.39 | 1698 | 49 | 5.19 | 641 | 20 | 7.54 |
| **2018** | 1301 | 51 | 3.28 | 681 | 36 | 2.15 | 2498 | 66 | 4.23 | 1553 | 51 | 5.08 | 668 | 19 | 9.15 |
| **Mean** | 1386 | 45 | 3.96 | 687 | 39 | 2.94 | 1537 | 54 | 3.84 | 1123 | 45 | 4.35 | 554 | 17 | 4.59 |

**Figure 2.2 Distribution of stocks by default 1**
This figure shows per country, the level of concentration of stocks in default 1. This metric is based on a variation of HHI for each country during the period 2002-2018. We adapt this concentration measure to obtain the HHI' as the proportion of the sum of the squared frequency of each stock with a portfolio weight higher than 10% divided by the squared frequency of all portfolio positions incurring default 1.




## 2.3.2 Model and variables

The objective of this analysis is to identify the stock characteristics that could be subject to portfolio holdings not fulfilling the EU portfolio concentration limits. We estimate the probability of the stocks that could be subject to defaults 1, 2, or 3 using a multinomial logit panel data model (fixed effects). [41] This model is a variation of the logit panel data in which the dependent variable *k* can take more than two values. The logistic probability function of a stock *s* to be subject to default *k* in period *t* is

$$\Pr(Default\ 1,2\ or\ 3)_s = \frac{e^{\beta' x_s}}{1+\sum_{k=1}^{K} e^{\beta' x_s}}, \quad \beta' X_s = \alpha_{s,0} + \beta_s X_{s,t} + \varepsilon_{s,t}\,; k = 1\ to\ K \quad [2.2]$$

where $X_{s,t}$ is a vector of time-varying stock-specific variables and *K* is the number of dependent variables. There are three dependent variables in our model, i.e., Default 1, Default 2, and Default 3. The multinomial logistic regression allows us to avoid the duplicity of the number of stocks included in each panel because it categorizes each stock by both the frequency and the type of default, if any. The multinomial logit model lets us evaluate the probability to incur defaults 1, 2 or 3 at the same time but isolating the stock

[41] The results of the Hausman test are available upon request.

frequencies by type of default, i.e., the multinomial logit model does not consider the frequency of stocks incurring in default 1 when analysing default 2 or 3.

We begin by testing whether stock characteristics benchmark-based increase the probability that stocks could be subject to defaults 1, 2, or 3.

In Section 2.2, we provided evidence that the level of concentration of the domestic equity benchmarks almost duplicates the probability of a domestic equity fund incurring defaults 1, 2, and 3. Accordingly, in this stock-based analysis, our hypothesis is that the characteristics of the constituents of domestic equity benchmarks may significantly influence the default probability in model [2.2].

Since the seminal work by Fama and French (1993, 1995), the size of stocks has been a key variable that influences portfolio composition and performance. The literature shows that mutual funds have a clear preference for large stocks (e.g., Chen *et al.*, 2000; Gompers and Metrick, 2001). In the same manner, liquidity is another variable that influences portfolio composition. The literature argues that both institutional and retail investors prefer liquid assets over illiquid ones in their portfolios (e.g., Amihud and Mendelson, 1986; Gompers and Metrick, 2001). Additionally, Ding *et al.* (2016) find that stocks with a higher free-float capitalization have a higher level of liquidity. Loban *et al.* (2020) find that domestic equity benchmarks of the Eurozone present a high level of concentration in some of their large free-float capitalization constituents. Thus, stocks with larger weights in the corresponding domestic equity benchmark could be more likely to be overweighted in the portfolios of domestic funds that follow this benchmark. Formally, our ninth hypothesis H9 is as follows:

*H9: A larger weight in domestic benchmark is positively related to the likelihood of incurring defaults 1, 2, or 3*.

This fact could subsequently imply a failure to fulfil the EU portfolio concentration limits. Traditionally, market capitalization is a common measure to compute stock size. However, we measure the size of stock *s* relative to its domestic equity benchmark at the end of month *t*, $WSize_{s,t}$, as the monthly weight of stock *s* in its domestic equity benchmark. We include this variable in our model [2.2] to test whether the free-float market capitalization as a proxy of size and liquidity could affect the probability of incurring the previously defined types of defaults.

In addition to stock size, Bae *et al.* (2008) argue that the importance of local advantage is inversely related to the quality of the information provided by firms. Ding *et al.* (2016) find that firms included in free-float benchmarks can alleviate information asymmetry problems. Furthermore, Kacperczyk and Seru (2007) show how analyst recommendations proxied by public information tend to affect portfolio holdings. Busse *et al.* (2007) use holdings information to consider fund managers' willingness to take big bets out-benchmark in a relatively small number of stocks, resulting in more concentrated portfolios. More recently, Reibnitz (2017) finds that firm-specific information influences fund performance more than market conditions, especially with regard to small companies with a relatively less rich information environment. These information asymmetries could affect the probability of incurring defaults on EU portfolio concentration limits. Our tenth hypothesis H10 is as follows:

*H10: The number of months that stock belongs in the benchmark is positively related to incurring defaults 1, 2, or 3.*

We use the recent permanency of the stocks in the domestic equity benchmark as a proxy for this information coverage. We include $Benchmark_{s,t}$ in model [2.2] as the proportion of months that stock *s* in month *t* has remained in the benchmark out of the last 24 months.

We also consider the accumulated weight of each industry in the benchmark as a potential factor to explain the different defaults. Fulkerson (2013) finds that fund managers tend to select majority stocks within economically relevant industries. More recently, Narayan *et al.* (2017) show that the same sectors that dominate returns from dynamic trading strategies are included in portfolios, regardless of the different portfolio constraints. Cremers and Petajisto (2009) show that managers may take large stock-specific positions if they simultaneously diversify their active positions across all industries, producing a low tracking error and a high active share. In addition, we find that domestic equity benchmarks present high return correlation levels within stocks included in each industry.[42] Thus, this evidence of correlation could be considered managers' incentive to diversify that overweighted stocks in the same industry exceed the EU portfolio concentration limits. Our eleventh hypothesis H11 is as follows:

*H11: A higher accumulated industry weight in domestic benchmark is positively related to the likelihood of incurring defaults 1, 2, or 3.*

We include $WIndustry_{I,t}$ in model [2.2] as the accumulated weight of the stocks in industry *I* at the end of month *t.*

Previous findings support that mutual fund holdings exhibit a distinct preference for growth stocks (e.g., Carhart, 1997; Wermers, 1999; Chen *et al*., 2000; Kacperczyk *et al.*, 2005; Franzzini and Lamont, 2008). Furthermore, Brands *et al.* (2005) find that more concentrated funds tend to be those that implement growth styles. Thus, growth strategies could generate more concentrated portfolios and imply conflicts with EU concentration limits.

[42] We obtain the correlation matrix of the returns between stocks belonging to the same industry. The industry classification is provided by Datastream, i.e., Basic Materials, Consumer Discretionary, Consumer Staples, Energy, Financials, Health Care, Industrials, Real Estate, Technology, Telecommunications, and Utilities. Details are available upon request.

Our twelfth hypothesis H12 is as follows:

*H12: The growth stock strategies are positively related to the likelihood of incurring defaults 1, 2, or 3.*

We compute $MB_{s,t}$ in model [2.2] as the monthly ratio between the stock market price and the value of each stock according to the book value of firm *s* at month *t.*

Traditionally, stock performance is a widely used variable. In our analysis, we include return and risk separately to capture the specific information provided by each performance factor. We examine how stock return records may influence the probability of that stock being subject to defaults 1, 2 or 3 by domestic equity funds. Jegadeesh and Titman (1993) show how stocks that have performed relatively well in the past have a subsequent positive return. Grinblatt *et al.* (1995) find that the tendency to include stocks based on their past return could be common among managers. Furthermore, Carhart (1997) finds persistent abnormal returns in portfolio management strategies based on the continuance of market trends, i.e., momentum strategies. Additionally, Wermers (1999) provides additional evidence that momentum is not a statistical fluke. Chen *et al.* (2000) show that fund managers prefer to hold past winners. Thus, a positive and significant previous return as a consequence of momentum strategies could increase the propensity to rely more on winner stocks regardless of the limits of portfolio concentration. Further, a merely mechanical explanation also complements momentum explanation. High past return stocks grow larger and increase naturally as a share of the portfolio. Both explanations are consistent with lagged stock return as an independent variable in our model. Our thirteenth hypothesis H13 is as follows:

*H13: Previous stock return is positively correlated with the likelihood of incurring defaults 1, 2, or 3.*

In model [2.2], we define $Return_{s,t-1}$ as the excess return of stock *s* during the previous 12-month period at the end of month *t-1*.

Finally, we evaluate the level of risk as a potential factor to explain the probability of a stock being subject to defaults 1, 2 or 3. The relationship between both the return on the stock and its risk is an important topic in financial research. There are important papers that find a significant and positive relation between different specifications of stock returns and risk (e.g., Merton, 1980; French *et al.*, 1987; Chou *et al.*, 1992). However, there are also relevant findings in that question (e.g., Black, 1976; Cox and Ross, 1976; Bekaert and Wu, 2000; Li *et al.*, 2005). Thus, we analyse how risk could affect the probability of being subject to EU regulation defaults by domestic equity funds. Falkenstein (1996) documents that mutual fund managers prefer stocks with high volatility. More recently, Huang *et al.* (2011) show that mutual funds can shift risk by changing their exposure to systematic risk (e.g., by switching between low-beta stocks and high-beta stocks). This commitment to managing risk could affect the probability of incurring defaults on EU portfolio concentration limits because domestic equity funds could also follow risk-shifting strategies by changing their exposure to idiosyncratic risk with more concentrated portfolios. Thus, risk may have a significant impact on our model [2.2]. Our fourteenth hypothesis H14 is as follows:

*H14: Risk-shifting strategies are positively correlated with the likelihood of incurring defaults 1, 2, or 3.*

We define $Volatility_{s,t-1}$ as the variance of excess return of stock *s* during the previous 12-month period at the end of month *t-1*.

Table 2.6 presents detailed definitions of the time-varying stock-specific variables included in model [2.2].

**Table 2.6 Variables in model [2.2].**
This table shows the definition of the time-varying stock-specific variables included in the multinomial logit panel data model [2.2] to estimate the probability of incurring defaults 1, 2, or 3

| Variable | Definition | Data source |
|---|---|---|
| $WSize_{s,t}$ | The weight of stock *s* in its domestic equity benchmark at the end of month *t*. | (Datastream) |
| $Benchmark_{s,t}$ | Proportion of months in which stock *s* is included in its domestic equity benchmark in the previous 24-month period at the end of month *t-1*. This variable is obtained with a rolling-window method from November 2000 to December 2018. | (Datastream) |
| $WIndustry_{I,t}$ | Accumulated weight of the domestic equity benchmark of the stocks included in the same industry at the end of month *t*. This industry classification is obtained following Global Industry Classification Standard criteria. | (Datastream) |
| $MB_{s,t}$ | Monthly ratio between the stock market price and the book value of each stock *s* at the end of month *t*. | (Datastream) |
| $Return_{s,t-1}$ | Lagged excess return of stock *s* during the previous 12-month period at the end of month *t-1*. | (Datastream) |
| $Volatility_{s,t-1}$ | Variance of monthly return of stock *s* over the prior 12 months at the end of month *t-1*. | (Datastream) |

Table 2.7 reports summary statistics for the previously defined variables. Both significant differences in the weights of the benchmark constituents and the accumulated industry weights of these constituents highlight the differences in our sample when the unique EU concentration limits are applied.

**Table 2.7 Summary statistics for the variables included in model [2.2].**
This table presents (1) the mean values, (2) the median values and (3) the standard deviation values of all variables included in the multinomial logit panel data model [2.2] to estimate the probability of incurring defaults 1, 2, or 3. This information is reported for each country included in our sample from 2002 to 2018. See Table 2.6 for more details about the definition of the variables

| | **WSize** | | | **Benchmark** | | | **WIndustry** | | |
|---|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **NETHERLANDS** | 13.95 | 12.74 | 4.41 | 0.58 | 0.98 | 0.46 | 13.98 | 11.34 | 9.94 |
| **GREECE** | 15.77 | 12.95 | 2.68 | 0.80 | 0.77 | 0.33 | 31.46 | 26.11 | 14.40 |
| **AUSTRIA** | 11.30 | 13.22 | 4.74 | 0.80 | 0.91 | 0.29 | 22.60 | 17.88 | 9.46 |
| **BELGIUM** | 10.49 | 7.52 | 5.29 | 0.66 | 0.59 | 0.41 | 14.80 | 11.41 | 8.24 |
| **FRANCE** | 6.01 | 5.94 | 2.31 | 0.58 | 0.55 | 0.47 | 14.55 | 10.33 | 3.26 |
| **GERMANY** | 7.46 | 7.94 | 1.64 | 0.89 | 0.78 | 0.31 | 16.01 | 15.02 | 3.44 |
| **ITALY** | 9.64 | 10.01 | 2.01 | 0.79 | 0.80 | 0.38 | 23.60 | 20.20 | 7.21 |
| **SPAIN** | 14.20 | 15.50 | 4.35 | 0.82 | 0.91 | 0.33 | 26.97 | 24.98 | 4.61 |
| **FINLAND** | 6.03 | 6.01 | 1.04 | 0.79 | 0.76 | 0.35 | 15.14 | 13.64 | 3.26 |
| **PORTUGAL** | 8.95 | 7.64 | 4.01 | 0.81 | 0.88 | 0.29 | 16.40 | 15.39 | 4.92 |
| | **MB** | | | **Return** | | | **Volatility** | | |
| | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **NETHERLANDS** | 1.96 | 1.77 | 2.00 | -0.01 | 0.01 | 0.00 | 0.04 | 0.01 | 0.25 |
| **GREECE** | 2.17 | 1.73 | 2.33 | 0.02 | 0.01 | 0.04 | 0.15 | 0.03 | 0.81 |
| **AUSTRIA** | 1.67 | 1.23 | 1.39 | -0.01 | 0.00 | 0.06 | 0.11 | 0.03 | 0.59 |
| **BELGIUM** | 1.95 | 1.31 | 1.29 | 0.00 | 0.00 | 0.03 | 0.07 | 0.01 | 0.24 |
| **FRANCE** | 2.07 | 1.59 | 1.71 | 0.01 | 0.00 | 0.07 | 0.04 | 0.01 | 0.20 |
| **GERMANY** | 2.26 | 1.89 | 1.60 | 0.00 | 0.00 | 0.00 | 0.04 | 0.02 | 0.12 |
| **ITALY** | 1.66 | 1.24 | 1.23 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.04 |
| **SPAIN** | 2.41 | 1.61 | 2.43 | 0.00 | 0.00 | 0.01 | 0.03 | 0.02 | 0.07 |
| **FINLAND** | 2.50 | 1.94 | 2.04 | 0.00 | 0.00 | 0.00 | 0.06 | 0.02 | 0.18 |
| **PORTUGAL** | 2.44 | 1.45 | 2.60 | -0.01 | 0.00 | 0.02 | 0.06 | 0.03 | 0.08 |

## 2.3.3 Empirical results

Table 2.8 reports the results for model [2.2]. The regressions allow us to identify the stock-specific characteristics that could be subject to portfolio holdings not fulfilling the EU portfolio concentration limits. These specific characteristics should be monitored by market supervisors to identify the stocks that are subject to the default of domestic equity funds. Consistent with the interpretation of the results in model [2.1], we also analyse the odds ratios of the coefficients minus one to explain the significance of the variables in terms of the probability that the default will occur with a small change in the independent variable.

Considering the stock characteristics in relation to their benchmarks, we find a positive and significant relation between the weight of stocks in their domestic benchmarks and the probability of a stock being subject to default by domestic equity funds. This positive significance is robust to different model specifications and to different types of default. The results show how the probability of a stock being subject to default is approximately 8%-25% higher when the stock weight in the domestic benchmark increases one unit (in percentage terms). Thus, market supervisors should monitor stocks with large weights in domestic equity benchmarks.

The recent permanency of stocks in their domestic equity benchmarks also has a positive significant effect of approximately 13%-24% on the likelihood of a stock being subject to defaults 1 and 3 (Panel A and Panel C) per each increase of one unit (in percentage terms). Thus, this result is consistent with previous literature that argues the local advantage of reducing information asymmetry problems. Therefore, supervisors should particularly monitor fund markets with a stable list of benchmark constituents. In contrast, this variable presents a negative effect on the likelihood of a stock being subject to default 2. The definition of default 2 implies that the accumulated weight of several

stocks over 5% must be higher than 40%, which could affect this result. Thus, the need for a higher number of stocks to incur this default leads us to hypothesize that managers may not analyse only the stocks included in their benchmarks for this type of default.

Finally, we also find that risk has a negative and significant effect on the likelihood of stocks being subject to defaults 1, 2, and 3. This significance is robust to the different model specifications and to the different types of default. The results confirm that the probability of a stock being subject to default is approximately 19%-27% lower when stock volatility increases one unit (in standard deviation terms). The commitment to controlled risk strategies could be consistent with the idea that domestic equity funds tend to hold low-volatility stocks.

To identify stocks subject to default EU portfolio concentration limits, the results in this section should encourage market supervisors to pay more attention to liquid, domestic and large-cap stocks with low volatility records. Furthermore, market supervisors should especially monitor these types of stocks held by domestic equity funds to prevent portfolio concentration default.

**Table 2.8 Results for several specifications of model [2.2].**

This table reports the results of specifications for defaults 1, 2, or 3 in the multinomial logit panel data model [2.2] using fixed effects.. In Panel A, Panel B and Panel C, the dependent variable is one when we detect defaults 1, 2 or 3, respectively, and zero otherwise. The odds ratios of the coefficients minus one are given for each model specification. Robust z-test statistics are in brackets underneath these values. *, **, and *** indicate significance at the 5%, 1% and 0.1% levels, respectively.

| | **Panel A** | | | **Panel B** | | | **Panel C** | | |
|---|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **Constant** | -0.0012 *** | -0.0019 | -0.0013 *** | -0.0004 *** | -0.0004 | -0.0005 *** | -0.0013 *** | -0.0019 *** | -0.0013 *** |
| | [-73.900] | [-73.416] | [-74.614] | [-27.781] | [-33.041] | [-28.115] | [-73.920] | [-73.400] | [-74.623] |
| **WSize**$_{s,\,t}$ | 0.1952 *** | | 0.2504 *** | 0.0812 *** | | 0.0877 *** | 0.2494 *** | | 0.2503 *** |
| | [47.555] | | [43.162] | [27.844] | | [23.060] | [43.940] | | [43.148] |
| **Benchmark**$_{s,\,t}$ | 0.2472 *** | | 0.2440 *** | -0.1246 *** | | -0.1219 *** | 0.1336 *** | | 0.1342 *** |
| | [54.410] | | [47.700] | [-8.943] | | [-9.129] | [54.455] | | [46.577] |
| **WIndustry**$_{s,\,t}$ | -0.0172 * | | -0.0173 * | -0.0309 * | | -0.0304 * | -0.0094 * | | -0.0097 * |
| | [-9.566] | | [-10.144] | [-3.038] | | [-3.019] | [-10.571] | | [-10.150] |
| **MB**$_{s,\,t}$ | | -0.0010 | -0.0012 | | -0.0048 | -0.0047 | | -0.0010 | -0.0012 |
| | | [-1.126] | [-1.257] | | [-2.218] | [-2.646] | | [-1.124] | [-1.614] |
| **Return**$_{s,\,t-1}$ | | 0.0114 | 0.0116 | | 0.0012 | 0.0019 | | 0.0116 | 0.0118 |
| | | [0.517] | [2.345] | | [1.450] | [1.765] | | [0.516] | [2.353] |
| **Volatility**$_{s,\,t-1}$ | | -0.2115 *** | -0.2047 *** | | -0.2736 *** | -0.2644 *** | | -0.1913 *** | -0.2147 *** |
| | | [-4.036] | [-3.011] | | [-0.408] | [-0.775] | | [-4.038] | [-3.009] |
| **AIC** | 25057 | 27772 | 24871 | 110250 | 117070 | 109710 | 24710 | 21712 | 24870 |
| **Observations** | 31427 | 31427 | 31427 | 131788 | 131788 | 131788 | 27423 | 27423 | 27423 |
| **Wald test** $\chi^2$ | 4405 | 5663 | 5722 | 15374 | 33676 | 28581 | 4466 | 5870 | 5727 |
| $\chi^2$ **( p-value)** | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Pseudo** $R^2$ | 0.1343 | 0.0147 | 0.1711 | 0.0645 | 0.0633 | 0.0742 | 0.1344 | 0.0144 | 0.1544 |
| **Pseudo** $R^2$ **(p-value)** | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

## 2.4 Robustness

We provide several robustness checks for our main findings from models [2.1] and [2.2].[43] First, the current situation in financial markets is different from the situation when Directive 2009/65/EC was first established. Fund managers might show different practices that are non-compliant with legal requirements depending on the market environment. We wonder if the portfolio concentration limits should be revised and adjusted for different market scenarios. We run a Chow test to check for any structural changes in defaults 1, 2, and 3 that do not comply with the limits of portfolio concentration included in the EU directives. We consider the period of the Euro sovereign debt crisis to be the most striking scenario affecting the financial markets of the European Union in the last decade. However, the results show no evidence of structural changes in the patterns of defaults 1, 2, and 3 for the following crisis phases defined by Lane (2012): pre-crisis (before January 2010), the most critical phase of the sovereign debt crisis (January 2010-June 2012), and after the Draghi effect on the financial markets (from July 2012 onward).[44] That is, we find that there are no structural breaks in the default series to justify a revision of the portfolio concentration limits depending on the significantly different market scenarios (see details in Appendix 2.2).

Second, the three types of defaults are not homogeneously distributed across our country sample. To control for this country-level variation, we run a new specification of model [2.1] with only fund-level variables and a control variable $Countrydefaults_{m,t-1,}$ which is defined as the percentage of defaults incurred per country-year at the end of month *t-1*. The new results are robust to the previous findings provided in Table 2.4 and

[43] Detailed results of all robustness analyses are available upon request.
[44] From Mario Draghi's speech on July 26, 2012, at the U.K. Trade and Investment Global Investment Conference: "The European Central Bank is ready to do whatever it takes to preserve the Euro, and believe me, it will be enough."

show why some funds are more likely to incur legal defaults while controlling for the overall likelihood of a default in a country. (see details in Appendix 2.3).

Then, we check the robustness of our findings using an alternative definition of default. In our primary specifications, we define three types of default according to the limits of portfolio concentration presented in article 52 of UCITS IV. We consider a more restrictive definition of default 1 to determine if the previous results are not biased by minor 10% overweights, which could be classified as non-intentional defaults due to the increase in the stock's market price and/or sales of other portfolio positions. First, we organize the holdings with weights over 10% into quartiles.[45] Second, we exclude holdings included in Q1. Finally, we run both models [2.1] and [2.2]. Further, we also run a similar analysis for holdings included only in Q4. All these new results are in accordance with the previous findings for both models, regardless of the definition of default 1. That is, our findings are not significantly biased by unconscious defaults on the legal requirements, (see details in Appendix 2.4 and 2.5).

The evidence of diverse characteristics of the Eurozone fund industries leads us to check the robustness of our results to alternative sample clusters based on homogeneous sets of mutual fund industries. We divide the sample into two alternative clusters based on the mean level of the previously defined *NHHI* as a proxy for the market concentration of each domestic fund industry. This choice is justified by the significance of this country-level variable in the likelihood of non-compliance with EU portfolio concentration limits. We also obtain very similar clusters and results when these homogeneous groups of countries are based on the concentration of each domestic equity benchmark, *HHI*. We find that the results are consistent with the previous findings reported in Table 2.4 and Table 2.8 (see details in Appendix 2.6).

[45] The quartile breakpoints are 10.67%, 11.58% and 13.74%, for Q2, Q3 and Q4, respectively.

Finally, we check the robustness of our results to alternative specifications of our lagged variables. Initially, we run model [2.1] including market and fund returns using four different performance and lag periods (the 3-month period at the end of month t-1, the 6-month period at the end of month t-1, the 12-month period at the end of month t-2, and the 12-month period at the end of month t-3). The results are consistent with previous findings using the entire sample of logit panel data. Our main findings also remain mostly unchanged when we run model [2.2] using the same periods defined in model [2.1] for both the stock return and volatility variables.

## 2.5 Summary and Conclusions

This chapter is the first to investigate how some market and fund characteristics play a crucial role in explaining the portfolio concentration default on EU Directive 2009/65/EC (UCITS IV). Our findings should help market regulators and supervisors improve the monitoring process of defaults by domestic equity funds in the Eurozone mutual fund industry.

Using a large sample of open-end domestic equity funds in 10 Eurozone countries over the 2002–2018 period, we find that both the level of domestic benchmark concentration and the level of the concentration of the domestic fund industry significantly increase the likelihood of non-compliance with the EU portfolio concentration limits.

In line with fund characteristics, we show that fund age has a positive and significant effect on portfolio concentration default. Additionally, our findings are consistent with the influence of management structures on portfolio concentration strategies.

Focusing on some stock-specific characteristics that influence the likelihood of stocks being subject to non-compliance with EU legal restrictions, we find that 1) the weight of the stocks in their benchmarks has a positive and significant effect on EU portfolio concentration default, 2) the stocks that are more permanently listed in domestic benchmarks are likely to be subject to concentration defaults, and 3) the stocks that present low volatility have a greater likelihood of being subject to non-compliance with EU portfolio concentration limits. Therefore, market supervisors should pay more attention to these stock characteristics to monitor stocks that are more frequently overweighted over EU concentration limits.

Finally, these documented diversification defaults should highlight the interest for further research regarding possible changes in the UCITS directive. Both return and risk consequences of these defaults should be analysed in deep to set the potential negative effects on mutual fund shareholders and to propose potential revisions of the limits to portfolio concentration.

# Appendix 2.1 Investment constraints in the EU directives

The seminal UCITS directive, Council Directive 85/611/EEC, was issued on December 20, 1985, (UCITS I) to create a single regulatory framework for mutual funds as a major financial industry in Europe. For the first time, Section V (article 22) showed the obligations concerning investment policies with mandatory compliance.

Article 52.1 of Directive 2009/65/EC (UCITS IV), which is currently in force, specifies, "A UCITS shall invest no more than 5% of its assets in transferable securities or money market instruments issued by the same body; or 20% of its assets in deposits made with the same body". According to article 52.2, "Member States may raise the 5% limit laid down in paragraph 1 to a maximum of 10%. If they do so, however, the total value of the transferable securities and the money market instruments held by the UCITS in the issuing bodies in each of which it invests more than 5% of its assets shall not exceed 40% of the value of its assets. That limitation shall not apply to deposits or OTC derivative transactions made with financial institutions subject to prudential supervision".

In terms of investment constraints, article 52 of Directive 2009/65/EC is similar to article 22 of seminal Directive 85/611/EEC.

In addition to the previously identified limitations, article 57.1 of UCITS IV specifies, "Member States may allow recently authorized UCITS to derogate from articles 52 for six months following the date of their authorization". However, there is not a precise time limit to correct exceeded portfolio weights in most of the European legal framework. We analysed the national transpositions of UCITS IV by Belgium, Germany, Greece, Spain, France, Italy, Netherlands, Austria, Portugal and Finland. Only article 65 of Greek law 4009/2012 gives a specific period.

# Appendix 2.2 Results of Chow test

This table reports the results of a Chow Test in Panels A, B, and C, which include the samples for defaults 1, 2 or 3, respectively. For each panel, we apply three breakpoints that divide the sample into three periods: December 2002 to December 2009: January 2010 to June 2012 and July 2012 to December 2018. F-statistics are given for each panel. P values are in brackets underneath these values.

| | **Panel A** | **Panel B** | **Panel C** |
|---|---|---|---|
| **Breakpoint** | 3 | 3 | 3 |
| **F-statistic** | 0.28104 | 0.31923 | 0.3647 |
| | **[**0.8724] | [0.8653] | [0.8373] |

# Appendix 2.3 Results for the new specification of Model [2.1]

This table reports the results of running Model [2.1] for the sample of domestic equity funds. In Panel A, Panel B and Panel C, the dependent variable is one when we detect defaults 1, 2 or 3, respectively, and zero otherwise. The odds ratios of the coefficients minus one are given for each model specification. Robust z-test statistics are in brackets underneath these values. *, **, and *** indicate significance at the 5%, 1% and 0.1% levels, respectively.

| | **Panel A** | | **Panel B** | | **Panel C** | |
|---|---|---|---|---|---|---|
| | **(2)** | | **(2)** | | **(2)** | |
| **Constant** | -0.0702 | *** | -0.0804 | *** | -0.0676 | *** |
| | [-37.701] | | [-59.624] | | [-33.245] | |
| **Countrydefaults**$_{m,t-1}$ | -0.0007 | ** | 0.0000 | ** | -0.0007 | ** |
| | [-1.163] | | [0.629] | | [-1.167] | |
| **ERB**$_{p,t-1}$ | -0.0165 | ** | -0.0198 | | -0.0161 | |
| | [-2.159] | | [-2.164] | | [-2.052] | |
| **TNA**$_{p,t}$ | 0.0101 | | 0.0103 | | 0.0101 | |
| | [1.498] | | [2.150] | | [1.349] | |
| **Flow**$_{p,t-1}$ | 0.0000 | | 0.0000 | | 0.0000 | |
| | [2.982] | | [0.690] | | [2.656] | |
| **Age**$_{p,t}$ | 0. 1547 | *** | 0.1893 | *** | 0.1515 | *** |
| | [5.748] | | [2.479] | | [5.640] | |
| **Man**$_{p,t}$ | 0. 0509 | *** | -0.1019 | *** | -0.0677 | *** |
| | [1.612] | | [-3.147] | | [-1.805] | |
| **AIC** | 30767 | | 30926 | | 32470 | |
| **Observations** | 50440 | | 50403 | | 50054 | |
| **Wald test** $\chi^2$ | 8462 | | 3015 | | 6845 | |
| $\chi^2$ **(p-value)** | 0.0000 | | 0.0000 | | 0.0000 | |
| **Pseudo** $R^2$ | 0.0866 | | 0.0843 | | 0.0959 | |
| **Pseudo** $R^2$ **(p-value)** | 0.0000 | | 0.0000 | | 0.0000 | |

# Appendix 2.4 Results of a more restrictive definition of default in Model [2.1]

This table reports the results of running Model [2.1] on the sample of domestic equity funds with positions with a weight over 10.67%. In Panel A, the dependent variable is one when we detect default 1 and zero otherwise. The odds ratios of the coefficients minus one are given for each model specification. Robust z-test statistics are in brackets underneath these values. *, **, and *** indicate significance at the 5%, 1% and 0.1% levels, respectively.

**Panel A**

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| **Constant** | -0.0017 | *** | -0.0149 | *** | -0.0019 | |
| | [-17.642] | | [-24.400] | | [-14.557] | |
| **$HHI_{m,t}$ (Log)** | 2.3317 | *** | | | 2.1477 | *** |
| | [12.901] | | | | [12.630] | |
| **$RB_{m,t-1}$** | -0.2367 | ** | | | -0.1455 | ** |
| | [-4.465] | | | | [-4.613] | |
| **$NHHI_{m,t}$** | 0.1685 | *** | | | 0.2106 | *** |
| | [4.512] | | | | [4.343] | |
| **$ERB_{p,t-1}$** | | | -0.0101 | ** | -0.0099 | ** |
| | | | [-2.301] | | [-2.503] | |
| **$TNA_{p,t}$** | | | 0.0055 | | 0.0059 | |
| | | | [0.252] | | [0.675] | |
| **$Flow_{p,t-1}$** | | | 0.0000 | | 0.0000 | |
| | | | [0.374] | | [0.352] | |
| **$Age_{p,t}$** | | | 0.1794 | *** | 0.1841 | *** |
| | | | [2.981] | | [3.412] | |
| **$Man_{p,t}$** | | | 0.0410 | *** | 0.0398 | *** |
| | | | [5.221] | | [5.493] | |
| **AIC** | 9951 | | 9901 | | 9497 | |
| **Observations** | 11517 | | 11035 | | 11033 | |
| **Wald test $\chi^2$** | 1310 | | 1544 | | 1307 | |
| **$\chi^2$ (p-value)** | 0.0000 | | 0.0000 | | 0.0000 | |
| **Pseudo $R^2$** | 0.0718 | | 0.0606 | | 0.0799 | |
| **Pseudo $R^2$ (p-value)** | 0.0000 | | 0.0000 | | 0.0000 | |

This table reports the results of running Model [2.1] for the sample of domestic equity funds with positions with a weight over 13.74%. In Panel A, the dependent variable is one when we detect default 1 and zero otherwise. The odds ratios of the coefficients minus one are given for each model specification. Robust z-test statistics are in brackets underneath these values. *, **, and *** indicate significance at the 5%, 1% and 0.1% levels, respectively.

**Panel A**

| | **(1)** | | **(2)** | | **(3)** | |
|---|---|---|---|---|---|---|
| **Constant** | -0.0020 | *** | -0.0160 | *** | -0.0014 | *** |
| | [-18.560] | | [-25.106] | | [-14.733] | |
| **$HHI_{m,t}$ (Log)** | 2.1758 | *** | | | 3.5591 | *** |
| | [11.399] | | | | [13.444] | |
| **$RB_{m,t-1}$** | -0.2212 | ** | | | -0.1377 | ** |
| | [-4.166] | | | | [-4.436] | |
| **$NHHI_{m,t}$** | 0.1518 | *** | | | 0.1994 | *** |
| | [3.998] | | | | [4.105] | |
| **$ERB_{p,t-1}$** | | | -0.0100 | ** | -0.0100 | ** |
| | | | [-2.233] | | [-2.394] | |
| **$TNA_{p,t}$** | | | 0.0047 | | 0.0049 | |
| | | | [0.287] | | [0.261] | |
| **$Flow_{p,t-1}$** | | | 0.0000 | | 0.0000 | |
| | | | [0.337] | | [0.353] | |
| **$Age_{p,t}$** | | | 0.2220 | *** | 0.2102 | *** |
| | | | [3.315] | | [3.167] | |
| **$Man_{p,t}$** | | | 0.03761 | *** | 0.0396 | *** |
| | | | [4.999] | | [5.387] | |
| **AIC** | 17834 | | 15401 | | 10822 | |
| **Observations** | 20190 | | 17666 | | 15430 | |
| **Wald test $\chi^2$** | 1944 | | 1651 | | 1135 | |
| **$\chi^2$ (p-value)** | 0.0000 | | 0.0000 | | 0.0000 | |
| **Pseudo $R^2$** | 0.0811 | | 0.0733 | | 0.0965 | |
| **Pseudo $R^2$ (p-value)** | 0.0000 | | 0.0000 | | 0.0000 | |

# Appendix 2.5 Results of a more restrictive definition of default in Model [2.2]

This table reports the results of running Model [2.2] for the sample of domestic equity funds with positions with a weight over 10.67%. In Panel A, the dependent variable is one when we detect default 1 and zero otherwise. The odds ratios of the coefficients minus one are given for each model specification. Robust z-test statistics are in brackets underneath these values. *, **, and *** indicate significance at the 5%, 1% and 0.1% levels, respectively.

**Panel A**

| | **(1)** | | **(2)** | | **(3)** | |
|---|---|---|---|---|---|---|
| **Constant** | -0.0010 | *** | -0.0015 | | -0.0013 | *** |
| | [-70.455] | | [-74.989] | | [-72.212] | |
| ***WSize***$_{s,\,t}$ | 0.2444 | *** | | | 0.2985 | *** |
| | [49.116] | | | | [50.733] | |
| ***Benchmark***$_{s,\,t}$ | 0.2714 | *** | | | 0.2562 | *** |
| | [55.555] | | | | [50.666] | |
| **WIndustry**$_{s,\,t}$ | -0.0304 | * | | | -0.0395 | * |
| | [-12.698] | | | | [-14.755] | |
| ***MB***$_{s,\,t}$ | | | -0.0034 | | -0.0027 | |
| | | | [-2.456] | | [-1.974] | |
| ***Return***$_{s,\,t-1}$ | | | 0.0310 | | 0.0444 | |
| | | | [1.363] | | [3.318] | |
| ***Volatility***$_{s,\,t-1}$ | | | -0.2148 | *** | -0.2156 | *** |
| | | | [-4.108] | | [-4.199] | |
| **AIC** | 21905 | | 19977 | | 19612 | |
| **Observations** | 24461 | | 24311 | | 23878 | |
| **Walt test** $\chi^2$ | 3942 | | 3868 | | 3844 | |
| $\chi^2$ **( p-value )** | 0.0000 | | 0.0000 | | 0.0000 | |
| **Pseudo** $R^2$ | 0.0991 | | 0.0833 | | 0.0816 | |
| **Pseudo** $R^2$ **(p-value)** | 0.0000 | | 0.0000 | | 0.0000 | |

This table reports the results of running Model [2.2] for the sample of domestic equity funds with position weights over 13.74%. In Panel A, the dependent variable is one when we detect default 1 and zero otherwise. The odds ratios of the coefficients minus one are given for each model specification. Robust z-test statistics are in brackets underneath these values. *, **, and *** indicate significance at the 5%, 1% and 0.1% levels, respectively.

| **Panel A** | | | | | | |
|---|---|---|---|---|---|---|
| | **(1)** | | | **(2)** | | **(3)** | |
| **Constant** | -0.0009 | *** | | -0.0010 | | -0.0011 | *** |
| | [-67.100] | | | [-72.444] | | [-71.611] | |
| ***WSize*$_{s,\,t}$** | 0.3314 | *** | | | | 0.3198 | *** |
| | [54.223] | | | | | [52.064] | |
| ***Benchmark*$_{s,\,t}$** | 0.2833 | *** | | | | 0.2772 | *** |
| | [59.648] | | | | | [59.135] | |
| **WIndustry$_{s,\,t}$** | -0.0425 | * | | | | -0.0447 | * |
| | [-14.322] | | | | | [-13.991] | |
| ***MB*$_{s,\,t}$** | | | | -0.0060 | | -0.0069 | |
| | | | | [-3.6988] | | [-4.232] | |
| ***Return*$_{s,\,t-1}$** | | | | 0.0842 | | 0.0997 | |
| | | | | [2.116] | | [4.455] | |
| ***Volatility*$_{s,\,t-1}$** | | | | -0.2353 | *** | -0.2411 | *** |
| | | | | [-4.166] | | [-4.384] | |
| **AIC** | 14471 | | | 13990 | | 13847 | |
| **Observations** | 15261 | | | 15145 | | 15108 | |
| **Walt test $\chi^2$** | 2310 | | | 2077 | | 2054 | |
| **$\chi^2$ ( p-value )** | 0.0000 | | | 0.0000 | | 0.0000 | |
| **Pseudo $R^2$** | 0.0605 | | | 0.0288 | | 0.0171 | |
| **Pseudo $R^2$ (p-value)** | 0.0000 | | | 0.0000 | | 0.0000 | |

# Appendix 2.6 Results with alternative sample clusters based on homogeneous sets of mutual fund industries

This table presents the results of robustness checks for Model [2.1]. In Panel A, Panel B and Panel C, the dependent variable is one when we detect defaults 1, 2 or 3, respectively, and zero otherwise. Cluster 1 includes domestic equity funds registered in countries whose domestic equity funds have an average NHHI higher than 0.0928. The rest of the country sample is included in Cluster 2. We obtain very similar clusters and results when these homogeneous groups of countries are based on the concentration of each domestic equity benchmark HHI. The odds ratios of the coefficients minus one are given for each model specification. Robust z-test statistics are in brackets underneath these values. *, **, and *** indicate significance at the 5%, 1% and 0.1% levels, respectively.

| | **Panel A** | | | | **Panel B** | | | | **Panel C** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Cluster 1** | | **Cluster 2** | | **Cluster 1** | | **Cluster 2** | | **Cluster 1** | | **Cluster 2** | |
| **Constant** | -0.2650 | *** | -0.0840 | *** | -0.1377 | *** | -0.0612 | *** | -0.3721 | *** | -0.0956 | *** |
| | [-5.633] | | [-11.505] | | [-8.691] | | [-15.977] | | [-1.455] | | [-10.838] | |
| **$HHI_{m,t}$ (Log)** | 2.4810 | *** | 2.3661 | *** | 2.3010 | *** | 2.1555 | *** | 2.0646 | *** | 2.4004 | *** |
| | [11.726] | | [11.433] | | [11.374] | | [9.734] | | [8.889] | | [11.561] | |
| **$RB_{m,t-1}$** | -0.2155 | ** | -0.1915 | ** | -0.0842 | | -0.0845 | * | -0.0411 | | -0.0264 | |
| | [-1.941] | | [-2.355] | | [-3.366] | | [-3.422] | | [-1.478] | | [-1.903] | |
| **$ERB_{p,t-1}$** | -0.0149 | ** | -0.0116 | ** | -0.0556 | | -0.0523 | | -0.0606 | | -0.0613 | |
| | [-2.158] | | [-2.077] | | [-2.966] | | [-2.857] | | [-1.947] | | [-1.776] | |
| **$TNA_{p,t}$** | 0.0051 | | 0.0056 | | 0.0042 | | 0.0099 | | 0.0067 | | 0.0054 | |
| | [2.229] | | [2.341] | | [1.988] | | [2.877] | | [2.202] | | [2.258] | |
| **$Flow_{p,t-1}$** | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | |
| | [0.541] | | [0.604] | | [0.483] | | [0.364] | | [0.284] | | [0.566] | |
| **$Age_{p,t}$** | 0.3500 | *** | 0.2310 | *** | 0.4021 | *** | 0.1744 | *** | 0.4100 | *** | 0.2125 | *** |
| | [9.640] | | [7.980] | | [6.622] | | [3.415] | | [8.977] | | [7.347] | |
| **$Man_{p,t}$** | 0.0355 | *** | 0.0360 | *** | -0.0841 | *** | -0.0990 | *** | -0.0664 | *** | -0.0636 | *** |
| | [1.997] | | [2.104] | | [-6.280] | | [-7.177] | | [-4.361] | | [-4.169] | |
| **AIC** | 20781 | | 28868 | | 20588 | | 29450 | | 17633 | | 25663 | |
| **Observations** | 21260 | | 33414 | | 26322 | | 32411 | | 19444 | | 30269 | |
| **Wald test $\chi^2$** | 3600 | | 3992 | | 2450 | | 3879 | | 2605 | | 8944 | |
| **$\chi^2$ (p-value)** | 0.0000 | | 0.0000 | | 0.0000 | | 0.0008 | | 0.0000 | | 0.0000 | |
| **Pseudo $R^2$** | 0.0951 | | 0.1194 | | 0.0520 | | 0.0641 | | 0.1101 | | 0.1097 | |
| **Pseudo $R^2$ (p-value)** | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | |

This table presents the results of robustness checks for Model [2.2]. In Panel A, Panel B and Panel C, the dependent variable is one when we detect defaults 1, 2 or 3, respectively, and zero otherwise. Cluster 1 includes domestic equity funds registered in countries whose domestic equity funds have an average NHHI higher than 0.0928. The rest of the country sample is included in Cluster 2. We obtain very similar clusters and results when these homogeneous groups of countries are based on the concentration of each domestic equity benchmark, HHI. The odds ratios of the coefficients minus one are given for each model specification. Robust z-test statistics are in brackets underneath these values. *, **, and *** indicate significance at the 5%, 1% and 0.1% levels, respectively.

| | **Panel A** | | | | **Panel B** | | | | **Panel C** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Cluster 1** | | **Cluster 2** | | **Cluster 1** | | **Cluster 2** | | **Cluster 1** | | **Cluster 2** | |
| **Constant** | -0.0009 | *** | -0.0017 | *** | -0.0008 | *** | -0.0007 | *** | -0.0015 | *** | -0.0017 | *** |
| | [-66.354] | | [-71.944] | | [-34.585] | | [-33.636] | | [-75.410] | | [-79.856] | |
| ***WSize***$_{s,\,t}$ | 0.2241 | *** | 0.1963 | *** | 0.1024 | *** | 0.1063 | *** | 0.2688 | *** | 0.2362 | *** |
| | [50.871] | | [41.967] | | [29.555] | | [27.767] | | [57.891] | | [48.369] | |
| ***Benchmark***$_{s,\,t}$ | 0.3125 | *** | 0.2259 | *** | -0.0921 | *** | -0.0925 | *** | 0.2630 | *** | 0.1377 | *** |
| | [64.633] | | [48.665] | | [-12.565] | | [-13.331] | | [61.221] | | [36.545] | |
| **WIndustry**$_{s,\,t}$ | -0.0250 | ** | -0.0194 | * | -0.0556 | ** | -0.0480 | * | -0.0162 | ** | -0.0141 | * |
| | [-10.323] | | [-11.522] | | [-14.817] | | [-13.396] | | [-8.565] | | [-8.321] | |
| ***MB***$_{s,\,t}$ | -0.0009 | | -0.0014 | | -0.0052 | | -0.0051 | | -0.0011 | | -0.0009 | |
| | [-1.630] | | [-1.455] | | [-2.647] | | [-2.784] | | [-1.306] | | [-1.240] | |
| ***Return***$_{s,\,t-1}$ | 0.0090 | | 0.0104 | | 0.0012 | | 0.0014 | | 0.0101 | | 0.0099 | |
| | [1.484] | | [2.165] | | [0.587] | | [0.615] | | [2.414] | | [2.220] | |
| ***Volatility***$_{s,\,t-1}$ | -0.1961 | *** | -0.2257 | *** | -0.2516 | *** | -0.2833 | *** | -0.1864 | *** | -0.2009 | *** |
| | [-4.118] | | [-3.346] | | [-1.835] | | [-1.949] | | [-3.888] | | [-3.943] | |
| **AIC** | 17865 | | 8942 | | 88747 | | 79621 | | 10866 | | 9625 | |
| **Observations** | 19641 | | 11841 | | 98010 | | 80433 | | 14765 | | 10899 | |
| **Wald test** $\chi^2$ | 3741 | | 3250 | | 10604 | | 8690 | | 5142 | | 4233 | |
| $\chi^2$ **( p-value)** | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | |
| **Pseudo** $R^2$ | 0.1455 | | 0.0397 | | 0.0684 | | 0.0361 | | 0.1394 | | 0.0397 | |
| **Pseudo** $R^2$ **(p-value)** | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | |

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# Chapter 3

# Dynamic perspective on the Active Share measure to capture valuable trading decisions

In this chapter, we propose a dynamic perspective on Active Share. This perspective considers the variation in the differences between portfolio and benchmark weights in two consecutive periods. The results show that the more a fund invests in non-benchmark stocks, the higher its performance. We empirically apply Active Share to a comprehensive sample of domestic equity funds in the Eurozone and find evidence that investment decisions that isolate managers' convictions are the trading decisions that then add value to portfolios

## 3.1 Introduction

According to Cremers and Pareek (2016), the question of whether actively managed portfolios can outperform passive benchmarks continues to be a hot topic in the financial literature. The discussion about the convenience of active versus passive management is not new, and previous studies have argued that certain actively managed mutual funds are able to consistently outperform due to their superior investment abilities (see, e.g., Cohen *et al.*, 2005; Kacperczyk *et al.*, 2005; Mamaysky *et al.*, 2008; Kacperczyk and Seru, 2007; Cremers and Petajisto, 2009; Cohen *et al.*, 2010; Fama and French, 2010; Petajisto 2013; Amihud and Goyenko, 2013; Jiang *et al.*, 2014; Doshi *et al.*, 2015). Furthermore, Kacperczyk *et al.*, (2005) and Cremers and Petajisto (2009) emphasize that for funds to outperform, they need to diversify away from a benchmark composition. Based on this reasoning, Active Share (AS) that was proposed by Cremers and Petajisto (2009) has emerged as a measure to determine the level of "activeness" of portfolio managers.

As we showed in Chapter 1, some of the major strengths of the AS are its intuitive expression and its easy calculation. We also assert that the AS overcomes previous measures proposed in the financial literature, such as Tracking Error (henceforth TE) because AS is a reasonable proxy to identify the selection of securities and TE is more suitable for measuring the volatility of investment portfolio returns relative to the benchmark. Thus, both measures can be used together for a more comprehensive picture of active management (Cremers and Petajisto, 2009; Petajisto, 2013).

Since its proposal, AS has attracted great attention from both practitioners and academic researchers, particularly in the current economic and financial context with the implementation of Markets in Financial Instruments Directive II (MIFID II). This

directive increases the protection of investors through greater transparency in management fees and expenses.[46]

The AS generates so much interest because stock pickers outperform closet indexers in the US market. Hence, AS is a proxy for managers' potential stock-picking abilities when they overweight (underweight) stocks that beat (are beaten by) the benchmark (Cremers and Petajisto, 2009). This evidence shows that mutual fund investors are better off selecting high AS managers. However, Cremers (2017) shows that AS has some weaknesses. First, the AS by itself is not necessarily associated with statistically significant outperformance. Ex ante, the portfolio differences from the benchmark can drive a fund to beat this benchmark as well as to be beaten by it. Various authors demonstrate that the statistical evidence that high AS funds outperform low AS funds is stronger for specific subsets of funds, such as among funds with greater TE, funds with low expense ratios, and funds with patient investment strategies (see, e.g., Cremers, 2017; Cremers and Pareek, 2016 and Cremers and Curtis, 2016; among others). Second, Cremers (2017) indicates that AS does not directly measure stock-picking skills. All you need for a high AS is to construct a portfolio that is very different from the benchmark portfolio. Hence, having a high AS is suggestive of an active stock picker, but AS does not measure the skill with which stocks are picked. Third, results about future performance from AS can be biased by the efficiency or inefficiency of the benchmark that is used to calculate the level of AS. Frazzini *et al.* (2016) show that small-cap US

[46] MiFID II entered into force on 3 January 2018. This new legislative framework will ensure fairer, safer, and more efficient markets and facilitate greater transparency for all participants. New reporting requirements and tests will increase the amount of information available and reduce the use of dark pools and OTC trading.
The protection of investors is strengthened through the introduction of new requirements on product governance and independent investment advice.

indices (which are usually the benchmark for high AS funds) underperform large-cap indices (which are usually the benchmark for low AS funds).[47]

AS offers a static perspective of the portfolio management given that it only considers the weight differences between the portfolio and the benchmark at a given moment in time. This static approach offers limited information about managers' activity given that a portfolio manager can follow a buy-and-hold strategy over time, and this strategy could maintain high levels of AS in the case where the original portfolio holdings are quite different from the composition of the benchmark (Cremers, 2017).

To be able to outperform the fund's benchmark, the manager should take positions that are different from the benchmark. However, a high AS value can be achieved using two different active strategies: by investing in assets included in the benchmark but in very different proportions or by investing in a high proportion of the portfolio in assets not included in the benchmark. The literature focuses on robustness analyses that use both the self-declared benchmarks of mutual funds and the benchmark that provides the lowest AS across all benchmarks considered. However, there needs to be a more thorough analysis on how mutual funds achieve high AS values.

Our empirical analysis provides a better understanding of the controversial relationship between future outperformance and a high level of AS in Eurozone markets. According to Loban *et al.* (2020), the accumulated weight of the constituents of equity benchmarks in domestic Eurozone markets is more concentrated than in US benchmarks. In addition, they show distortions in the accuracy of AS in the Eurozone mutual fund markets due to the conflicts between the high concentration levels detected in the

[47] This fact is also recognized Cremers and Pareek (2016, p.8). They indicate that Cremers *et al.* (2013) further show that this benchmark effect can be removed by either adjusting the returns to the benchmark or by using an index-based seven-factor model. Our chapter (as described in subsection 3.2) does not suffer from this potential bias because we focus on large-cap mutual funds to obtain a homogenous sample. Therefore, the funds examined do not have small-cap indices as benchmarks.

domestic Eurozone benchmarks and the concentration limits included in the context of legal restrictions from EU regulation.[48] This chapter is the first to show that investment bets in non-benchmark securities may produce the high level of AS in the Eurozone markets with concentrated benchmarks, such as by investing in small caps when the benchmark is a large-cap index in response to the aforementioned conflict.

We propose an improvement to AS that considers how this deviation varies over time. We examine the managers' deviations from the benchmark in two consecutive periods to determine whether the static AS is uncorrelated with the consecutive active managers' decisions. AS itself does not detect whether fund managers are actively managing the portfolio by searching for new investment opportunities (new bets) or whether they are just increasing and decreasing the existing positions to manage investment flows (Brown and Davies, 2017; Cremers *et al.*, 2021). Our dynamic measure captures not only the long and short static positions in each stock included in the benchmark but also the previous long (short) positions that have been overweighted (underweighted) in the next period. Our proposed dynamic Active Share (dAS) allows us to split investment decisions into those to reach portfolio weights that are closer to the benchmark (i.e., decisions that lead to a lower differentiation) or further from the benchmark (i.e., decisions that lead to a higher differentiation).

Another advantage of the dAS compared to the AS is that it provides more useful information about a fund manager's potential to add value to the portfolio. This advantage stems from its ability to determine which investment decisions are valuable, which is the key issue for both current and potential investors. Cremers and Pareek (2016) show that

[48] The aim of the EU regulation developed with the UCITS directive (that we expose with more details in Chapters 1 and 2) was to remove barriers to the cross-border marketing of units of collective investment funds within the EU by allowing funds to invest in a broader range of financial instruments and streamlining the regulations of different countries. The UCITS IV in force (Directive 2009/65/EC) sets the rules relating to mutual funds as one of the major financial instruments.

ex ante, whether funds would generally be more successful by holding stocks for long periods or by frequently changing the portfolio is not clear. On the one hand, if markets are fairly information-efficient, managers may need to frequently trade in order to benefit from their temporary superior information. On the other hand, fund managers may be able to spot market mispricing that is only reversed over longer periods, and therefore investment strategies should be patient.

The introduction of the dynamism in the analysis has different financial and management implications. This study is relevant from mutual fund investors' point of view given that they should be interested in knowing whether their fund manager is active and, therefore, is searching for new investment opportunities (i.e., undervalued assets) to add value to the portfolio; or if, on the other hand, the fund manager is passive. This difference is important because these two types of funds typically charge different management fees. Investors should not pay (too) much for low AS funds because they generally underperform. The chapter is also relevant to regulators in order to align the fees charged by management companies to the actual level of activity carried out by mutual funds.

The main contribution of this chapter is that it captures a high proportion of the prediction ability for performance of the AS that is explained by the investment in non-benchmark stocks. While the portion of AS that comes from over or underweighting benchmark stocks is actually related to stock picking abilities, the investment in non-benchmark stocks might indicate distortion in their performance valuation that could lead to spurious contributions to the portfolio's performance. Indeed, our results show that the more the fund invests in non-benchmark stocks, the higher its performance. Additionally, the dAS presents less prediction ability than the AS of subsequent fund performance. The main reason for this minor capability is the neutrality of this alternative measure to

investment in non-benchmark stocks. In this sense, the dAS provides similar results to the AS whether we remove the portion of fund performance generated by non-benchmark stocks. More interestingly, the dAS allows us to isolate the contributions to this measure generated by those trading decisions that might be considered as bets by the managers. These bets could be those decisions that increase holdings already overweighted (buy bets) or decrease holdings already underweighted (sell bets). The results of predictive performance show that those portfolios with a higher concentration of these bets offer subsequent abnormal returns that make this prediction ability even higher than the seminal AS in some of the markets analysed in this chapter. Thus, the results shown in this chapter are an interesting addition to Cohen *et al.* (2010) who try to identify the trades in which the managers have more confidence. The empirical findings show that those mutual funds whose managers make trading decisions with a higher conviction (i.e., decisions that leads them to deviate even more from the benchmark) outperform the remaining funds, especially when considering buying decisions.

This chapter is organized as follows: Section 3.2 presents the database used in the study. In Section 3.3, we examine the relationship between AS and future fund performance, while in Section 3.4 we examine the relationship between dAS and fund performance. In Section 3.5 we split the dAS to determine which investment decisions are able to add value to the portfolio. Further, Section 3.6 presents summary and conclusions.

## 3.2 Database

### 3.2.1 Information on portfolio holdings

The empirical application of this chapter focuses on mutual fund industries that have been present in the Eurozone.[49] The sample period is from 2003 to 2018. This period allows us to examine whether the prediction ability of AS is exclusive to the US domestic equity funds or can be extended to the Eurozone mutual fund industry. We focus on those European mutual funds that manage at least 70% of the total net assets (TNA) and comprise at least 80 % of the domestic equity funds in the Eurozone mutual fund industry (Investment Company Institute, 2020; EFAMA, 2020).

Our comprehensive sample includes data on open-end mutual funds that actively manage their investments and are categorized as domestic equity funds by Morningstar.[50] The database is free of survivor bias because it includes active and terminated funds. We do not include offshore funds (e.g., funds registered in Luxembourg or Ireland), index funds, exchange-traded funds (ETF), enhanced index funds, funds in funds, international funds, industry funds, and real estate funds. Furthermore, we also exclude those funds with an investment focus on "mid cap" or "small cap" securities. Our final sample comprises 26,164 portfolios for 346 domestic equity funds from the following Eurozone countries: Austria, Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Spain, and Portugal.[51] Morningstar provides information on 68.5% of these portfolios on a monthly basis. The rest of the portfolios are also obtained from Morningstar using

[49] The countries analysed are members of the Eurozone. The region was created in 1999 by 11 founding countries: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Spain, and Portugal. In 2001, Greece joined. Luxembourg and Ireland are excluded from our sample because Morningstar does not provide a domestic equity category for their mutual fund industries.
[50] Morningstar defines domestic equity funds as mutual funds that mainly invest in domestic stocks.
[51] Morningstar provides portfolio holdings as the value of a given holding that is calculated by multiplying the price per share by the total number of shares. That is, each security shows the total net assets invested in each position.

quarterly information according to the fiscal year definition of each fund, which is substantially higher than the average three report dates in the study by Cremers and Petajisto (2009). The frequency of portfolio holdings is especially relevant in the analysis of active management because the literature that analyzes quarterly or semi-annual holdings miss interim trades as demonstrated by Elton *et al.* (2010).

Panel A of Table 3.1 gives some descriptive statistics for the 346 domestic equity funds in our sample during the period from January 2003 to December 2018 that is split by the country of the funds' domicile. The table shows that France, Germany, Italy, and Spain are the most important countries for mutual funds in terms of the number of domestic equity funds (254) and money managed by these funds (EUR 15.85 billion on average that represent 73.41% of our sample). These four industries also represent the high average number of stocks by funds. Italian funds present, on average, the greatest number of holdings in each fund (65 stocks). Followed by German, French and Spanish funds that held, on average, 44, 42, and 33 stocks, respectively. In contrast, countries such as the Netherlands, and Portugal, present much more concentrated fund portfolios (29 and 25 stocks, respectively).

Additionally, Panel B of Table 3.1 gives some descriptive statistics about the percentage of the portfolio invested in different types of stocks that are split by countries and years. Due to the focus on domestic equity investment, the mutual fund industries in the 10 countries invest more than 80% in domestic stocks. We define "domestic stocks" as those equity securities with an ISIN code that starts with the country.[52] Table 3.1 also shows the average percentage invested in stocks that take part in the large-cap benchmarks of each country. Thus, Portuguese funds on average invest 83% in stocks

[52] Specifically, equity ISIN codes that begin with "AT" for Austria "AT", "BE" for Belgium, "FI" for Finland, "FR" for France , "GR" for Greece, "DE" for Germany, "IT" for Italy, "NL" for the Netherlands, "ES" for Spain and "PT" for Portugal.

included in the PSI 20. In contrast, Belgium funds invest on average no more than 36% in stocks included in the BEL 20. This panel also shows relevant information about the percentage of investment in domestic equity stocks that do not belong to the large-cap index of each country. In this case, Belgium shows, on average, the largest percentages of stocks that belong to other domestic indexes. In addition, Panel B presents, on average, the percentage of investment in stocks for each fund industry that belongs in our 10 Eurozone countries. Nine of the 10 fund industries each provide, on average, 92% of the investment in Eurozone mutual funds (except the Netherlands that shows, on average, 85%).

**Table 3.1 Summary statistics for our sample of domestic equity funds (2003-2018).**
This table is divided into Panels A and B.
**Panel A** shows (1) the number of funds, (2) the average portfolio size in million EUR, and (3) the average number of stocks in each domestic equity fund portfolio by country and year.

| Panel A | NETHERLANDS | | | GREECE | | | AUSTRIA | | | BELGIUM | | | FRANCE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2003** | 27 | 272 | 20 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 66 | 202 | 38 |
| **2004** | 31 | 305 | 23 | N/A | N/A | N/A | 9 | 29 | 29 | N/A | N/A | N/A | 99 | 229 | 41 |
| **2005** | 37 | 327 | 31 | N/A | N/A | N/A | 16 | 96 | 33 | 3 | 46 | 41 | 73 | 188 | 44 |
| **2006** | 43 | 369 | 30 | 14 | 232 | 41 | 75 | 122 | 37 | 3 | 46 | 42 | 104 | 190 | 41 |
| **2007** | 47 | 414 | 28 | 62 | 179 | 37 | 86 | 134 | 41 | 1 | 42 | 38 | 162 | 209 | 37 |
| **2008** | 51 | 239 | 27 | 62 | 85. | 34 | 80 | 68 | 39 | 16 | 26 | 35 | 265 | 185 | 35 |
| **2009** | 53 | 206 | 25 | 65 | 56 | 33 | 131 | 64 | 34 | 16 | 19 | 32 | 466 | 120 | 36 |
| **2010** | 57 | 323 | 27 | 52 | 46 | 31 | 122 | 92 | 32 | 21 | 26 | 37 | 437 | 138 | 38 |
| **2011** | 71 | 350 | 28 | 54 | 31 | 28 | 123 | 122 | 32 | 13 | 52 | 46 | 451 | 139 | 36 |
| **2012** | 72 | 311 | 28 | 40 | 38 | 28 | 114 | 111 | 34 | 12 | 65 | 49 | 509 | 113 | 36 |
| **2013** | 71 | 305 | 28 | 40 | 48 | 31 | 110 | 148 | 31 | 3 | 69 | 49 | 510 | 147 | 40 |
| **2014** | 57 | 346 | 27 | 75 | 46 | 32 | 87 | 183 | 30 | N/A | N/A | N/A | 495 | 151 | 42 |
| **2015** | 32 | 251 | 30 | 69 | 32 | 32 | 100 | 166 | 32 | N/A | N/A | N/A | 517 | 150 | 45 |
| **2016** | 35 | 209 | 32 | 68 | 26 | 30 | 112 | 150 | 32 | N/A | N/A | N/A | 564 | 175 | 48 |
| **2017** | 47 | 198 | 31 | 66 | 32 | 30 | 104 | 224 | 33 | N/A | N/A | N/A | 611 | 310 | 55 |
| **2018** | 48 | 211 | 41 | 66 | 32 | 31 | 94 | 221 | 32 | N/A | N/A | N/A | 623 | 326 | 52 |
| **Average** | 49 | 290 | 29 | 56 | 68 | 32 | 91 | 129 | 33 | 10 | 43 | 41 | 372 | 186 | 42 |
| | **GERMANY** | | | **ITALY** | | | **SPAIN** | | | **FINLAND** | | | **PORTUGAL** | | |
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2003** | 147 | 271 | 39 | N/A | N/A | N/A | 227 | 53 | 29 | 41 | 56 | 31 | N/A | N/A | N/A |
| **2004** | 144 | 304 | 37 | 70 | 299 | 54 | 204 | 95 | 33 | 69 | 71 | 30 | N/A | N/A | N/A |
| **2005** | 119 | 327 | 44 | 258 | 277 | 61 | 229 | 109 | 35 | 79 | 97 | 34 | N/A | N/A | N/A |
| **2006** | 119 | 369 | 49 | 232 | 255 | 58 | 221 | 122 | 36 | 94 | 89 | 34 | N/A | N/A | N/A |
| **2007** | 189 | 414 | 46 | 210 | 197 | 61 | 237 | 116 | 36 | 137 | 101 | 35 | 176 | 70 | 28 |
| **2008** | 247 | 238 | 43 | 184 | 133 | 61 | 263 | 60 | 31 | 169 | 83 | 32 | 199 | 35 | 30 |
| **2009** | 320 | 207 | 44 | 216 | 95 | 59 | 254 | 43 | 31 | 197 | 93 | 33 | 170 | 25 | 29 |
| **2010** | 292 | 323 | 46 | 202 | 108 | 58 | 317 | 39 | 32 | 237 | 144 | 32 | 187 | 25 | 28 |
| **2011** | 280 | 350 | 45 | 205 | 84 | 59 | 327 | 38 | 30 | 262 | 122 | 31 | 176 | 17 | 27 |
| **2012** | 272 | 311 | 42 | 211 | 98 | 64 | 338 | 32 | 29 | 284 | 106 | 31 | 171 | 18 | 26 |
| **2013** | 238 | 305 | 42 | 169 | 118 | 67 | 410 | 55 | 30 | 294 | 129 | 31 | 149 | 17 | 25 |
| **2014** | 228 | 346 | 42 | 173 | 164 | 74 | 450 | 103 | 34 | 324 | 124 | 31 | 143 | 24 | 25 |
| **2015** | 262 | 251 | 44 | 159 | 187 | 79 | 482 | 109 | 35 | 268 | 141 | 31 | 125 | 22 | 23 |
| **2016** | 275 | 209 | 44 | 154 | 158 | 74 | 504 | 86 | 34 | 230 | 134 | 31 | 118 | 18 | 20 |
| **2017** | 295 | 198 | 46 | 392 | 233 | 71 | 484 | 111 | 35 | 231 | 179 | 35 | 85 | 27 | 18 |
| **2018** | 284 | 211 | 47 | 380 | 232 | 72 | 476 | 124 | 37 | 211 | 184 | 36 | 73 | 32 | 18 |
| **Average** | 232 | 290 | 44 | 214 | 176 | 65 | 339 | 81 | 33 | 195 | 116 | 32 | 148 | 27 | 25 |

**Panel B** shows (1) the average percentage of investment in stocks that belong to the benchmark, (2) the average percentage of investment in stocks that belong to other national indexes, and (3) the average percentage of investment in stocks that belong to the 10 domestic equity funds industries in the Eurozone by country and year.

| **Panel B** | **NETHERLANDS** | | | **GREECE** | | | **AUSTRIA** | | | **BELGIUM** | | | **FRANCE** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **% Domestic stocks** | 81% | | | 92% | | | 97% | | | 92% | | | 91% | | |
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2003** | 73 | 27 | 100 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 65 | 32 | 99 |
| **2004** | 68 | 30 | 97 | N/A | N/A | N/A | 84 | 16 | 100 | N/A | N/A | N/A | 64 | 31 | 99 |
| **2005** | 77 | 20 | 89 | N/A | N/A | N/A | 82 | 17 | 100 | 10 | 88 | 99 | 62 | 34 | 99 |
| **2006** | 80 | 17 | 85 | 60 | 38 | 92 | 76 | 22 | 98 | 11 | 85 | 97 | 66 | 31 | 99 |
| **2007** | 85 | 14 | 79 | 60 | 38 | 89 | 71 | 27 | 98 | 20 | 79 | 98 | 62 | 33 | 98 |
| **2008** | 89 | 11 | 73 | 57 | 39 | 91 | 69 | 28 | 97 | 49 | 47 | 98 | 64 | 31 | 98 |
| **2009** | 88 | 11 | 77 | 64 | 33 | 91 | 75 | 24 | 99 | 68 | 31 | 99 | 66 | 28 | 97 |
| **2010** | 85 | 14 | 80 | 65 | 30 | 86 | 78 | 22 | 99 | 64 | 34 | 98 | 63 | 30 | 96 |
| **2011** | 86 | 12 | 77 | 65 | 30 | 88 | 79 | 20 | 99 | 39 | 56 | 95 | 63 | 30 | 97 |
| **2012** | 83 | 16 | 80 | 66 | 29 | 90 | 81 | 18 | 99 | 34 | 59 | 93 | 61 | 31 | 97 |
| **2013** | 84 | 15 | 84 | 84 | 15 | 97 | 83 | 16 | 99 | 31 | 64 | 95 | 63 | 32 | 98 |
| **2014** | 82 | 17 | 83 | 81 | 17 | 98 | 79 | 19 | 99 | N/A | N/A | N/A | 61 | 34 | 98 |
| **2015** | 59 | 38 | 88 | 84 | 15 | 95 | 72 | 27 | 99 | N/A | N/A | N/A | 61 | 33 | 98 |
| **2016** | 54 | 42 | 89 | 85 | 14 | 93 | 70 | 28 | 98 | N/A | N/A | N/A | 60 | 34 | 98 |
| **2017** | 52 | 46 | 90 | 85 | 15 | 95 | 70 | 28 | 99 | N/A | N/A | N/A | 59 | 33 | 97 |
| **2018** | 69 | 28 | 89 | 83 | 17 | 96 | 74 | 24 | 99 | N/A | N/A | N/A | 62 | 30 | 97 |
| **Average** | 76 | 22 | 85 | 72 | 25 | 92 | 76 | 22 | 99 | 36 | 60 | 97 | 63 | 32 | 98 |
| | **GERMANY** | | | **ITALY** | | | **SPAIN** | | | **FINLAND** | | | **PORTUGAL** | | |
| **% Domestic stocks** | 97% | | | 89% | | | 94% | | | 96% | | | 96% | | |
| **Year** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **2003** | 85 | 27 | 100 | N/A | N/A | N/A | 81 | 15 | 99 | 65 | 35 | 95 | N/A | N/A | N/A |
| **2004** | 85 | 30 | 99 | 68 | 30 | 100 | 85 | 11 | 98 | 68 | 31 | 96 | N/A | N/A | N/A |
| **2005** | 79 | 20 | 99 | 65 | 32 | 99 | 82 | 15 | 98 | 65 | 35 | 96 | N/A | N/A | N/A |
| **2006** | 82 | 17 | 99 | 64 | 33 | 97 | 79 | 18 | 98 | 68 | 32 | 96 | N/A | N/A | N/A |
| **2007** | 79 | 14 | 99 | 62 | 35 | 98 | 77 | 18 | 99 | 70 | 30 | 96 | 81 | 19 | 100 |
| **2008** | 79 | 11 | 99 | 65 | 31 | 97 | 79 | 17 | 99 | 73 | 27 | 96 | 74 | 25 | 100 |
| **2009** | 80 | 11 | 98 | 61 | 33 | 96 | 77 | 17 | 98 | 74 | 26 | 96 | 77 | 23 | 100 |
| **2010** | 76 | 14 | 98 | 62 | 32 | 96 | 77 | 17 | 97 | 72 | 28 | 96 | 79 | 20 | 100 |
| **2011** | 76 | 12 | 98 | 64 | 30 | 96 | 77 | 18 | 97 | 70 | 30 | 97 | 84 | 16 | 100 |
| **2012** | 74 | 16 | 98 | 66 | 30 | 96 | 74 | 20 | 97 | 73 | 27 | 97 | 81 | 18 | 100 |
| **2013** | 78 | 15 | 98 | 69 | 28 | 97 | 77 | 18 | 97 | 71 | 27 | 96 | 86 | 14 | 100 |
| **2014** | 77 | 17 | 97 | 66 | 31 | 97 | 72 | 22 | 97 | 68 | 30 | 96 | 82 | 18 | 100 |
| **2015** | 75 | 38 | 98 | 64 | 34 | 98 | 71 | 25 | 98 | 68 | 30 | 97 | 81 | 19 | 100 |
| **2016** | 72 | 42 | 98 | 63 | 36 | 98 | 69 | 27 | 99 | 69 | 29 | 96 | 85 | 15 | 100 |
| **2017** | 69 | 46 | 98 | 68 | 32 | 98 | 67 | 28 | 98 | 70 | 28 | 97 | 92 | 7 | 100 |
| **2018** | 64 | 28 | 98 | 66 | 33 | 98 | 65 | 29 | 98 | 72 | 26 | 96 | 91 | 9 | 100 |
| **Average** | 77 | 22 | 98 | 65 | 32 | 97 | 76 | 20 | 98 | 70 | 29 | 96 | 83 | 17 | 100 |

### 3.2.2 Information of domestic benchmarks

From Morningstar, we also selected the most frequently reported benchmarks in the prospectuses of domestic equity funds that are classified as large-cap indexes and that are registered in each of our 10 Eurozone countries. These are AEX 20 (by the Netherlands), ATHEX 20 (by Greece), ATX (by Austria), BEL 20 (by Belgium), CAC 40 (by France), DAX 30 (by Germany), FTSE MIB (by Italy), IBEX 35 (by Spain), OMXH (by Finland), and PSI 20 (by Portugal).[53]

Refinitv Eikon-Datastream provides comprehensive data of these relevant benchmarks. We obtain the monthly characteristics of each domestic benchmark, such as their constituent identifications (ISIN code) and their constituent weights. Our benchmark sample covers January 2003 to December 2018 and comprises 54,977 constituent weights.[54]

In addition, Eurozone domestic equity benchmarks are highly concentrated as we have shown in Chapters 1 and 2. In 2018, the weight of the top 10 constituents is around 20.7% in the S&P 500 index. The largest weight of a constituent is 3.7%, while the accumulated weight of the top 10 constituents in the IBEX 35 index is above 70.82% with the largest weight of a constituent being 14.34% according to S&P Dow Jones Index (2019) and Bolsa de Madrid (2019), respectively. Thus, we focus on analyzing the ability of both AS and dAS to predict funds' performance in the presence of concentrated domestic benchmarks.

[53] We assumed a potential benchmark "game" when selecting samples (Sensoy, 2009). However, even if the main prospectus benchmark may not match the style of the fund, it should be included because the fund may show higher AS data.

[54] Datastream does not provide information for benchmark constituents for ATHEX 20 (Greece), FTSE MIB 40 (Italy), and PSI 20 (Portugal) for 2003-2007, 2002-2003 and 2003-2006, respectively.

### 3.2.3 Information of returns

From Morningstar, we obtain the returns of the domestic equity funds for all the industries considered in our study. This source provides daily and monthly information about net returns.[55] The returns for both the equity benchmark itself and its constituents as well as the risk-free rate are from Refinitv Eikon-Datastream. We also collect the return of the daily Euribor 1 week as a risk-free rate. In addition, we control for information on price data and their corporate actions for 3,572 different stocks involved in more than one million holding positions.

Both benchmark holdings and fund holdings are month-end. All stock holdings for both mutual funds and benchmarks are matched with the stock returns through the ISIN code of each security.

[55] We use net returns instead of gross returns due to this information is not available for all the industries included in our sample.

## 3.3 AS and the performance of domestic equity funds

In this section, following the relevant papers of Cremers and Petajisto (2009), Petajisto (2013), and Frazzini *et al.* (2016), we analyse the future performance of domestic equity funds in the 10 Eurozone countries according to their level of AS which has a logical economic interpretation. The traditional formula of AS [1.1] has been simplified with a new equation of AS developed in Cremers (2017):

$$AS_{p,t} = 100\% - \sum_{i=1}^{N} Min(w_{i,t}^{p}; w_{i,t}^{b}) \times d(w_{i,t}^{p}) > 0 \qquad [3.1]$$

where N is the total number of stocks that are included in the fund, and $d(w_{i,t}^{p})$ is an indicator variable equal to one for all positions where the fund is positive (i.e., not short) and zero otherwise. If all weights are positive, the minimum of each stock's weight in the fund ($w_{i,t}^{p}$) and in the benchmark($w_{i,t}^{b}$) is the overlapping weight of the stock.

The simpler AS formula [3.1] indicates that AS is equal to 100% minus the sum of the overlapping weights between the portfolio and its benchmark and thus emphasizes that AS is only decreased by overlapping positions that are in both the fund and its benchmark. The calculation requirement of the new formula [3.1] is lower than for the original formula [1.1] because the AS calculation that uses equation [3.1] only involves the weights for the subset of stocks that are both in the fund and in the benchmark (rather than the weights of all stocks included in either the fund or the benchmark).

We calculate AS for all domestic equity funds included in our database between the period from January 2003 to December 2018.[56] Table 3.2 presents the average AS for each year and industry. The results show that Belgian funds have low overlapped positions with the BEL 20 benchmark due to their high AS (almost 75% on average). By

[56] We compute AS using portfolio compositions from Morningstar that show the euros invested in each position. With this information, we calculate portfolio weights that consider only the equities' assets. Thus, we apply the measure exclusively to equity portfolio assets.

contrast, German funds show the minimum level of AS with a value on average of 32%. This information lets us know the proportion of the portfolios that differs with the benchmark at a given moment in time.

Next, we sort the domestic equity funds into AS quintiles for each date in each country and compute the equally weighted performance within each quintile. Specifically, we calculate the CAPM alpha and the Carhart alpha (4 factor alpha).[57]

Table 3.3 shows, the difference in the average performance of the portfolios included in the extreme quintiles (Q1-Q5) according to their AS for each country. This average of the performances is calculated for the next month (period *t+1*), next quarter *(t+3),* next semester *(t+6)* and next year *(t+12)* for each performance metric. See Appendix 3.1 with detailed information per quintiles and countries for both analyses. The overall evidence that we can observe in Table 3.3 is that AS provides limited ability to predict performance that is lower than what the literature shows in another markets.[58] The most statistically significant results are found in the Spanish industry and, less significance in Germany, the Netherlands, Austria and Belgium.[59] On the other hand, France only shows this relationship in the long term and when we consider the CAPM alpha, while Italy, Finland, Portugal, and Greece fail to offer significant results or even present negative relationships. These results indicate that the prediction ability of AS presents assorted results as this relation less clear than that presented in the seminal literature (see Cremers and Petajisto, 2009; Cremers, 2017).

[57] The 4-factor alphas are obtained by regressing the risk-free rate adjusted returns of each fund on the four-factor model proposed by Carhart (1997). The 4-factor model controls for market, size, value and momentum. These factors have been calculated for each country following the same procedure detailed at the website of Kenneth French. More information is available online:
http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[58] For evidence on the AS prediction ability see Cremers and Curtis (2016) who analyse US mutual funds, Frijns and Indriawan (2018) who study mutual funds in New Zealand, Lee and Morri (2015) who analysed British mutual fund industry, and finally Cremers et al. (2016) and Muller and Weber (2014) who developed a global study in mutual funds.

[59] The conclusions about the Belgian industry must be taken with caution because both the monthly portfolio holdings are very limited and the number of domestic equity funds in our sample is the smallest.

Table 3.3 also shows how domestic equity funds achieve their level of AS. As previously stated, a high level of AS can be due to investment decisions in benchmark stocks with different weights, but another important source of AS is related to investment decisions in securities that are not included in the benchmark. If securities that are not included in the benchmark outperform those that are included in it, the predictive power of AS for performance would be misleading. The last column of Table 3.3 presents the average percentage of fund portfolios invested in non-benchmark stocks for each country. All the countries show that a high proportion of the portfolio is invested in stocks that do not belong to their benchmark. Furthermore, in Appendix 3.1, we show how this proportion is the greatest in portfolios classified in quintile 1. Thus, the outperformance of high AS portfolios could be spurious in concentrated benchmarks as we demonstrated in Chapter 1. To further explore this issue in each country, we separately examine the influence on the power of AS to predict performance by splitting apart the benchmark and non-benchmark stocks that are included in the portfolios of our sample. With this analysis, we examine to what extent the prediction ability of AS might be biased by the investment in non-benchmark stocks. Thus, when AS is not biasing its prediction capacity, it should be similar for both benchmark and non-benchmark stocks. Table 3.4 has a summary of the results, while Appendix 3.2 provides detailed information per country.

Panel A of Table 3.4 shows that when we focus on the contribution to fund performance of the AS portion that comes from stocks that belong to the benchmark in each country of the Eurozone, the prediction ability of AS is null or even negative. France, Germany, Italy, the Netherlands, and Finland are clear examples of this contrary and significant effect on subsequent fund performance when considering only those stocks

included in the benchmark. Only the Spanish industry provides positive results in the long term and when we only use the CAPM alpha.

On the other hand, Panel B of Table 3.4 allows us to conclude that the actual prediction ability of AS on fund performance comes from the portion of investment in stocks that do not belong to the respective benchmark. Hence, the main explanation of the apparent ability of AS to predict subsequent fund performance is the outperformance of non-benchmark securities. The only exception of this clear evidence refers to the Portuguese case. In this sense, Panel J of Appendix 3.1 clarifies that this circumstance may be explained by the small portion of non-benchmark stocks included in the Portuguese funds compared to the funds that belong to the remaining industries of this chapter.

The evaluation of the results of both analyses (Panels A and B) has shown the actual source of the overperformance of active management. We should then question the convenience of this fact to consider that the added value of fund management is coming from securities that are not contemplated in the respective fund prospects.

**Table 3.2 Level of AS from 2003 to 2018.**

This table presents the annual statistics of AS following Cremers (2017) in percent terms of domestic equity funds included in our sample from January 2003 to December 2018 for every year and country. These average results are computed considering the reporting dates of all funds in the industry that year.

| Year | NETHERLANDS | GREECE | AUSTRIA | BELGIUM | FRANCE | GERMANY | ITALY | SPAIN | FINLAND | PORTUGAL | Average | St. Dev. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2003** | 41.52 | N/A | N/A | N/A | 57.87 | 26.76 | N/A | 38.47 | 47.63 | N/A | 42.45 | 11.48 |
| **2004** | 48.07 | N/A | 33.07 | N/A | 57.00 | 26.94 | 46.50 | 35.16 | 44.24 | N/A | 41.57 | 10.32 |
| **2005** | 31.27 | N/A | 35.89 | 95.89 | 55.74 | 27.96 | 48.31 | 36.99 | 44.97 | N/A | 47.13 | 21.73 |
| **2006** | 30.14 | 47.20 | 38.90 | 92.77 | 52.19 | 25.85 | 49.15 | 37.00 | 43.78 | N/A | 46.33 | 19.46 |
| **2007** | 26.89 | 48.49 | 41.37 | 88.09 | 54.57 | 28.60 | 49.60 | 38.26 | 42.74 | 43.77 | 46.24 | 17.09 |
| **2008** | 22.99 | 53.39 | 43.14 | 63.00 | 53.67 | 29.73 | 46.27 | 38.06 | 43.04 | 46.19 | 43.95 | 11.71 |
| **2009** | 23.49 | 49.85 | 35.57 | 63.84 | 50.34 | 27.18 | 50.69 | 41.96 | 40.42 | 43.35 | 42.67 | 11.96 |
| **2010** | 25.70 | 49.67 | 32.59 | 56.67 | 52.42 | 31.61 | 48.99 | 45.43 | 42.32 | 44.92 | 43.03 | 10.02 |
| **2011** | 25.05 | 51.56 | 32.14 | 66.69 | 53.50 | 32.72 | 48.24 | 46.71 | 44.54 | 46.46 | 44.76 | 12.09 |
| **2012** | 28.29 | 55.58 | 32.67 | 71.78 | 54.70 | 34.46 | 44.54 | 49.49 | 44.10 | 51.68 | 46.73 | 12.92 |
| **2013** | 27.15 | 46.94 | 31.77 | 75.43 | 54.36 | 30.79 | 41.34 | 47.62 | 44.53 | 45.15 | 44.51 | 13.87 |
| **2014** | 29.25 | 43.52 | 35.33 | N/A | 55.74 | 30.81 | 42.98 | 49.41 | 45.31 | 45.33 | 41.96 | 8.67 |
| **2015** | 50.73 | 41.20 | 38.54 | N/A | 55.70 | 33.73 | 45.15 | 47.57 | 45.08 | 41.34 | 44.34 | 6.58 |
| **2016** | 55.30 | 42.29 | 39.85 | N/A | 55.52 | 37.43 | 44.98 | 48.46 | 46.33 | 41.88 | 45.78 | 6.38 |
| **2017** | 58.28 | 39.15 | 40.23 | N/A | 54.55 | 39.28 | 41.04 | 50.82 | 42.52 | 37.90 | 44.86 | 7.61 |
| **2018** | 43.14 | 38.84 | 37.91 | N/A | 53.06 | 45.14 | 40.86 | 51.46 | 42.17 | 33.36 | 42.88 | 6.31 |
| **Average** | 35.45 | 46.74 | 36.60 | 74.91 | 54.43 | 31.81 | 45.91 | 43.93 | 43.98 | 43.44 | 44.32 | 11.76 |
| **St. Dev.** | 12.06 | 5.39 | 3.69 | 14.18 | 1.90 | 5.26 | 3.27 | 5.75 | 1.76 | 4.60 | 1.78 | 4.55 |

**Table 3.3 Comparison among extreme quintiles (Q1-Q5) of AS in domestic equity funds' performance in the Eurozone from 2003 to 2018.**

This table shows the difference between the performance of domestic equity funds that are split into quintiles (Q1-Q5) according to their level of active management as measured by AS per country. For each month, domestic equity funds are ranked into quintiles according to their level of active management. Q1 compiles those domestic equity funds with the highest value in the measure, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and from the 4-factor model. We compute the alphas as the intercept in the regression of benchmark-adjusted fund returns on market, size, value, and momentum factors for each country. The last columns of the table provide the average percentage that is invested in non-benchmark stocks. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

| | CAPM alpha | | | | | | | | Carhart alpha | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | t+1 | | t+3 | | t+6 | | t+12 | | t+1 | | t+3 | | t+6 | | t+12 | | (1) |
| **NETHERLANDS** | 0.59% | | 1.65% | | 3.82% | ** | 7.68% | *** | 0.86% | | 1.59% | * | 3.28% | *** | 7.02% | *** | 21.44% |
| **GREECE** | 0.21% | | 0.52% | | 0.95% | | 1.48% | | 0.13% | | 0.31% | | 0.45% | | 0.68% | | 26.15% |
| **AUSTRIA** | 0.27% | | 1.53% | | 3.44% | ** | 7.27% | *** | 0.28% | | 1.60% | * | 3.53% | ** | 7.68% | *** | 24.46% |
| **BELGIUM** | 4.30% | * | 6.05% | * | 13.37% | ** | 14.24% | * | 4.50% | * | 6.93% | * | 13.10% | ** | 13.47% | * | 43.02% |
| **FRANCE** | 0.17% | | 0.20% | | 0.70% | * | 1.81% | *** | 0.06% | | -0.09% | | -0.05% | | -0.24% | | 37.17% |
| **GERMANY** | 0.34% | * | 0.80% | *** | 2.00% | *** | 4.42% | *** | -0.01% | | 0.30% | | 1.07% | *** | 2.61% | *** | 24.23% |
| **ITALY** | 0.07% | | 0.13% | | 0.43% | | 0.78% | * | 0.00% | | -0.03% | | -0.09% | | -0.11% | | 35.32% |
| **SPAIN** | 0.59% | *** | 1.30% | *** | 2.52% | *** | 4.88% | *** | 0.38% | *** | 0.78% | *** | 1.33% | *** | 2.59% | *** | 25.84% |
| **FINLAND** | 0.03% | | -0.01% | | -0.15% | | -0.52% | | -0.31% | ** | -0.40% | ** | -0.86% | *** | -1.84% | *** | 29.62% |
| **PORTUGAL** | -0.30% | | -0.60% | | -0.60% | | -0.88% | | -0.34% | | -0.68% | | -0.47% | | -0.84% | | 18.23% |

**Table 3.4 Comparison among extreme quintiles (Q1-Q5) of AS in domestic equity funds' performance that is split by type of stocks in the Eurozone from 2003 to 2018.**

This table presents the difference in performance of the stock positions of domestic equity funds that are split into quintiles (Q1-Q5) according to their level of active management as measured by AS per country. This table is divided into Panels A and B.

**Panel A** presents the performance outcomes of the benchmark positions held by domestic equity funds that are included in each quintile for each country. Each month, domestic equity funds are ranked into quintiles according to their level of active management. Q1 compiles those domestic equity funds with the highest value in the measure, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns (considering its benchmark) on market, size, value, and momentum factors for each industry. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

| **Panel A Benchmark stocks** | **CAPM alpha** | | | | | | | | **Carhart alpha** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **t+1** | | **t+3** | | **t+6** | | **t+12** | | **t+1** | | **t+3** | | **t+6** | | **t+12** | |
| **NETHERLANDS** | 0.02% | | -0.29% | ** | -0.55% | ** | -1.02% | ** | 0.01% | | -0.25% | * | -0.58% | ** | -0.99% | ** |
| **GREECE** | -0.01% | | -0.30% | | -0.51% | | -0.67% | | -0.04% | | -0.22% | | -0.30% | | -0.35% | |
| **AUSTRIA** | 0.05% | | 0.10% | | -0.06% | | -0.07% | | -0.06% | | 0.13% | | -0.12% | | -0.02% | |
| **BELGIUM** | 0.77% | ** | -0.33% | | -1.15% | | -2.46% | * | 0.73% | ** | -0.24% | | -0.94% | | -1.95% | * |
| **FRANCE** | -0.07% | ** | -0.20% | *** | -0.32% | *** | -0.60% | *** | -0.10% | *** | -0.26% | *** | -0.47% | *** | -0.74% | *** |
| **GERMANY** | -0.18% | ** | -0.34% | *** | -0.62% | *** | -1.04% | *** | -0.13% | ** | -0.28% | *** | -0.58% | *** | -0.98% | *** |
| **ITALY** | 0.03% | | -0.06% | | -0.28% | *** | -0.42% | *** | 0.02% | | -0.06% | | -0.22% | ** | -0.45% | *** |
| **SPAIN** | 0.04% | | 0.10% | | 0.25% | ** | 0.26% | ** | 0.03% | | 0.00% | | 0.10% | | 0.01% | |
| **FINLAND** | -0.14% | | -0.39% | ** | -0.60% | ** | -1.40% | *** | -0.19% | ** | -0.37% | *** | -0.56% | *** | -1.23% | *** |
| **PORTUGAL** | -0.11% | | -0.17% | | -0.29% | * | -1.01% | | -0.03% | | 0.03% | | 0.03% | | -0.33% | |

**Panel B** gives the performance outcomes of the remaining stock positions held by domestic equity funds (non-benchmark investments). Each month, domestic equity funds are ranked into quintiles according to their level of active management. Q1 compiles those domestic equity funds with the highest value in the measure, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns (considering its benchmark) on market, size, value, and momentum factors for each industry. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

| **Panel B Non-Benchmark stocks** | **CAPM alpha** | | | | | | | | **Carhart alpha** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **t+1** | | **t+3** | | **t+6** | | **t+12** | | **t+1** | | **t+3** | | **t+6** | | **t+12** | |
| **NETHERLANDS** | 0.10% | | 0.39% | * | 0.93% | *** | 1.45% | *** | 0.13% | | 0.26% | | 0.74% | *** | 1.27% | *** |
| **GREECE** | 0.03% | | 0.04% | | -0.13% | | 4.12% | | 0.00% | | 0.01% | | -0.20% | | 1.09% | |
| **AUSTRIA** | 0.13% | | 0.21% | | 0.90% | *** | 0.97% | *** | 0.02% | | 0.06% | | 0.47% | *** | 0.37% | |
| **BELGIUM** | 0.37% | | 0.68% | | 1.09% | * | 1.61% | ** | 0.30% | | 0.53% | | 1.02% | | 1.58% | ** |
| **FRANCE** | 0.30% | *** | 0.61% | *** | 1.26% | *** | 2.31% | *** | 0.25% | *** | 0.51% | *** | 1.06% | *** | 1.88% | *** |
| **GERMANY** | 0.32% | *** | 0.51% | *** | 0.89% | *** | 1.70% | *** | 0.12% | *** | 0.14% | *** | 0.17% | *** | 0.27% | *** |
| **ITALY** | 0.21% | *** | 0.43% | *** | 0.81% | *** | 1.49% | *** | 0.12% | *** | 0.15% | *** | 0.15% | *** | 0.39% | *** |
| **SPAIN** | 0.33% | *** | 0.52% | *** | 0.89% | *** | 1.66% | *** | 0.23% | *** | 0.35% | *** | 0.48% | *** | 0.76% | *** |
| **FINLAND** | 0.23% | *** | 0.38% | *** | 0.66% | *** | 1.14% | *** | 0.10% | ** | 0.17% | *** | 0.33% | *** | 0.51% | *** |
| **PORTUGAL** | -0.04% | | -0.27% | * | -0.49% | * | -0.32% | * | 0.04% | | -0.12% | | -0.13% | | 0.22% | |

## 3.4 dAS and domestic equity funds performance

In the previous section, we test the performance predictive power of the AS in the most relevant industries of domestic equity funds in the Eurozone. In this section, we examine the predictive power of our proposed measure: the dAS. We use this extended version of AS to capture the actual level of "activity" over time and not only the differences from the benchmark. Furthermore, this measure allows us to identify how mutual funds achieve high levels of AS. Thus, we want to test if "active" investment decisions from one month to the next could add value to the portfolio. The dAS of fund *p* in month *t* is defined as follows:

$$Dynamic\ AS\ (dAS)_{p,t} = \frac{1}{2}\sum_{i=1}^{N} |(w_{i,t}^{p} - w_{i,t}^{b}) - (w_{i,t-1}^{p} - w_{i,t-1}^{b})| \qquad [3.2]$$

where $w_{i,t}^{p}$ and $w_{i,t}^{b}$ are the portfolio weights of asset *i* in mutual fund *p* and the benchmark *b* in month *t* (as occurs in the AS), $w_{i,t-1}^{p}$ and $w_{i,t-1}^{b}$ are the portfolio weights of asset *i* in mutual fund *p* and the benchmark *b* in month *t-1*, and N is the total number of stocks in the fund or benchmark in months *t* or *t-1*. The dAS is also as logical as the original AS and has some advantages because it provides more information about fund managers' activities and allows us to determine which investment decisions add value to the portfolio.

We obtain the dAS for each domestic equity fund in our sample for each reporting date between February 2003 and December 2018.[60] Table 3.5 presents the average dAS for each year and country during the sample period. This table shows that Austrian and Dutch funds have lower average dAS than the other funds (with 7.95% and 7.65%,

[60] It is not possible to obtain the dAS in January 2003 because we need information about two consecutive periods. Thus, the first month that a domestic equity fund is in the database, the dAS is not calculated.

respectively). By contrast, Italian funds show the greatest level of dAS with the average of 13.92%.

In addition, in each month we sort domestic equity funds into dAS quintiles and compute the equally weighted performance within each quintile that follows the same process as in Section 3.3. Table 3.6 presents the differences in the average performances of the portfolios included in the extreme quintiles (Q1-Q5) according to their dAS for each country. This table shows that the dAS has less prediction ability and is limited to the German and Dutch mutual fund industries. This evidence indicates that the fees charged by the management companies could influence the results.[61] See Appendix 3.3 with detailed information per quintiles.

Hence, the overall results of Table 3.6 are not as relevant as those in Table 3.3 when the seminal AS defines the quintiles. However, given that we have demonstrated the bias that non-benchmark investments provoke in the apparent prediction ability of AS, we should compare the figures in Table 3.6 with those shown in Panel B of Table 3.4.

This latter comparison indicates that dAS offers a slightly better prediction ability for performance if we consider that this alternative measure is not as influenced as AS by non-benchmarks stocks. As opposed to the AS, where the weights of non-benchmark stocks directly generate value, this percentage may or may not generate value in the dAS depending on the weight of these stocks in the previous period. A given domestic equity fund can be invested at 3% in a specific non-benchmark stock in period *t*; but if the fund has maintained this investment from period *t-1* to period *t*, it will not provoke any value for the dAS. Therefore, the performance of non-benchmark stocks in high AS funds will not be necessarily extended to mutual funds with high dAS that indicates the measure is

[61] We calculate the average of management fees charged by funds at the end of 2018 and the results per country (in ascending order) is as follow: the Netherlands 0.61%; Belgium 0.78%; Germany 1.29%; Italy 1.38%; Austria 1.44%; Finland 1.46%; Portugal 1.64%; France 1.73%; Spain 2.00% and Greece 2.22%. (Source: Morningstar)

less sensitive to the weight of the portfolio invested in securities not included in the benchmark. As shown in the Eurozone countries, this issue is relevant because their domestic stock benchmarks are highly concentrated. According to Cremers (2017) and Ang *et al*. (2017), AS itself is not enough to outperform the benchmark and only certain high AS funds are able to add value to their investors. Even a high level of dAS might not be enough to outperform the benchmark because while the dAS comprises all the activity of portfolio managers only certain investment decisions might add value to fund investors.

The main advantage of the dAS compared with the AS is that our measure provides more information and can be split according to different investment decisions. For that reason, we propose splitting the dAS to further examine which trading decisions add value to the portfolio.

**Table 3.5 Level of dAS from 2003 to 2018.**

This table presents the annual statistics of dAS in percentage terms of the domestic equity funds included in our sample every year and country. These average results are computed considering the reporting dates of all funds in the industry that year.

| Year | NETHERLANDS | GREECE | AUSTRIA | BELGIUM | FRANCE | GERMANY | ITALY | SPAIN | FINLAND | PORTUGAL | Average | St. Dev. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2003** | 11.32 | N/A | N/A | N/A | 13.02 | 17.15 | N/A | 12.56 | 18.98 | N/A | 14.61 | 3.28 |
| **2004** | 7.63 | N/A | 4.18 | N/A | 10.08 | 15.57 | 18.73 | 11.33 | 13.68 | N/A | 11.60 | 4.90 |
| **2005** | 10.84 | N/A | 14.87 | 21.80 | 10.89 | 13.13 | 15.94 | 13.07 | 17.39 | N/A | 14.74 | 3.66 |
| **2006** | 5.48 | 9.17 | 8.19 | 20.96 | 12.79 | 13.01 | 14.66 | 14.80 | 14.81 | N/A | 12.65 | 4.56 |
| **2007** | 7.49 | 8.62 | 9.31 | N/A | 12.42 | 13.18 | 14.76 | 15.68 | 12.52 | 11.98 | 11.77 | 2.77 |
| **2008** | 10.58 | 13.33 | 12.64 | 17.24 | 15.22 | 17.63 | 14.41 | 13.99 | 18.99 | 13.06 | 14.71 | 2.58 |
| **2009** | 7.89 | 14.15 | 11.97 | 11.82 | 12.15 | 11.21 | 15.05 | 15.24 | 14.91 | 11.85 | 12.62 | 2.27 |
| **2010** | 7.57 | 10.95 | 6.97 | 8.43 | 10.84 | 9.33 | 14.27 | 12.75 | 10.14 | 10.61 | 10.19 | 2.25 |
| **2011** | 4.97 | 12.89 | 7.46 | 7.13 | 10.34 | 9.53 | 15.05 | 11.64 | 10.21 | 10.77 | 10.00 | 2.93 |
| **2012** | 5.13 | 16.10 | 6.10 | 5.36 | 9.80 | 10.25 | 13.42 | 15.54 | 9.76 | 11.83 | 10.33 | 3.98 |
| **2013** | 6.02 | 17.66 | 6.51 | 8.93 | 8.89 | 7.83 | 13.33 | 11.00 | 9.18 | 11.37 | 10.07 | 3.47 |
| **2014** | 6.04 | 11.20 | 7.83 | N/A | 8.90 | 7.28 | 9.97 | 12.25 | 7.93 | 11.93 | 9.26 | 2.20 |
| **2015** | 7.62 | 13.20 | 5.65 | N/A | 8.93 | 9.29 | 9.77 | 11.18 | 8.21 | 10.03 | 9.32 | 2.15 |
| **2016** | 7.68 | 9.46 | 7.03 | N/A | 8.68 | 9.37 | 10.53 | 10.14 | 7.99 | 7.17 | 8.67 | 1.28 |
| **2017** | 6.84 | 6.98 | 5.31 | N/A | 8.23 | 10.45 | 9.59 | 9.31 | 7.32 | 7.51 | 7.95 | 1.60 |
| **2018** | 9.35 | 9.00 | 5.24 | N/A | 8.29 | 11.59 | 9.09 | 9.23 | 6.98 | 5.53 | 8.25 | 2.02 |
| **Average** | 7.65 | 11.75 | 7.95 | 12.71 | 10.59 | 11.61 | 13.24 | 12.48 | 11.81 | 10.30 | 11.05 | 2.87 |
| **St. Dev.** | 1.99 | 3.14 | 3.04 | 6.43 | 2.03 | 3.12 | 2.82 | 2.12 | 4.16 | 2.33 | 2.28 | 1.03 |

**Table 3.6 Comparison among extreme quintiles (Q1-Q5) of dynamic Active Share (dAS) in domestic equity funds' performance in the Eurozone from 2003 to 2018.**

This table presents the difference between the performance of domestic equity funds that are split into quintiles (Q1-Q5) according to their level of active management as measured by dAS for each month per country. Q1 compiles those domestic equity funds with the highest value in the measure, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns (considering its benchmark) on market, size, value, and momentum factors for each country. The last columns of the table give the average percentage invested per quintiles in non-benchmark stocks. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

| | **CAPM alpha** | | | | **Carhart alpha** | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** |
| **NETHERLANDS** | 0.63% | 1.42% | 2.62% * | 3.38% * | 0.82% | 1.70% ** | 2.85% ** | 4.41% ** | 22.24% |
| **GREECE** | 0.18% | 0.06% | 0.00% | 0.84% | 0.03% | 0.12% | -0.02% | 0.90% | 26.32% |
| **AUSTRIA** | 0.49% | 1.13% | 0.97% | 2.62% | 0.45% | 1.16% | 1.08% | 2.86% | 24.61% |
| **BELGIUM** | 2.55% | 5.34% | 8.91% * | 7.71% | 2.84% | 5.86% | 8.67% * | 7.48% | 49.52% |
| **FRANCE** | 0.03% | -0.24% | -0.03% | 0.76% | -0.02% | -0.28% | -0.24% | -0.31% | 37.23% |
| **GERMANY** | 0.34% * | 0.38% * | 1.14% *** | 2.69% *** | 0.13% | 0.04% | 0.46% | 1.71% *** | 24.24% |
| **ITALY** | 0.01% | -0.11% | -0.16% | -0.07% | -0.00% | -0.22% | -0.48% ** | -1.02% *** | 35.18% |
| **SPAIN** | 0.09% | 0.05% | 0.32% | 0.13% | 0.00% | -0.06% | -0.04% | -0.66% ** | 25.98% |
| **FINLAND** | -0.05% | -0.02% | 0.08% | -0.13% | -0.10% | 0.16% | 0.19% | -0.09% | 29.86% |
| **PORTUGAL** | -0.51% | -0.94% | -1.98% * | -1.19% | -0.70% * | -0.79% * | -1.78% * | -0.64% | 18.29% |

## 3.5 Splitting dAS to capture the investment decisions that add value

In this section, we use the dAS to isolate the investment decisions that add value to fund performance. According with this objective, we first develop a study focused on the type of trading (buy or sell) and how these actions have effects on the portfolio weights. We also study the contribution of the more relevant investment decisions to dAS by focusing on the type of trading (buy or sell) and their positive or negative effects that are based on the deviation from their benchmark.

### 3.5.1 Analysis by type of trading and their contribution to dAS

First, we detect whether fund managers have carried out trading and the type of trading that they are doing without analyzing the portfolio weights. Portfolio weights cannot appropriately capture managers' trading due to the no proportional changes in security prices. That is, imagine that the manager in a given month does not trade any security; the trading activity would be zero, but the weights of the portfolio held may have changed because the revalorization of all stocks held by the fund is not the same. Therefore, we must consider the fund manager's trading decisions and the changes in portfolio weights. Specifically, we calculate a separate dAS indicator for purchased and sold stocks.

We define "buying decisions" and "selling decisions" as follows: There is a buying decision in a given security when the number of stocks held by the portfolio has increased in two consecutive periods ($t$ - $t$-$1$). There is a selling decision when the number of stocks held in the portfolio has decreased (partial sell) or has become zero (termination sell) in two consecutive periods ($t$ - $t$-$1$). There is no trading if the number of stocks has remained the same.

For the buying decisions, we additionally require a positive deviation from the benchmark in two consecutive periods (i.e., these buying decisions contribute positively to the dAS).

$$\left(w_{i,t}^{p} - w_{i,t}^{b}\right) - \left(w_{i,t-1}^{p} - w_{i,t-1}^{b}\right) > 0\ . \qquad [3.3]$$

These are the buying decisions relevant to our study because they capture purchases that cause an increase in the portfolio weight that is higher than the increase in the benchmark weight. Hence, these investment decisions clearly represent a manager's bets, and they should be the investment decisions that add value to the portfolio when the manager has stock-picking skills. In the extreme case, this subset of buying decisions can include purchases of a security that have decreased its weight in the benchmark that clearly represents a bet or the conviction of the manager to hold this stock and to increase its importance in the portfolio.

Similarly, for the selling decisions, we add a negative deviation from the benchmark in two consecutive periods (i.e., these selling decisions contribute negatively to the dAS).

$$\left(w_{i,t}^{p} - w_{i,t}^{b}\right) - \left(w_{i,t-1}^{p} - w_{i,t-1}^{b}\right) < 0. \qquad [3.4]$$

Further, we calculate a dAS for each domestic equity fund on each reporting date for each country when the fund has made purchases that positively contribute to the dAS on that date. Then, we sort the funds into quintiles based on the magnitude of the deviation from the benchmark in two consecutive periods and compute the future equally weighted fund performance within each quintile for the next month (period *t+1*), next quarter (period *t+3*), next semester (period *t+6*), and next year (period *t+12*). For each country, the difference in the average performance of the portfolios included in the extreme quintiles (Q1-Q5) according to buying decisions are reported in Panel A of Table 3.7.

Furthermore, we calculate a dAS for each domestic equity fund on each reporting date for each country when the fund has made sales that negatively contribute to the dAS. Then, we sort the funds into quintiles based on the magnitude of the deviation from the benchmark in two consecutive periods and compute the future equally weighted fund performance within each quintile. The results of the difference in the average performance of the portfolios included in the extreme quintiles (Q1-Q5) according to selling decisions are reported in Panel B of Table 3.7. Similar to Table 3.6, both panels of Table 3.7 show little evidence of prediction abilities for performance. We find a robust relationship between selling investment decisions and subsequent better performance in German funds. This relationship is also found in Austria and Portugal but with very limited significance. Furthermore, regarding buying investment decisions, only Portuguese funds seem to offer some evidence in some cases. See Appendix 3.4 with detailed information per quintiles.

**Table 3.7 Comparison among extreme quintiles (Q1-Q5) of dAS for buying and selling decisions for domestic equity funds' performance in the Eurozone from 2003 to 2018.**

This table presents the performance of the domestic equity funds that are split into quintiles (Q1-Q5) according to their level of active management as measured by the dAS per country. This table is divided into Panels A and B.

**Panel A** gives the difference in performance of domestic equity funds that are split into quintiles according to the variation in the differences between portfolio and benchmarks weights in two consecutive periods in those stocks that have been bought and have contributed positively to the dAS. Each month, domestic equity funds are ranked into quintiles according to their level of variation. Q1 compiles those domestic equity funds with the highest value, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns (considering its benchmarks) on market, size, value, and momentum factors. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

| **Panel A Buying decisions with** $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1}) > 0$ | **CAPM alpha** | | | | **Carhart alpha** | | | |
|---|---|---|---|---|---|---|---|---|
| **Country** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **NETHERLANDS** | 0.03% | 0.44% | 1.28% | 1.36% | -0.08% | 0.47% | 1.42% | 2.03% |
| **GREECE** | 0.18% | 0.24% | -0.01% | 0.88% | 0.12% | 0.15% | 0.01% | 0.49% |
| **AUSTRIA** | 0.46% | 1.29% | 0.25% | 0.50% | 0.66% | 1.46% * | 0.48% | 0.97% |
| **BELGIUM** | 0.50% | 2.09% | 3.90% | 5.18% | 0.63% | 2.71% | 4.14% | 4.92% |
| **FRANCE** | 0.07% | -0.19% | 0.22% | 0.80% | 0.04% | -0.18% | 0.05% | 0.20% |
| **GERMANY** | 0.13% | 0.18% | 0.43% | 0.48% | 0.01% | -0.12% | -0.08% | -0.43% |
| **ITALY** | 0.04% | -0.07% | -0.22% | -0.05% | 0.01% | -0.23% * | -0.49% ** | -0.86% *** |
| **SPAIN** | 0.06% | 0.04% | 0.14% | -0.46% | 0.00% | -0.11% | -0.10% | -0.91% * |
| **FINLAND** | -0.11% | -0.14% | -0.20% | -0.10% | -0.06% | 0.09% | 0.18% | 0.32% |
| **PORTUGAL** | 0.59% * | 0.31% | 0.50% * | -1.29% | 0.76% * | 0.61% | 0.93% * | -0.97% |

**Panel B** gives the difference in performance of domestic equity funds that are split into quintiles according to the variation in the differences between portfolio and benchmark weights in two consecutive periods in those securities that have been sold and have contributed negatively to the dAS. Each month, domestic equity funds are ranked into quintiles according to their level of variation. Q1 compiles those domestic equity funds with the highest value, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns (considering its benchmarks) on market, size, value, and momentum factors. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

| **Panel B Selling decisions** with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1}) < 0$ | **CAPM alpha** | | | | **Carhart alpha** | | | |
|---|---|---|---|---|---|---|---|---|
| **Country** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **NETHERLANDS** | 0.19% | 0.58% | 1.65% | 1.38% | 0.46% | 1.03% | 1.75% | 1.96% |
| **GREECE** | 0.08% | 0.02% | -0.06% | 0.14% | 0.04% | -0.06% | -0.07% | -0.01% |
| **AUSTRIA** | 0.14% | 1.19% | 1.56% | 3.51% | 0.22% | 1.17% | 1.58% | 3.92% * |
| **BELGIUM** | 1.77% | -0.23% | 2.52% | 4.68% | 1.19% | 0.14% | 2.59% | 4.05% |
| **FRANCE** | 0.01% | -0.13% | 0.29% | 0.58% | -0.04% | -0.25% | -0.06% | -0.06% |
| **GERMANY** | 0.39% ** | 0.49% *** | 1.08% *** | 1.67% *** | 0.23% | 0.17% | 0.56% ** | 0.99% *** |
| **ITALY** | -0.07% | -0.12% | -0.12% | 0.26% * | -0.06% | -0.26% * | -0.39% ** | -0.44% *** |
| **SPAIN** | -0.01% | -0.08% | -0.01% | -0.61% ** | -0.04% | -0.17% | -0.28% | -1.06% ** |
| **FINLAND** | -0.04% | -0.04% | -0.18% | 0.04% | -0.11% | 0.15% | 0.08% | 0.07% |
| **PORTUGAL** | 0.19% | -0.09% | 0.57% * | 0.08% | 0.31% | 0.02% | 1.16% * | 0.38% |

## 3.5.2 Analysis by type of trading and their contribution to dAS and by their deviation from the benchmark

In this study, we add a requirement to those in subsection 3.5.1. This deviation lets us classify the stocks as overweighted or underweighted on each date

Specifically, we calculate a separate dAS for those securities that fulfill the following criteria:

(1) There are buying decisions, that is, the number of stocks held for the analyzed stocks has increased.

(2) These stocks contribute positively to the dAS.

That is, the difference $\left(w_{i,t}^{p} - w_{i,t}^{b}\right) - \left(w_{i,t-1}^{p} - w_{i,t-1}^{b}\right)$ is positive. As previously indicated, this difference means that the manager is buying a stock that increases its portfolio weight but is higher than the increase in the benchmark or even that the manager is buying a stock while its weight in the benchmark has lowered.

(3) These stocks must be overweighted in comparison to the benchmark in *t-1* and overweighted in *t* as the value of the overweight in *t* is higher than in *t-1*.

These are the buying decisions relevant because they capture which stocks that the manager shows strong beliefs in. These investment decisions represent special bets by fund managers that should add value to the portfolio whether they are skillful or not. For each country, we calculate a separate dAS for those buying decisions that fulfill the abovementioned requirements in each domestic equity fund and in each reporting date. The results are reported in Panel A of Table 3.8.

Additionally, we also calculate a separate dAS for those securities that fulfill the following criteria:

(1) They are selling decisions, that is, the number of these stocks has decreased in the portfolio.

(2) These stocks contribute negatively to the dAS.

That is, the difference $\left(w_{i,t}^{p} - w_{i,t}^{b}\right) - \left(w_{i,t-1}^{p} - w_{i,t-1}^{b}\right)$ is negative. Therefore, the manager is selling a security that decreases its portfolio weight but is higher than the decrease in the benchmark or even that the manager is selling a security when its weight in the benchmark has increased.

(3) These stocks must be underweighted in comparison to the benchmark in *t-1* and underweighted in t as the value of the underweight in t is higher than in *t-1*.

These selling decisions are relevant because they isolate the investment decisions in which the manager is showing a strong belief about the lack of interest in that stock. These investment decisions represent special bets by fund managers and should add value to the portfolio if they are skillful.

Thus, with these requirements, we capture the relevant selling decisions in which the manager has shown strong beliefs about the lack of interest in that stock. We calculate a separate dAS for those selling decisions for each mutual fund in each month. The results are reported in Panel B of Table 3.8.

Again, both panels of Table 3.8 present limited evidence on the potential prediction abilities for the performance of those portfolios. Regarding buying decisions in which the manager has shown strong beliefs, we find a certain trend to subsequent better performance in several countries; however, this relationship is only significant in Germany and in some cases of the Austrian and Portuguese mutual fund industries. Regarding Panel B, only Finnish funds show a positive relationship among selling decisions with strong manager beliefs and performance. See Appendix 3.5 with detailed information per quintiles.

**Table 3.8 Comparison among extreme quintiles (Q1-Q5) of dAS by buying and selling that identify manager's strong beliefs in domestic equity funds' performance in the Eurozone from 2003 to 2018.**

This table presents the difference in performance of the domestic equity funds that are split into quintiles (Q1-Q5) according to their level of active management as measured by dAS per country. This table is divided into Panels A and B.

**Panel A** gives the difference in performance of domestic equity funds that are split into quintiles according to the variation in the differences between portfolio and benchmark weights in two consecutive periods in those securities that (1) have been bought, (2) have contributed positively to the dAS, and (3) have increased their level of overweighting from period *t-1* to period *t*. Each month, domestic equity funds are ranked into quintiles according to their level of variation. Q1 compiles those domestic equity funds with the highest value, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns (considering its benchmarks) on market, size, value, and momentum factors. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

| **Panel A Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1}) > 0$ and a higher overweight in period t** | **CAPM alpha** | | | | | | | | **Carhart alpha** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **t+1** | | **t+3** | | **t+6** | | **t+12** | | **t+1** | | **t+3** | | **t+6** | | **t+12** | |
| **NETHERLANDS** | 0.15% | | 0.27% | | 1.68% | | 2.11% | | 0.24% | | 0.48% | | 1.87% | | 2.47% | |
| **GREECE** | 0.56% | | 1.80% | | 2.79% | | 3.74% | | 0.62% | | 1.90% | | 2.80% | | 4.02% | |
| **AUSTRIA** | 0.04% | | -0.17% | * | 0.05% | * | 0.23% | * | 0.01% | | -0.01% | ** | 0.26% | ** | 0.19% | ** |
| **BELGIUM** | 0.98% | | 3.03% | | 7.28% | | 11.42% | * | 0.61% | | 3.21% | | 7.21% | | 10.91% | * |
| **FRANCE** | 0.17% | | 0.08% | | 0.49% | | 1.13% | | 0.10% | | 0.00% | | 0.27% | | 0.38% | |
| **GERMANY** | 0.13% | | 0.41% | | 0.92% | *** | 1.49% | *** | -0.12% | | 0.03% | | 0.33% | | 0.46% | |
| **ITALY** | 0.02% | | 0.09% | | -0.04% | | 0.27% | | -0.03% | | -0.10% | | -0.32% | * | -0.29% | |
| **SPAIN** | 0.24% | ** | 0.36% | ** | 0.76% | *** | 0.65% | ** | 0.08% | | 0.11% | | 0.21% | | -0.28% | |
| **FINLAND** | -0.07% | | -0.05% | | -0.11% | | -0.30% | | -0.13% | | -0.26% | | -0.28% | | -0.65% | * |
| **PORTUGAL** | -0.55% | | -0.73% | | -1.20% | | -0.38% | | -0.68% | | -0.77% | | -1.16% | | -0.16% | |

**Panel B** gives the difference in performance of domestic equity funds split into quintiles according to the variation of the differences between portfolio and benchmark weights in two consecutive periods in those securities that (1) have been sold, (2) have contributed negatively to the dAS, and (3) have increased their level of underweighting from period *t-1* to period t. Each month, domestic equity funds are ranked into quintiles according to their level of variation. Q1 compiles those domestic equity funds with the highest value, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns (considering its benchmarks) on market, size, value, and momentum factors. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

| **Panel B Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1}) < 0$ and a higher underweight in period *t*** | **CAPM alpha** | | | | | | | | **Carhart alpha** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **t+1** | | **t+3** | | **t+6** | | **t+12** | | **t+1** | | **t+3** | | **t+6** | | **t+12** | |
| **NETHERLANDS** | -0.31% | | 0.35% | | 1.67% | | 2.98% | | 0.09% | | 0.54% | | 0.98% | | 2.19% | |
| **GREECE** | 0.10% | | 0.14% | | -0.34% | | -1.01% | | 0.07% | | 0.15% | | -0.19% | | -0.78% | |
| **AUSTRIA** | -0.39% | | -0.31% | | -0.11% | | 0.02% | | -0.30% | | -0.43% | | -0.21% | | 0.04% | |
| **BELGIUM** | 1.62% | | 1.80% | | 9.17% | | 14.59% | | 1.14% | | 1.77% | | 9.19% | | 14.07% | |
| **FRANCE** | -0.61% | *** | -0.07% | | -1.28% | *** | -3.03% | *** | -0.53% | ** | -0.49% | *** | -0.83% | *** | -2.61% | *** |
| **GERMANY** | 0.35% | * | 0.22% | | 0.09% | | 1.00% | * | 0.34% | | 0.29% | | 0.13% | | 0.33% | |
| **ITALY** | 0.10% | | 0.15% | | 0.12% | | 0.04% | | 0.04% | | -0.06% | | -0.01% | | -0.21% | |
| **SPAIN** | 0.00% | | 0.37% | | 0.22% | | -0.24% | | 0.01% | | 0.19% | | 0.15% | | -0.12% | |
| **FINLAND** | 0.25% | ** | 0.31% | *** | 0.65% | *** | 0.78% | *** | -0.11% | | 0.01% | *** | 0.35% | *** | 0.36% | *** |
| **PORTUGAL** | -0.13% | | -0.12% | | 0.06% | | 0.44% | | -0.19% | | -0.04% | | 0.16% | | 1.01% | |

## 3.6 Summary and Conclusions

This chapter is the first to introduce a dynamic perspective on the AS to capture managers' activity and skill. We develop a new measure, the dAS, that focuses on the variation in the difference between portfolio and benchmark weights in two consecutive periods to capture investment decisions that add value to portfolios.

We assess this dynamic perspective of active management in a sample of domestic equity funds registered in 10 Eurozone countries for the period from 2003 to 2018. Our findings indicate some problems with the predictive power for performance of the traditional AS given that the apparent performance of more active funds is biased by the portion of portfolios invested in stocks not included in the benchmark. Furthermore, our results also show that the prediction ability of AS presents assorted results, as this relation is less clear than that presented in the literature (Cremers and Petajisto, 2009, Cremers, 2017).

The dAS contributes to the financial literature because it captures valuable investment decisions and is not as sensitive as the AS to the investment in non-benchmarks stocks because it directly captures the variation instead of the weight of a portfolio that is invested in non-benchmark securities. This issue is more relevant in the Eurozone countries where domestic benchmarks are highly concentrated.

Further, we define manager convictions as those buying (selling) decisions that increase the deviation from the benchmark in comparison with that observed in the previous period. These decisions show a clear intention by the manager to increase (decrease) the position in the portfolio that clearly represents a bet or a conviction. Our proposal is consistent with Karoui and Patel (2020) who argue that the benefits of AS stem from the selection decision rather than the weighting decision. Focusing on the

selling decision, the dAS of German funds presents a robust relationship with subsequent better performance. Regarding buying decisions that reflect managers' strong convictions, German, Austrian, and Portuguese industries show subsequent better performance.

Our unbiased approach has important implications for investors in terms of the identification of an active management map of the Eurozone fund industry. Our findings support the hypothesis that dAS provides more information and can be split according to different investment decisions.

# Appendix 3.1 Detailed results of AS and domestic equity funds' performance

This table presents the performance of domestic equity funds that are split into quintiles according to their level of active management as measured by AS per country in panels from A to J. For each month, domestic equity funds are ranked into quintiles according to their level of active management. Q1 compiles those domestic equity funds with the highest value in the measure, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns on market, size, value, and momentum factors for each country. The last columns of the table give (1) the average level of AS of funds included in each quintile and (2) the average percentage invested in non-benchmark stocks. The last row (3) gives the difference between the extreme quintiles (Q1-Q5) is calculated as well as its statistical significance. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

**Panel A NETHERLANDS**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | 0.66% | 1.33% | 2.60% | 5.55% | 0.51% | 1.17% | 1.95% | 3.68% | 50.98% | 41.64% |
| **AS2** | 0.70% | 1.22% | 2.83% | 4.37% | 0.31% | 1.26% | 2.14% | 3.18% | 33.24% | 19.34% |
| **AS3** | 0.67% | 1.61% | 4.39% | 8.46% | 0.23% | 1.24% | 3.87% | 6.82% | 31.76% | 19.48% |
| **AS4** | -0.40% | -0.60% | -0.31% | 1.44% | -0.45% | -0.41% | -0.55% | 0.40% | 23.11% | 13.49% |
| **AS5** | 0.07% | -0.32% | -1.22% | -2.13% | -0.35% | -0.42% | -1.33% | -3.34% | 26.05% | 13.23% |
| **(3)** | 0.59% | 1.65% | 3.82%** | 7.68%*** | 0.86% | 1.59%* | 3.28%*** | 7.02%** | 24.93% | 28.41% |

**Panel B GREECE**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | 0.52% | 0.46% | 0.22% | -0.46% | -0.10% | -0.59% | -1.20% | -1.82% | 58.66% | 37.66% |
| **AS2** | 0.39% | 0.55% | 0.12% | -1.04% | -0.20% | -0.55% | -1.32% | -2.16% | 49.67% | 28.91% |
| **AS3** | 0.49% | 0.13% | -0.62% | -2.04% | -0.01% | -1.21% | -1.89% | -2.56% | 45.59% | 25.39% |
| **AS4** | 0.24% | 0.33% | -0.16% | -2.33% | -0.12% | -0.50% | -1.17% | -2.96% | 40.20% | 20.25% |
| **AS5** | 0.31% | -0.06% | -0.74% | -1.94% | -0.23% | -0.90% | -1.66% | -2.50% | 35.74% | 18.52% |
| **(3)** | 0.21% | 0.52% | 0.95% | 1.48% | 0.13% | 0.31% | 0.45% | 0.68% | 22.93% | 19.14% |

**Panel C AUSTRIA**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | 1.27% | 2.58% | 5.63% | 10.04% | 1.18% | 2.65% | 5.42% | 9.21% | 51.15% | 35.73% |
| **AS2** | 0.81% | 1.21% | 2.51% | 5.42% | 0.98% | 1.33% | 2.51% | 4.71% | 41.20% | 26.89% |
| **AS3** | 1.13% | 1.42% | 2.85% | 3.22% | 1.16% | 1.31% | 2.43% | 1.13% | 35.46% | 23.50% |
| **AS4** | 1.04% | 1.01% | 1.69% | 5.42% | 0.91% | 0.99% | 1.48% | 3.65% | 31.50% | 20.76% |
| **AS5** | 1.00% | 1.05% | 2.19% | 2.77% | 0.90% | 1.05% | 1.90% | 1.53% | 23.17% | 15.44% |
| **(3)** | 0.27% | 1.53% | 3.44%** | 7.27%*** | 0.28% | 1.60%* | 3.53%** | 7.68%*** | 27.97% | 20.29% |

**Panel D BELGIUM**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | 0.11% | -0.40% | 1.16% | 5.39% | -0.16% | -0.48% | 0.57% | 4.65% | 76.15% | 72.30% |
| **AS2** | - | - | - | - | - | - | - | - | - | - |
| **AS3** | -4.63% | -12.55% | -17.47% | -18.28% | -4.32% | -12.41% | -17.29% | -18.13% | 55.80% | 20.80% |
| **AS4** | 0.31% | -0.64% | -1.19% | -3.83% | 0.17% | -0.71% | -1.15% | -3.91% | 70.89% | 57.08% |
| **AS5** | -4.19% | -6.45% | -12.21% | -8.85% | -4.66% | -7.41% | -12.53% | -8.81% | 47.22% | 21.89% |
| **(3)** | 4.30%* | 6.05%* | 13.37%* | 14.24%* | 4.50%* | 6.93%* | 13.10%** | 13.47%* | 28.93% | 50.41% |

**Panel E FRANCE**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | 0.37% | 0.31% | 1.00% | 2.22% | 0.04% | -0.40% | -0.77% | -1.41% | 81.92% | 65.70% |
| **AS2** | 0.20% | 0.09% | 0.34% | 1.16% | 0.04% | -0.28% | -0.80% | -1.43% | 63.86% | 46.72% |
| **AS3** | 0.14% | 0.12% | 0.25% | 0.71% | 0.05% | -0.14% | -0.67% | -1.17% | 53.61% | 32.27% |
| **AS4** | 0.20% | 0.02% | -0.17% | -0.39% | 0.01% | -0.29% | -0.99% | -2.08% | 43.92% | 26.02% |
| **AS5** | 0.20% | 0.12% | 0.30% | 0.41% | -0.02% | -0.31% | -0.73% | -1.17% | 27.71% | 15.13% |
| **(3)** | 0.17% | 0.20% | 0.70%* | 1.81%*** | 0.06% | -0.09% | -0.05% | -0.24% | 54.22% | 50.56% |

**Panel F GERMANY**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | 0.71% | 1.13% | 2.65% | 5.11% | -0.16% | -0.46% | -0.58% | -0.64% | 56.12% | 44.44% |
| **AS2** | 0.49% | 1.12% | 2.38% | 4.69% | -0.25% | -0.29% | -0.79% | -1.01% | 39.59% | 27.65% |
| **AS3** | 0.69% | 0.80% | 1.85% | 3.78% | 0.09% | -0.39% | -0.78% | -1.36% | 31.35% | 23.81% |
| **AS4** | 0.48% | 0.87% | 1.60% | 2.67% | -0.11% | -0.25% | -1.01% | -2.15% | 25.51% | 18.76% |
| **AS5** | 0.37% | 0.34% | 0.65% | 0.68% | -0.15% | -0.76% | -1.65% | -3.24% | 11.29% | 6.48% |
| **(3)** | 0.34%* | 0.80%*** | 2.00%*** | 4.42%*** | -0.01% | 0.30% | 1.07%*** | 2.61%*** | 44.83% | 37.96% |

**Panel G ITALY**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | 0.21% | 0.17% | 0.34% | 0.30% | 0.02% | -0.22% | -0.67% | -1.81% | 76.31% | 63.55% |
| **AS2** | 0.09% | 0.06% | -0.03% | 0.03% | -0.01% | -0.22% | -0.70% | -1.44% | 48.88% | 34.92% |
| **AS3** | 0.19% | 0.03% | -0.17% | -0.47% | 0.05% | -0.15% | -0.66% | -1.69% | 40.98% | 30.35% |
| **AS4** | 0.17% | 0.17% | 0.40% | 0.66% | 0.09% | 0.01% | -0.09% | -0.54% | 35.99% | 27.42% |
| **AS5** | 0.14% | 0.04% | -0.09% | -0.48% | 0.03% | -0.19% | -0.58% | -1.69% | 27.29% | 20.35% |
| **(3)** | 0.07% | 0.13% | 0.43% | 0.78%* | 0.00% | -0.03% | -0.09% | -0.11% | 49.02% | 43.20% |

**Panel H SPAIN**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | 0.49% | 0.94% | 1.86% | 3.62% | 0.20% | 0.35% | 0.38% | 0.55% | 78.08% | 56.07% |
| **AS2** | 0.23% | 0.36% | 0.73% | 1.39% | 0.04% | -0.01% | -0.19% | -0.58% | 57.06% | 34.10% |
| **AS3** | -0.13% | -0.19% | -0.27% | -1.11% | -0.25% | -0.47% | -0.97% | -2.58% | 42.90% | 19.90% |
| **AS4** | 0.07% | -0.19% | -0.41% | -0.88% | -0.07% | -0.36% | -0.88% | -1.79% | 32.08% | 12.81% |
| **AS5** | -0.11% | -0.36% | -0.66% | -1.25% | -0.18% | -0.44% | -0.95% | -2.03% | 17.56% | 6.30% |
| **(3)** | 0.59%*** | 1.30%*** | 2.52%*** | 4.88%*** | 0.38%*** | 0.78%*** | 1.33%*** | 2.59%*** | 60.53% | 49.76% |

**Panel I FINLAND**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | 0.39% | 0.56% | 0.89% | 1.52% | -0.28% | -0.56% | -1.33% | -2.70% | 76.64% | 58.19% |
| **AS2** | 0.41% | 0.32% | 0.15% | 0.29% | 0.05% | -0.30% | -1.18% | -2.29% | 50.47% | 34.58% |
| **AS3** | 0.23% | 0.07% | 0.04% | 0.31% | -0.19% | -0.59% | -1.21% | -2.33% | 38.05% | 23.66% |
| **AS4** | 0.31% | 0.51% | 0.94% | 1.72% | -0.10% | -0.24% | -0.65% | -1.17% | 30.20% | 17.88% |
| **AS5** | 0.36% | 0.57% | 1.04% | 2.04% | 0.03% | -0.15% | -0.47% | -0.86% | 23.23% | 13.80% |
| **(3)** | 0.03% | -0.01% | -0.15% | -0.52% | -0.31%** | -0.40%** | -0.86%*** | -1.84%*** | 53.41% | 44.39% |

**Panel J PORTUGAL**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **AS1** | -0.35% | -0.76% | -1.20% | -1.99% | -0.23% | -0.48% | -0.46% | -1.03% | 50.82% | 21.98% |
| **AS2** | -0.36% | -0.91% | -1.90% | -2.40% | -0.30% | -0.54% | -1.17% | -1.42% | 46.91% | 19.30% |
| **AS3** | -0.23% | -1.12% | -2.43% | -3.76% | -0.16% | -0.96% | -1.87% | -3.29% | 44.24% | 17.92% |
| **AS4** | -0.42% | -1.11% | -3.34% | -5.23% | -0.32% | -0.98% | -2.73% | -4.35% | 42.30% | 16.87% |
| **AS5** | -0.05% | -0.15% | -0.60% | -1.11% | 0.10% | 0.20% | 0.00% | -0.19% | 37.93% | 15.09% |
| **(3)** | -0.30% | -0.60% | -0.60% | -0.88% | -0.34% | -0.68% | -0.47% | -0.84% | 12.89% | 6.89% |

# Appendix 3.2 AS and performance results by the type of stocks

This table presents the performance of the equity positions of domestic equity funds that are split into quintiles according to their level of active management as measured by AS per country in panels from A to J. **Subpanel 1** presents the performance outcomes of the benchmark positions held by domestic equity funds included in each quintile. **Subpanel 2** presents the performance outcomes of the remaining equity positions held by domestic equity funds (non-benchmark investments). Each month, domestic equity funds are ranked into quintiles according to their level of active management. Q1 compiles those domestic equity funds with the highest value in the measure while Q5 compiles those funds with the lowest value. Next, the average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns on market, size, value, and momentum factors for each country. The difference between the extreme quintiles (Q1-Q5) is calculated as well as its statistical significance. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

**Panel A NETHERLANDS**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 0.12% | 0.25% | 0.58% | 1.34% | 0.16% | 0.35% | 0.66% | 1.33% |
| **AS2** | 0.22% | 0.45% | 0.99% | 2.05% | 0.28% | 0.60% | 1.13% | 1.91% |
| **AS3** | 0.23% | 0.51% | 1.08% | 1.45% | 0.29% | 0.60% | 1.07% | 1.52% |
| **AS4** | 0.31% | 0.76% | 1.34% | 2.14% | 0.41% | 0.81% | 1.43% | 2.06% |
| **AS5** | 0.10% | 0.54% | 1.12% | 2.36% | 0.15% | 0.60% | 1.24% | 2.33% |
| **AS1 vs AS5** | 0.02% | -0.29%** | -0.55%** | -1.02%** | 0.01% | -0.25%* | -0.58%** | -0.99%** |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.36% | 0.84% | 1.64% | 2.77% | 0.32% | 0.63% | 1.24% | 2.05% |
| **AS2** | 0.21% | 0.48% | 1.06% | 1.71% | 0.16% | 0.44% | 0.87% | 1.51% |
| **AS3** | 0.37% | 0.67% | 1.27% | 2.11% | 0.26% | 0.63% | 1.09% | 1.50% |
| **AS4** | 0.12% | 0.27% | 0.64% | 1.04% | 0.13% | 0.22% | 0.45% | 0.82% |
| **AS5** | 0.27% | 0.45% | 0.71% | 1.32% | 0.19% | 0.37% | 0.50% | 0.78% |
| **AS1 vs AS5** | 0.10% | 0.39%* | 0.93%*** | 1.45%*** | 0.13% | 0.26% | 0.74%*** | 1.27%*** |

**Panel B GREECE**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 1.06% | 2.03% | 3.81% | 7.68% | 0.87% | 1.66% | 3.36% | 7.16% |
| **AS2** | 1.08% | 2.64% | 3.99% | 7.69% | 1.09% | 2.23% | 3.50% | 7.32% |
| **AS3** | 0.88% | 1.56% | 2.12% | 6.57% | 0.86% | 1.39% | 1.97% | 6.30% |
| **AS4** | 1.08% | 2.38% | 4.07% | 8.06% | 1.14% | 2.11% | 3.61% | 7.70% |
| **AS5** | 1.07% | 2.33% | 4.32% | 8.35% | 0.91% | 1.87% | 3.66% | 7.51% |
| **AS1 vs AS5** | -0.01% | -0.30% | -0.51% | -0.67% | -0.04% | -0.22% | -0.30%* | -0.35%** |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.34% | 0.60% | 1.00% | 9.45% | 0.19% | 0.29% | 0.48% | 4.32% |
| **AS2** | 0.15% | 0.67% | 0.89% | 6.25% | 0.09% | 0.14% | 0.08% | 2.75% |
| **AS3** | 0.17% | 0.47% | 0.84% | 2.92% | 0.11% | 0.14% | 0.28% | 1.74% |
| **AS4** | 0.18% | 0.61% | 1.01% | 5.61% | 0.15% | 0.33% | 0.69% | 2.86% |
| **AS5** | 0.31% | 0.56% | 1.13% | 5.33% | 0.19% | 0.28% | 0.67% | 3.22% |
| **AS1 vs AS5** | 0.03% | 0.04% | -0.13% | 4.12% | 0.00% | 0.01% | -0.20% | 1.09% |

**Panel C AUSTRIA**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 0.54% | 1.04% | 1.87% | 3.70% | 0.52% | 1.10% | 1.79% | 3.36% |
| **AS2** | 0.51% | 0.99% | 1.97% | 3.92% | 0.58% | 0.99% | 1.93% | 3.46% |
| **AS3** | 0.52% | 0.96% | 1.74% | 3.58% | 0.57% | 1.00% | 1.71% | 3.29% |
| **AS4** | 0.61% | 1.12% | 2.13% | 3.99% | 0.68% | 1.25% | 2.06% | 3.47% |
| **AS5** | 0.50% | 0.94% | 1.93% | 3.77% | 0.57% | 0.97% | 1.91% | 3.37% |
| **AS1 vs AS5** | 0.05% | 0.10% | -0.06% | -0.07% | -0.06% | 0.13% | -0.12% | -0.02% |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.42% | 0.94% | 2.04% | 2.93% | 0.24% | 0.55% | 1.11% | 1.33% |
| **AS2** | 0.56% | 0.91% | 1.87% | 2.90% | 0.38% | 0.50% | 0.93% | 1.13% |
| **AS3** | 0.38% | 0.77% | 1.55% | 2.38% | 0.22% | 0.34% | 0.67% | 0.85% |
| **AS4** | 0.37% | 0.66% | 1.44% | 2.88% | 0.20% | 0.30% | 0.70% | 1.16% |
| **AS5** | 0.30% | 0.72% | 1.14% | 1.96% | 0.22% | 0.48% | 0.64% | 0.96% |
| **AS1 vs AS5** | 0.13% | 0.21% | 0.90%*** | 0.97%*** | 0.02% | 0.06% | 0.47%*** | 0.37% |

**Panel D BELGIUM**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 0.38% | 0.33% | 1.35% | 1.65% | 0.34% | 0.50% | 1.40% | 1.84% |
| **AS2** | - | - | - | - | - | - | - | - |
| **AS3** | 1.94% | 3.98% | 5.74% | 6.58% | 2.10% | 3.99% | 5.65% | 6.87% |
| **AS4** | -0.02% | -0.22% | -0.14% | 0.17% | 0.09% | -0.22% | -0.10% | 0.25% |
| **AS5** | -0.39% | 0.66% | 2.49% | 4.10% | -0.39% | 0.74% | 2.34% | 3.79% |
| **AS1 vs AS5** | 0.77%** | -0.33% | -1.15% | -2.46%* | 0.73%** | -0.24% | -0.94% | -1.95%* |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.32% | 0.43% | 1.31% | 3.42% | 0.23% | 0.33% | 1.16% | 3.28% |
| **AS2** | - | - | - | - | - | - | - | - |
| **AS3** | 0.69% | 0.33% | 3.50% | 8.98% | 0.50% | -0.13% | 3.39% | 8.15% |
| **AS4** | 0.50% | 0.88% | 1.49% | 3.09% | 0.34% | 0.92% | 1.54% | 2.92% |
| **AS5** | -0.05% | -0.25% | 0.22% | 1.80% | -0.07% | -0.20% | 0.14% | 1.70% |
| **AS1 vs AS5** | 0.37% | 0.68% | 1.09%* | 1.61%** | 0.30% | 0.53% | 1.02% | 1.58%** |

**Panel E FRANCE**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 0.16% | 0.31% | 0.67% | 1.40% | 0.23% | 0.38% | 0.74% | 1.44% |
| **AS2** | 0.17% | 0.36% | 0.64% | 1.38% | 0.22% | 0.43% | 0.77% | 1.44% |
| **AS3** | 0.15% | 0.35% | 0.68% | 1.38% | 0.21% | 0.44% | 0.82% | 1.49% |
| **AS4** | 0.13% | 0.39% | 0.76% | 1.51% | 0.23% | 0.49% | 0.93% | 1.66% |
| **AS5** | 0.23% | 0.51% | 0.99% | 1.94% | 0.31% | 0.62% | 1.18% | 2.12% |
| **AS1 vs AS5** | -0.07%** | -0.20%*** | -0.32%*** | -0.60%*** | -0.10%*** | -0.26%*** | -0.47%*** | -0.74%*** |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.65% | 1.33% | 2.77% | 5.33% | 0.59% | 1.18% | 2.38% | 4.54% |
| **AS2** | 0.59% | 1.18% | 2.46% | 4.88% | 0.57% | 1.11% | 2.18% | 4.21% |
| **AS3** | 0.53% | 1.21% | 2.38% | 4.73% | 0.53% | 1.09% | 2.06% | 4.01% |
| **AS4** | 0.51% | 1.08% | 2.07% | 4.16% | 0.50% | 0.97% | 1.79% | 3.55% |
| **AS5** | 0.41% | 0.84% | 1.68% | 3.24% | 0.39% | 0.76% | 1.45% | 2.83% |
| **AS1 vs AS5** | 0.29%*** | 0.61%*** | 1.29%*** | 2.31%*** | 0.25%*** | 0.51%*** | 1.06%*** | 1.88%*** |

**Panel F GERMANY**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 0.30% | 0.50% | 0.87% | 1.71% | 0.24% | 0.47% | 0.80% | 1.71% |
| **AS2** | 0.34% | 0.78% | 1.33% | 2.25% | 0.31% | 0.66% | 1.19% | 2.26% |
| **AS3** | 0.47% | 0.72% | 1.29% | 2.45% | 0.37% | 0.69% | 1.24% | 2.40% |
| **AS4** | 0.43% | 0.74% | 1.38% | 2.48% | 0.32% | 0.68% | 1.24% | 2.41% |
| **AS5** | 0.48% | 0.84% | 1.49% | 2.75% | 0.37% | 0.76% | 1.38% | 2.69% |
| **AS1 vs AS5** | -0.18%** | -0.34%*** | -0.62%*** | -1.04%*** | -0.13%** | -0.28%*** | -0.58%*** | -0.98%*** |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.49% | 0.85% | 1.54% | 2.83% | 0.21% | 0.25% | 0.35% | 0.60% |
| **AS2** | 0.35% | 0.59% | 1.18% | 2.27% | 0.13% | 0.17% | 0.27% | 0.57% |
| **AS3** | 0.33% | 0.55% | 1.05% | 1.99% | 0.10% | 0.11% | 0.19% | 0.44% |
| **AS4** | 0.28% | 0.51% | 0.98% | 1.86% | 0.09% | 0.11% | 0.17% | 0.34% |
| **AS5** | 0.17% | 0.34% | 0.65% | 1.13% | 0.09% | 0.11% | 0.18% | 0.33% |
| **AS1 vs AS5** | 0.32%*** | 0.51%*** | 0.89%*** | 1.70%*** | 0.12%*** | 0.14%** | 0.17%** | 0.27%*** |

**Panel G ITALY**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 0.26% | 0.50% | 0.93% | 1.84% | 0.26% | 0.46% | 0.82% | 1.47% |
| **AS2** | 0.25% | 0.57% | 1.08% | 1.98% | 0.27% | 0.58% | 1.02% | 1.70% |
| **AS3** | 0.30% | 0.63% | 1.16% | 2.22% | 0.29% | 0.60% | 1.06% | 1.85% |
| **AS4** | 0.24% | 0.56% | 1.14% | 1.96% | 0.26% | 0.60% | 1.07% | 1.69% |
| **AS5** | 0.24% | 0.57% | 1.21% | 2.26% | 0.24% | 0.51% | 1.04% | 1.92% |
| **AS1 vs AS5** | 0.03% | -0.06% | -0.28%*** | -0.42%*** | 0.02% | -0.06% | -0.22%** | -0.45%*** |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.41% | 0.79% | 1.52% | 2.57% | 0.30% | 0.44% | 0.63% | 0.97% |
| **AS2** | 0.40% | 0.59% | 1.26% | 2.49% | 0.33% | 0.42% | 0.70% | 1.09% |
| **AS3** | 0.38% | 0.73% | 1.43% | 2.45% | 0.27% | 0.43% | 0.70% | 1.07% |
| **AS4** | 0.22% | 0.49% | 0.85% | 1.61% | 0.21% | 0.45% | 0.58% | 0.79% |
| **AS5** | 0.21% | 0.35% | 0.71% | 1.08% | 0.17% | 0.30% | 0.47% | 0.58% |
| **AS1 vs AS5** | 0.21%*** | 0.43%*** | 0.81%*** | 1.49%*** | 0.12%*** | 0.15%*** | 0.15%*** | 0.39%*** |

**Panel H SPAIN**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 0.21% | 0.49% | 1.02% | 1.87% | 0.20% | 0.40% | 0.72% | 1.16% |
| **AS2** | 0.20% | 0.47% | 0.90% | 1.66% | 0.13% | 0.39% | 0.63% | 1.01% |
| **AS3** | 0.16% | 0.47% | 0.93% | 1.73% | 0.13% | 0.36% | 0.58% | 0.97% |
| **AS4** | 0.19% | 0.48% | 1.04% | 1.84% | 0.15% | 0.42% | 0.73% | 1.11% |
| **AS5** | 0.17% | 0.39% | 0.77% | 1.61% | 0.18% | 0.41% | 0.63% | 1.15% |
| **AS1 vs AS5** | 0.04% | 0.10% | 0.25%** | 0.26%** | 0.03% | 0.00% | 0.10% | 0.01% |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.47% | 0.80% | 1.40% | 2.76% | 0.31% | 0.52% | 0.73% | 1.28% |
| **AS2** | 0.46% | 0.84% | 1.67% | 2.74% | 0.32% | 0.53% | 0.86% | 1.33% |
| **AS3** | 0.35% | 0.76% | 1.45% | 2.55% | 0.24% | 0.44% | 0.75% | 1.22% |
| **AS4** | 0.36% | 0.69% | 1.25% | 2.28% | 0.23% | 0.47% | 0.66% | 1.17% |
| **AS5** | 0.14% | 0.28% | 0.51% | 1.11% | 0.09% | 0.18% | 0.24% | 0.52% |
| **AS1 vs AS5** | 0.33%*** | 0.52%*** | 0.89%*** | 1.66%*** | 0.23%*** | 0.35%*** | 0.48%*** | 0.76%*** |

**Panel I FINLAND**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 0.46% | 0.99% | 2.05% | 4.10% | 0.29% | 0.74% | 1.36% | 2.87% |
| **AS2** | 0.50% | 1.04% | 2.02% | 4.09% | 0.41% | 0.81% | 1.44% | 2.98% |
| **AS3** | 0.50% | 1.12% | 2.16% | 4.50% | 0.37% | 0.88% | 1.53% | 3.23% |
| **AS4** | 0.57% | 1.36% | 2.60% | 5.34% | 0.43% | 1.03% | 1.80% | 3.90% |
| **AS5** | 0.60% | 1.38% | 2.65% | 5.50% | 0.49% | 1.11% | 1.93% | 4.10% |
| **AS1 vs AS5** | -0.14% | -0.39%** | -0.60%** | -1.40%*** | -0.19%** | -0.37%*** | -0.56%*** | -1.23%*** |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.49% | 0.84% | 1.46% | 2.50% | 0.25% | 0.43% | 0.73% | 1.15% |
| **AS2** | 0.46% | 0.83% | 1.38% | 2.40% | 0.24% | 0.49% | 0.73% | 1.18% |
| **AS3** | 0.43% | 0.74% | 1.33% | 2.52% | 0.26% | 0.46% | 0.75% | 1.30% |
| **AS4** | 0.34% | 0.64% | 1.04% | 1.80% | 0.23% | 0.38% | 0.54% | 0.85% |
| **AS5** | 0.26% | 0.46% | 0.80% | 1.36% | 0.15% | 0.26% | 0.40% | 0.64% |
| **AS1 vs AS5** | 0.23%*** | 0.38%*** | 0.66%*** | 1.14%*** | 0.10%** | 0.17%** | 0.33%*** | 0.51%*** |

**Panel J PORTUGAL**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1 Benchmark stocks** | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **AS1** | 0.47% | 1.18% | 2.21% | 4.42% | 0.56% | 1.37% | 2.56% | 4.66% |
| **AS2** | 0.54% | 1.11% | 2.08% | 4.59% | 0.56% | 1.26% | 2.42% | 4.80% |
| **AS3** | 0.54% | 1.13% | 2.19% | 4.60% | 0.55% | 1.18% | 2.36% | 4.42% |
| **AS4** | 0.55% | 1.22% | 2.11% | 4.56% | 0.57% | 1.29% | 2.29% | 4.50% |
| **AS5** | 0.58% | 1.34% | 2.50% | 5.43% | 0.59% | 1.34% | 2.53% | 4.98% |
| **AS1 vs AS5** | -0.11% | -0.17% | -0.29% | -1.01%* | -0.03% | 0.03% | 0.03% | -0.33% |
| **Subpanel 2 Non-Benchmark stocks** | | | | | | | | |
| **AS1** | 0.03% | 0.01% | 0.21% | 1.07% | 0.17% | 0.10% | 0.22% | 0.91% |
| **AS2** | 0.02% | 0.11% | 0.33% | 1.34% | 0.14% | 0.18% | 0.34% | 1.00% |
| **AS3** | 0.00% | 0.06% | 0.22% | 1.10% | 0.13% | 0.12% | 0.24% | 0.88% |
| **AS4** | -0.01% | 0.04% | 0.12% | 0.79% | 0.13% | 0.10% | 0.14% | 0.59% |
| **AS5** | 0.07% | 0.28% | 0.70% | 1.40% | 0.14% | 0.21% | 0.35% | 0.69% |
| **AS1 vs AS5** | -0.04% | -0.27%* | -0.49%* | -0.32%* | 0.04% | -0.12% | -0.13% | 0.22% |

# Appendix 3.3 Detailed results of dAS and domestic equity funds performance

This table presents the performance of domestic equity funds that are split into quintiles according to their level of active management as measured by dAS per country in panels from A to J. For each month, domestic equity funds are ranked into quintiles according to their level of active management. Q1 compiles those domestic equity funds with the highest value in the measure, while Q5 compiles those funds with the lowest value. The average of the performances for the next month *(t+1),* next quarter *(t+3),* next semester *(t+6)* and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns on market, size, value and momentum factors for each country. The last columns of the table give the average level of dAS of funds included in each quintile and the average percentage invested in non-benchmark stocks. The difference between the extreme quintiles (Q1-Q5) is calculated as well as its statistical significance. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

**Panel A NETHERLANDS**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | 0.87% | 1.54% | 2.49% | 4.25% | 0.61% | 1.43% | 2.21% | 3.34% | 11.22% | 31.39% |
| **d AS2** | 0.19% | 0.55% | 0.89% | 1.59% | 0.04% | 0.62% | 0.63% | 1.17% | 6.81% | 22.03% |
| **d AS3** | 0.61% | 0.90% | 3.38% | 7.20% | 0.29% | 0.90% | 3.11% | 4.88% | 5.76% | 22.19% |
| **d AS4** | -0.08% | 0.02% | 1.30% | 3.80% | -0.19% | 0.24% | 0.55% | 2.11% | 6.76% | 16.05% |
| **d AS5** | 0.25% | 0.13% | -0.13% | 0.86% | -0.21% | -0.26% | -0.64% | -1.07% | 5.07% | 19.52% |
| **d AS1 vs d AS5** | 0.63% | 1.42% | 2.62%* | 3.38%* | 0.82% | 1.70%** | 2.85%** | 4.41%** | 6.15% | 11.87% |

**Panel B GREECE**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | 0.38% | 0.14% | -0.25% | -0.52% | -0.32% | -0.86% | -1.56% | -1.41% | 17.99% | 28.85% |
| **d AS2** | 0.48% | 1.04% | 0.35% | -1.45% | 0.07% | -0.15% | -0.88% | -2.30% | 12.78% | 26.66% |
| **d AS3** | 0.42% | -0.18% | -1.18% | -3.18% | -0.05% | -1.06% | -2.30% | -3.87% | 10.98% | 28.55% |
| **d AS4** | 0.13% | 0.01% | -0.46% | -2.16% | -0.18% | -0.83% | -1.39% | -2.63% | 8.28% | 22.59% |
| **d AS5** | 0.20% | 0.09% | -0.25% | -1.36% | -0.35% | -0.98% | -1.53% | -2.31% | 6.91% | 24.93% |
| **d AS1 vs d AS5** | 0.18% | 0.06% | 0.00% | 0.84% | 0.03% | 0.12% | -0.02% | 0.90% | 11.08% | 3.92% |

**Panel C AUSTRIA**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | 1.37% | 2.50% | 3.82% | 6.02% | 1.29% | 2.43% | 3.59% | 4.91% | 14.09% | 29.10% |
| **d AS2** | 0.59% | 0.46% | 2.37% | 5.80% | 0.62% | 0.70% | 2.44% | 5.09% | 8.41% | 26.57% |
| **d AS3** | 0.69% | 0.40% | 2.08% | 3.86% | 0.68% | 0.58% | 1.88% | 2.70% | 6.30% | 24.40% |
| **d AS4** | 1.46% | 2.02% | 3.50% | 7.68% | 1.50% | 1.82% | 2.92% | 5.73% | 5.95% | 23.71% |
| **d AS5** | 0.89% | 1.37% | 2.88% | 3.40% | 0.84% | 1.27% | 2.50% | 2.05% | 3.48% | 19.27% |
| **d AS1 vs d AS5** | 0.49% | 1.13% | 0.94% | 2.62% | 0.45% | 1.16% | 1.08% | 2.86% | 10.62% | 9.83% |

**Panel D BELGIUM**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | -0.57% | -1.25% | 0.62% | 3.87% | -0.52% | -1.15% | 0.10% | 3.27% | 16.44% | 62.71% |
| **d AS2** | - | - | - | - | - | - | - | - | - | - |
| **d AS3** | -0.46% | 0.33% | 14.96% | 22.52% | -2.86% | -1.11% | 15.18% | 22.01% | 17.24% | 50.45% |
| **d AS4** | 0.47% | -0.76% | -1.63% | -3.69% | 0.23% | -0.87% | -1.65% | -3.82% | 10.07% | 59.93% |
| **d AS5** | -3.12% | -6.59% | -8.29% | -3.84% | -3.36% | -7.01% | -8.57% | -4.21% | 6.04% | 24.97% |
| **d AS1 vs d AS5** | 2.55% | 5.34% | 8.91%* | 7.71% | 2.84% | 5.86% | 8.67%* | 7.48% | 10.40% | 37.74% |

**Panel E FRANCE**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | 0.27% | -0.01% | 0.40% | 1.35% | 0.01% | -0.50% | -0.96% | -1.49% | 20.97% | 44.19% |
| **d AS2** | 0.28% | 0.14% | 0.33% | 0.96% | 0.07% | -0.23% | -0.75% | -1.38% | 10.81% | 41.16% |
| **d AS3** | 0.11% | 0.08% | 0.12% | 0.35% | -0.06% | -0.37% | -1.08% | -1.98% | 7.64% | 38.20% |
| **d AS4** | 0.20% | 0.20% | 0.21% | 0.67% | 0.08% | -0.17% | -0.71% | -1.36% | 5.67% | 35.50% |
| **d AS5** | 0.24% | 0.23% | 0.44% | 0.59% | 0.03% | -0.22% | -0.72% | -1.18% | 3.66% | 27.09% |
| **d AS1 vs d AS5** | 0.03% | -0.24% | -0.03% | 0.76% | -0.02% | -0.28% | -0.24% | -0.31% | 17.31% | 17.10% |

**Panel F GERMANY**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | 0.73% | 0.99% | 2.36% | 4.11% | -0.12% | -0.46% | -0.75% | -1.11% | 25.37% | 33.87% |
| **d AS2** | 0.65% | 0.85% | 1.60% | 3.35% | 0.06% | -0.30% | -1.07% | -1.80% | 11.55% | 26.03% |
| **d AS3** | 0.55% | 0.62% | 1.66% | 3.72% | -0.20% | -0.73% | -1.06% | -1.29% | 7.99% | 24.36% |
| **d AS4** | 0.41% | 0.94% | 1.88% | 3.62% | -0.14% | -0.21% | -0.63% | -1.19% | 6.40% | 23.40% |
| **d AS5** | 0.39% | 0.62% | 1.21% | 1.42% | -0.25% | -0.49% | -1.20% | -2.82% | 3.96% | 13.49% |
| **d AS1 vs d AS5** | 0.34%* | 0.38% | 1.14%*** | 2.69%*** | 0.13% | 0.04% | 0.46% | 1.71%*** | 21.41% | 20.38% |

**Panel G ITALY**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | 0.15% | -0.04% | -0.09% | -0.02% | -0.02% | -0.38% | -0.98% | -2.20% | 25.38% | 43.95% |
| **d AS2** | 0.16% | 0.00% | 0.13% | 0.16% | 0.07% | -0.24% | -0.41% | -1.20% | 12.99% | 35.96% |
| **d AS3** | 0.23% | 0.07% | 0.12% | -0.27% | 0.07% | -0.17% | -0.42% | -1.43% | 10.12% | 33.98% |
| **d AS4** | 0.08% | 0.10% | 0.11% | -0.09% | 0.05% | 0.03% | -0.31% | -1.29% | 8.23% | 32.74% |
| **d AS5** | 0.14% | 0.08% | 0.07% | 0.06% | -0.02% | -0.16% | -0.50% | -1.18% | 6.10% | 29.28% |
| **d AS1 vs d AS5** | 0.01% | -0.11% | -0.16% | -0.07% | 0.00% | -0.22% | -0.48%** | -1.02%*** | 19.28% | 14.67% |

**Panel H SPAIN**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | 0.11% | 0.01% | 0.09% | -0.11% | -0.07% | -0.27% | -0.72% | -2.00% | 26.53% | 32.57% |
| **d AS2** | 0.22% | 0.18% | 0.52% | 0.50% | -0.04% | -0.23% | -0.56% | -1.55% | 14.14% | 31.62% |
| **d AS3** | 0.09% | 0.22% | 0.56% | 1.01% | -0.05% | -0.16% | -0.36% | -0.92% | 9.33% | 28.33% |
| **d AS4** | 0.13% | 0.24% | 0.47% | 0.93% | -0.05% | -0.08% | -0.33% | -0.64% | 6.72% | 24.82% |
| **d AS5** | 0.03% | -0.04% | -0.23% | -0.24% | -0.07% | -0.21% | -0.67% | -1.34% | 3.16% | 12.55% |
| **d AS1 vs d AS5** | 0.09% | 0.05% | 0.32% | 0.13% | 0.00% | -0.06% | -0.04% | -0.66%** | 23.37% | 20.02% |

**Panel I FINLAND**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | 0.30% | 0.30% | 0.59% | 1.13% | -0.22% | -0.40% | -0.92% | -1.99% | 17.77% | 36.62% |
| **d AS2** | 0.33% | 0.53% | 0.48% | 0.69% | -0.12% | -0.23% | -1.06% | -2.29% | 11.56% | 34.00% |
| **d AS3** | 0.31% | 0.34% | 0.57% | 1.14% | -0.04% | -0.35% | -0.82% | -1.54% | 9.03% | 32.60% |
| **d AS4** | 0.34% | 0.40% | 0.59% | 1.15% | -0.02% | -0.36% | -1.02% | -1.76% | 7.72% | 25.49% |
| **d AS5** | 0.35% | 0.32% | 0.50% | 1.26% | -0.12% | -0.56% | -1.11% | -1.90% | 5.61% | 20.58% |
| **d AS1 vs d AS5** | -0.05% | -0.02% | 0.08% | -0.13% | -0.10% | 0.16% | 0.19% | -0.09% | 12.15% | 16.04% |

**Panel J PORTUGAL**

| | CAPM alpha | | | | Carhart alpha | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** | **(1)** | **(2)** |
| **d AS1** | -0.51% | -1.34% | -2.86% | -3.46% | -0.54% | -1.08% | -2.22% | -2.50% | 16.70% | 18.77% |
| **d AS2** | -0.43% | -0.67% | -1.71% | -2.19% | -0.22% | -0.31% | -0.85% | -1.27% | 12.19% | 18.54% |
| **d AS3** | -0.09% | -0.50% | -1.53% | -2.26% | 0.10% | -0.20% | -0.76% | -1.39% | 10.09% | 19.10% |
| **d AS4** | -0.32% | -1.37% | -2.54% | -3.25% | -0.23% | -0.95% | -1.89% | -2.39% | 8.84% | 18.07% |
| **d AS5** | 0.01% | -0.40% | -0.89% | -2.28% | 0.17% | -0.29% | -0.44% | -1.87% | 6.22% | 16.98% |
| **d AS1 vs d AS5** | -0.51% | -0.94% | -1.98%* | -1.19% | -0.70%* | -0.79%* | -1.78%* | -0.64% | 10.47% | 1.78% |

# Appendix 3.4 dAS and performance results by buying and selling decisions

This table presents the performance of the domestic equity funds split into quintiles according to their level of active management measured by dAS per country during the 2003-2018 period in panels from A to J. **Subpanel 1** presents the performance of domestic equity funds that are split into quintiles according to the variation of the differences between portfolio and benchmarks weights in two consecutive periods in those securities that have been bought and have contributed positively to the dAS. **Subpanel 2** presents the performance of domestic equity funds that are split into quintiles according to the variation in the differences between portfolio and benchmark weights in two consecutive periods in those securities that have been sold and have contributed negatively to the dAS. Each month, domestic equity funds are ranked into quintiles according to their level of variation. Q1 compiles those domestic equity funds with the highest value, while Q5 compiles those funds with the lowest value. Next, the average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns on market, size, value and momentum factors for each country analysed. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

**Panel A NETHERLANDS**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.63% | 1.13% | 1.90% | 3.42% | 0.18% | 1.02% | 1.63% | 2.56% |
| **d AS2** | 0.25% | 0.84% | 1.43% | 2.21% | -0.07% | 0.45% | 0.79% | 1.36% |
| **d AS3** | 0.34% | 0.53% | 2.84% | 6.31% | 0.24% | 0.76% | 2.61% | 4.17% |
| **d AS4** | -0.29% | -0.20% | 1.24% | 3.47% | -0.32% | -0.07% | 0.60% | 1.58% |
| **d AS5** | 0.60% | 0.69% | 0.62% | 2.05% | 0.26% | 0.55% | 0.21% | 0.53% |
| **d AS1 vs d AS5** | 0.03% | 0.44% | 1.28% | 1.36% | -0.08% | 0.47% | 1.42% | 2.03% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | 0.68% | 1.34% | 1.99% | 3.32% | 0.55% | 1.32% | 1.60% | 2.26% |
| **d AS2** | -0.12% | 0.46% | 1.47% | 2.00% | -0.47% | 0.44% | 0.37% | 0.67% |
| **d AS3** | 0.54% | -0.14% | 2.35% | 6.10% | 0.14% | 0.13% | 2.62% | 4.13% |
| **d AS4** | -0.07% | 0.19% | 1.65% | 3.92% | -0.20% | 0.29% | 1.17% | 2.64% |
| **d AS5** | 0.49% | 0.77% | 0.34% | 1.95% | 0.09% | 0.28% | -0.15% | 0.30% |
| **d AS1 vs d AS5** | 0.19% | 0.58% | 1.65% | 1.38% | 0.46% | 1.03% | 1.75% | 1.96% |

**Panel B GREECE**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.50% | 0.39% | -0.06% | -0.22% | -0.18% | -0.79% | -1.44% | -1.43% |
| **d AS2** | 0.17% | 0.31% | 0.05% | -0.89% | -0.22% | -0.54% | -1.05% | -1.92% |
| **d AS3** | 0.82% | 0.40% | -0.79% | -4.08% | 0.30% | -0.57% | -1.94% | -4.44% |
| **d AS4** | 0.23% | 0.13% | -0.62% | -2.58% | -0.10% | -0.72% | -1.38% | -3.13% |
| **d AS5** | 0.33% | 0.15% | -0.05% | -1.09% | -0.31% | -0.94% | -1.45% | -1.92% |
| **d AS1 vs d AS5** | 0.18% | 0.24% | -0.01% | 0.88% | 0.12% | 0.15% | 0.01% | 0.49% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | 0.38% | 0.33% | -0.15% | -1.14% | -0.24% | -0.83% | -1.58% | -2.18% |
| **d AS2** | 0.45% | 0.44% | -0.43% | -2.09% | -0.01% | -0.46% | -1.30% | -2.92% |
| **d AS3** | 0.52% | -0.09% | -0.90% | -2.20% | -0.02% | -1.28% | -2.18% | -2.84% |
| **d AS4** | 0.35% | 0.23% | 0.04% | -1.39% | -0.04% | -0.48% | -0.76% | -2.05% |
| **d AS5** | 0.30% | 0.31% | -0.09% | -1.27% | -0.28% | -0.77% | -1.51% | -2.17% |
| **d AS1 vs d AS5** | 0.08% | 0.02% | -0.06% | 0.14% | 0.04% | -0.06% | -0.07% | -0.01% |

**Panel C AUSTRIA**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 1.39% | 2.42% | 3.45% | 5.23% | 1.38% | 2.53% | 3.31% | 4.42% |
| **d AS2** | 0.78% | 1.16% | 3.60% | 7.78% | 0.85% | 1.29% | 3.25% | 6.07% |
| **d AS3** | 0.81% | 1.02% | 1.32% | 2.37% | 0.72% | 1.11% | 1.17% | 1.06% |
| **d AS4** | 1.30% | 1.48% | 3.25% | 7.19% | 1.40% | 1.32% | 3.14% | 5.72% |
| **d AS5** | 0.92% | 1.13% | 3.20% | 4.72% | 0.72% | 1.07% | 2.83% | 3.44% |
| **d AS1 vs d AS5** | 0.46% | 1.29% | 0.25% | 0.50% | 0.66% | 1.46%* | 0.48% | 0.97% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | 1.13% | 2.33% | 3.65% | 6.47% | 1.12% | 2.33% | 3.44% | 5.60% |
| **d AS2** | 1.01% | 0.80% | 2.25% | 4.49% | 1.03% | 0.84% | 2.07% | 3.34% |
| **d AS3** | 0.90% | 0.50% | 1.92% | 4.05% | 0.82% | 0.63% | 1.87% | 2.69% |
| **d AS4** | 1.23% | 2.30% | 4.87% | 8.95% | 1.23% | 2.20% | 4.45% | 7.13% |
| **d AS5** | 0.99% | 1.15% | 2.09% | 2.96% | 0.89% | 1.16% | 1.85% | 1.68% |
| **d AS1 vs d AS5** | 0.14% | 1.19% | 1.56% | 3.51% | 0.22% | 1.17% | 1.58% | 3.92%* |

**Panel D BELGIUM**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | -1.74% | -2.99% | -3.57% | 1.74% | -1.75% | -3.02% | -3.87% | 1.12% |
| **d AS2** | - | - | - | - | - | - | - | - |
| **d AS3** | -3.95% | -5.21% | -4.78% | 3.81% | -6.26% | -6.38% | -5.20% | 3.39% |
| **d AS4** | 0.31% | -0.64% | -1.19% | -3.83% | 0.17% | -0.71% | -1.15% | -3.91% |
| **d AS5** | -2.24% | -5.08% | -7.47% | -3.44% | -2.39% | -5.73% | -8.00% | -3.80% |
| **d AS1 vs d AS5** | 0.50% | 2.09% | 3.90% | 5.18% | 0.63% | 2.71% | 4.14% | 4.92% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | -0.21% | -2.97% | -2.78% | 3.05% | -0.82% | -3.15% | -3.22% | 2.24% |
| **d AS2** | - | - | - | - | - | - | - | - |
| **d AS3** | -12.09% | -15.26% | -18.61% | -9.44% | -12.18% | -16.17% | -18.30% | -9.87% |
| **d AS4** | 0.31% | -0.64% | -1.19% | -3.83% | 0.17% | -0.71% | -1.15% | -3.91% |
| **d AS5** | -1.97% | -2.74% | -5.30% | -1.63% | -2.01% | -3.29% | -5.81% | -1.81% |
| **d AS1 vs d AS5** | 1.77% | -0.23% | 2.52% | 4.68% | 1.19% | 0.14% | 2.59% | 4.05% |

**Panel E FRANCE**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.22% | -0.02% | 0.40% | 1.34% | -0.03% | -0.46% | -0.87% | -1.30% |
| **d AS2** | 0.27% | 0.19% | 0.44% | 0.71% | 0.06% | -0.26% | -0.76% | -1.65% |
| **d AS3** | 0.27% | 0.15% | 0.25% | 0.74% | 0.08% | -0.26% | -0.79% | -1.53% |
| **d AS4** | 0.21% | 0.19% | 0.46% | 0.77% | 0.08% | -0.16% | -0.60% | -1.28% |
| **d AS5** | 0.15% | 0.17% | 0.18% | 0.54% | -0.07% | -0.28% | -0.92% | -1.51% |
| **d AS1 vs d AS5** | 0.07% | -0.19% | 0.22% | 0.80% | 0.04% | -0.18% | 0.05% | 0.20% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | 0.24% | 0.06% | 0.55% | 1.34% | -0.02% | -0.39% | -0.76% | -1.29% |
| **d AS2** | 0.24% | 0.16% | 0.35% | 0.91% | 0.06% | -0.36% | -0.87% | -1.60% |
| **d AS3** | 0.25% | 0.25% | 0.42% | 0.81% | 0.07% | -0.14% | -0.66% | -1.32% |
| **d AS4** | 0.16% | 0.02% | 0.15% | 0.29% | -0.01% | -0.39% | -0.97% | -1.83% |
| **d AS5** | 0.23% | 0.19% | 0.26% | 0.76% | 0.02% | -0.15% | -0.70% | -1.22% |
| **d AS1 vs d AS5** | 0.01% | -0.13% | 0.29% | 0.58% | -0.04% | -0.25% | -0.06%** | -0.06%** |

**Panel F GERMANY**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.66% | 0.88% | 1.88% | 3.29% | -0.08% | -0.45% | -0.95% | -1.78% |
| **d AS2** | 0.57% | 0.88% | 2.11% | 4.29% | -0.18% | -0.66% | -1.03% | -1.49% |
| **d AS3** | 0.54% | 0.85% | 1.60% | 2.74% | -0.12% | -0.47% | -1.12% | -1.94% |
| **d AS4** | 0.49% | 0.87% | 1.88% | 3.35% | -0.18% | -0.29% | -0.89% | -1.90% |
| **d AS5** | 0.52% | 0.70% | 1.45% | 2.81% | -0.08% | -0.33% | -0.87% | -1.35% |
| **d AS1 vs d AS5** | 0.13% | 0.18% | 0.43% | 0.48% | 0.01% | -0.12% | -0.08% | -0.43% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | 0.74% | 1.00% | 2.19% | 3.79% | -0.04% | -0.39% | -0.72% | -1.21% |
| **d AS2** | 0.63% | 1.00% | 2.16% | 3.99% | -0.08% | -0.42% | -1.02% | -1.92% |
| **d AS3** | 0.58% | 0.72% | 1.69% | 3.56% | -0.18% | -0.53% | -0.85% | -1.26% |
| **d AS4** | 0.49% | 0.94% | 1.78% | 3.10% | -0.07% | -0.28% | -0.95% | -1.83% |
| **d AS5** | 0.35% | 0.51% | 1.11% | 2.12% | -0.27% | -0.57% | -1.29% | -2.21% |
| **d AS1 vs d AS5** | 0.39%** | 0.49%*** | 1.08%*** | 1.67%*** | 0.23% | 0.17% | 0.56%** | 0.99%*** |

**Panel G ITALY**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.15% | 0.11% | -0.03% | 0.00% | 0.00% | -0.25% | -0.89% | -2.07% |
| **d AS2** | 0.14% | -0.04% | 0.09% | -0.19% | 0.05% | -0.25% | -0.41% | -1.47% |
| **d AS3** | 0.17% | 0.17% | 0.25% | 0.12% | -0.02% | -0.15% | -0.38% | -1.17% |
| **d AS4** | 0.24% | 0.03% | 0.05% | 0.13% | 0.17% | -0.11% | -0.43% | -1.16% |
| **d AS5** | 0.12% | 0.18% | 0.19% | 0.05% | -0.01% | -0.02% | -0.40% | -1.22% |
| **d AS1 vs d AS5** | 0.04% | -0.07% | -0.22% | -0.05% | 0.01% | -0.23%* | -0.49%** | -0.86%** |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | 0.14% | 0.02% | -0.03% | -0.04% | -0.02% | -0.37% | -0.89% | -2.03% |
| **d AS2** | 0.17% | 0.02% | 0.03% | 0.13% | 0.04% | -0.21% | -0.48% | -1.27% |
| **d AS3** | 0.20% | 0.24% | 0.23% | -0.06% | 0.07% | -0.06% | -0.38% | -1.34% |
| **d AS4** | 0.09% | 0.03% | 0.22% | 0.37% | 0.07% | -0.04% | -0.28% | -0.89% |
| **d AS5** | 0.21% | 0.14% | 0.09% | -0.30% | 0.04% | -0.11% | -0.50% | -1.58% |
| **d AS1 vs d AS5** | -0.07% | -0.12% | -0.12% | 0.26% | -0.06% | -0.26%* | -0.39%** | -0.44%*** |

**Panel H SPAIN**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.11% | 0.03% | 0.10% | -0.29% | -0.05% | -0.29% | -0.65% | -2.04% |
| **d AS2** | 0.23% | 0.23% | 0.55% | 0.69% | -0.02% | -0.18% | -0.55% | -1.39% |
| **d AS3** | 0.04% | 0.10% | 0.36% | 0.89% | -0.11% | -0.19% | -0.46% | -0.78% |
| **d AS4** | 0.13% | 0.21% | 0.33% | 0.50% | -0.02% | -0.10% | -0.41% | -1.01% |
| **d AS5** | 0.05% | -0.01% | -0.04% | 0.17% | -0.05% | -0.18% | -0.55% | -1.13% |
| **d AS1 vs d AS5** | 0.06% | 0.04% | 0.14% | -0.46% | 0.00% | -0.11% | -0.10% | -0.91%*** |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | 0.10% | -0.08% | -0.03% | -0.45% | -0.05% | -0.34% | -0.79% | -2.21% |
| **d AS2** | 0.20% | 0.21% | 0.54% | 0.88% | -0.04% | -0.16% | -0.43% | -1.09% |
| **d AS3** | 0.07% | 0.27% | 0.45% | 0.83% | -0.10% | -0.11% | -0.41% | -0.90% |
| **d AS4** | 0.07% | 0.16% | 0.38% | 0.54% | -0.06% | -0.16% | -0.44% | -1.00% |
| **d AS5** | 0.11% | 0.00% | -0.01% | 0.16% | -0.01% | -0.16% | -0.52% | -1.14% |
| **d AS1 vs d AS5** | -0.01% | -0.08% | -0.01% | -0.61%** | -0.04% | -0.17% | -0.28% | -1.06%*** |

**Panel I FINLAND**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.31% | 0.36% | 0.56% | 1.21% | -0.13% | -0.29% | -0.84% | -1.70% |
| **d AS2** | 0.25% | 0.27% | 0.40% | 0.76% | -0.15% | -0.45% | -1.16% | -2.14% |
| **d AS3** | 0.33% | 0.42% | 0.56% | 1.09% | -0.06% | -0.25% | -0.90% | -1.80% |
| **d AS4** | 0.38% | 0.47% | 0.75% | 1.46% | -0.09% | -0.50% | -0.94% | -1.70% |
| **d AS5** | 0.41% | 0.50% | 0.75% | 1.31% | -0.07% | -0.38% | -1.02% | -2.01% |
| **d AS1 vs d AS5** | -0.11% | -0.14% | -0.20% | -0.10% | -0.06% | 0.09% | 0.18% | 0.32% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | 0.28% | 0.35% | 0.47% | 1.20% | -0.20% | -0.37% | -1.01% | -1.84% |
| **d AS2** | 0.26% | 0.45% | 0.65% | 1.07% | -0.17% | -0.29% | -0.88% | -1.73% |
| **d AS3** | 0.35% | 0.36% | 0.59% | 0.91% | -0.05% | -0.37% | -0.93% | -2.22% |
| **d AS4** | 0.48% | 0.48% | 0.70% | 1.50% | 0.02% | -0.31% | -0.93% | -1.62% |
| **d AS5** | 0.32% | 0.39% | 0.65% | 1.16% | -0.09% | -0.52% | -1.09% | -1.92% |
| **d AS1 vs d AS5** | -0.04% | -0.04% | -0.18% | 0.04% | -0.11% | 0.15% | 0.08% | 0.07% |

**Panel J PORTUGAL**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})>0$** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | -0.07% | -0.64% | -1.38% | -2.51% | 0.09% | -0.22% | -0.60% | -1.53% |
| **d AS2** | -0.30% | -0.96% | -2.40% | -2.95% | -0.10% | -0.61% | -1.79% | -2.22% |
| **d AS3** | -0.36% | -0.96% | -1.77% | -3.02% | -0.28% | -0.66% | -0.98% | -2.17% |
| **d AS4** | 0.04% | -0.39% | -1.06% | -1.97% | 0.12% | -0.26% | -0.66% | -1.57% |
| **d AS5** | -0.66% | -0.95% | -1.88% | -1.22% | -0.67% | -0.83% | -1.53% | -0.56% |
| **d AS1 vs d AS5** | 0.59%* | 0.31% | 0.50%* | -1.29% | 0.76%* | 0.61% | 0.93%* | -0.97% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})<0$** | | | | | | | | |
| **d AS1** | -0.34% | -0.74% | -1.18% | -1.39% | -0.34% | -0.43% | -0.37% | -0.43% |
| **d AS2** | -0.19% | -0.85% | -1.98% | -2.84% | 0.01% | -0.64% | -1.50% | -2.34% |
| **d AS3** | -0.33% | -1.12% | -2.43% | -3.66% | -0.16% | -0.86% | -1.80% | -2.82% |
| **d AS4** | 0.02% | -0.48% | -1.08% | -2.08% | 0.19% | -0.26% | -0.50% | -1.58% |
| **d AS5** | -0.53% | -0.65% | -1.76% | -1.48% | -0.65% | -0.45% | -1.53% | -0.80% |
| **d AS1 vs d AS5** | 0.19% | -0.09% | 0.57%* | 0.08% | 0.31%* | 0.02% | 1.16% | 0.38% |

# Appendix 3.5 dAS and performance results by trading decisions collecting manager's convictions

This table presents the performance of the domestic equity funds that are split into quintiles according to their level of active management measured by dAS per country during the 2003-2018 period in panels from A to J. **Subpanel 1** presents the performance of domestic equity funds split into quintiles according to the variation of the differences between portfolio and benchmark weights in two consecutive periods in those securities that (1) have been bought, (2) have contributed positively to the dAS, and (3) have increased their level of overweight from period *t-1* to period t. **Subpanel 2** presents the performance of domestic equity funds split into quintiles according to the variation in the differences between portfolio and benchmark weights in two consecutive periods in those securities that (1) have been sold, (2) have contributed negatively to the dAS and (3) have increased their level of underweight from period *t-1* to period t. Each month, domestic equity funds are ranked into quintiles according to their level of variation. Q1 compiles those domestic equity funds with the highest value, while Q5 compiles those funds with the lowest value. Next, the average of the performances for the next month *(t+1)*, next quarter *(t+3)*, next semester *(t+6)*, and next year *(t+12)* is calculated for each quintile. The performance measures used are the alphas from CAPM and the 4-factor model. We compute alphas as the intercept in the regression of benchmark-adjusted fund returns on market, size, value, and momentum factors for each country. The *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

**Panel A NETHERLANDS**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^p_{i,t}-w^b_{i,t})-(w^p_{i,t-1}-w^b_{i,t-1})$ >0 and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.69% | 1.00% | 2.23% | 3.84% | 0.43% | 1.01% | 1.81% | 2.62% |
| **d AS2** | 0.27% | 1.12% | 1.55% | 2.22% | 0.09% | 0.88% | 1.12% | 0.96% |
| **d AS3** | 0.28% | 0.61% | 2.71% | 7.33% | -0.15% | 0.44% | 2.51% | 5.24% |
| **d AS4** | -0.26% | -0.32% | 0.87% | 2.47% | -0.39% | -0.15% | 0.40% | 1.32% |
| **d AS5** | 0.54% | 0.73% | 0.54% | 1.73% | 0.19% | 0.54% | -0.06% | 0.15% |
| **d AS1 vs d AS5** | 0.15% | 0.27% | 1.68% | 2.11% | 0.24% | 0.48% | 1.87% | 2.47% |
| **Subpanel 2: Selling decisions with $(w^p_{i,t}-w^b_{i,t})-(w^p_{i,t-1}-w^b_{i,t-1})$ <0 and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | 0.39% | 0.89% | 1.90% | 3.56% | 0.24% | 0.86% | 1.33% | 2.14% |
| **d AS2** | -0.21% | 0.28% | 1.87% | 1.46% | -0.75% | -0.19% | 0.65% | 0.41% |
| **d AS3** | 0.50% | 0.33% | 2.03% | 6.34% | 0.27% | 0.46% | 1.81% | 4.31% |
| **d AS4** | 0.15% | 0.72% | 1.64% | 5.02% | 0.19% | 0.92% | 1.23% | 3.00% |
| **d AS5** | 0.71% | 0.54% | 0.23% | 0.57% | 0.15% | 0.32% | 0.35% | -0.05% |
| **d AS1 vs d AS5** | -0.31% | 0.35% | 1.67% | 2.98% | 0.09% | 0.54% | 0.98% | 2.19% |

**Panel B GREECE**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ >0 and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.40% | 0.12% | -0.09% | -0.81% | -0.24% | -0.93% | -1.33% | -1.78% |
| **d AS2** | 0.30% | 0.44% | -0.18% | -1.31% | -0.13% | -0.58% | -1.13% | -1.84% |
| **d AS3** | 0.67% | 0.01% | -0.98% | -4.36% | 0.14% | -0.77% | -1.98% | -5.02% |
| **d AS4** | 0.30% | 0.43% | -0.13% | -1.44% | -0.08% | -0.43% | -1.26% | -2.42% |
| **d AS5** | 0.35% | 0.30% | -0.14% | -1.04% | -0.25% | -0.91% | -1.59% | -1.97% |
| **d AS1 vs d AS5** | 0.04% | -0.17% | 0.05% | 0.23% | 0.01% | -0.01%* | 0.26% | 0.19% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ <0 and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | 0.21% | 0.01% | -0.47% | -1.93% | -0.30% | -1.03% | -1.63% | -2.62% |
| **d AS2** | 0.32% | 0.21% | -0.27% | -1.80% | -0.11% | -0.80% | -1.65% | -3.22% |
| **d AS3** | 0.31% | 0.51% | -0.32% | -3.38% | -0.05% | -0.93% | -1.93% | -3.51% |
| **d AS4** | 0.47% | 0.41% | 0.16% | 0.59% | -0.17% | -0.38% | -0.71% | -0.42% |
| **d AS5** | 0.61% | 0.32% | -0.36% | -1.95% | 0.00% | -0.60% | -1.42% | -2.67% |
| **d AS1 vs d AS5** | -0.39% | -0.31% | -0.11% | 0.02% | -0.30% | -0.43%* | 0.21% | 0.04% |

**Panel C AUSTRIA**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ >0 and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 1.39% | 2.55% | 4.70% | 6.27% | 1.36% | 2.63% | 4.46% | 5.36% |
| **d AS2** | 0.96% | 1.15% | 2.52% | 5.69% | 0.88% | 1.12% | 2.55% | 4.22% |
| **d AS3** | 0.62% | 1.02% | 1.96% | 4.79% | 0.67% | 1.12% | 1.83% | 3.45% |
| **d AS4** | 1.41% | 1.78% | 3.75% | 8.07% | 1.40% | 1.73% | 3.30% | 6.48% |
| **d AS5** | 0.82% | 0.75% | 1.91% | 2.53% | 0.73% | 0.73% | 1.65% | 1.34% |
| **d AS1 vs d AS5** | 0.56% | 1.80%* | 2.79%* | 3.74%* | 0.62% | 1.90%** | 2.80%** | 4.02%** |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ <0 and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | 0.93% | 1.41% | 2.71% | 4.20% | 0.97% | 1.57% | 2.65% | 3.29% |
| **d AS2** | 0.83% | 0.84% | 1.82% | 3.47% | 0.83% | 0.86% | 1.70% | 2.35% |
| **d AS3** | 1.34% | 2.36% | 4.92% | 7.93% | 1.18% | 2.05% | 4.44% | 5.93% |
| **d AS4** | 1.30% | 1.42% | 2.59% | 6.43% | 1.20% | 1.44% | 2.31% | 5.02% |
| **d AS5** | 0.84% | 1.27% | 3.05% | 5.21% | 0.89% | 1.42% | 2.85% | 4.07% |
| **d AS1 vs d AS5** | 0.10% | 0.14% | -0.34% | -1.01% | 0.07% | 0.15% | -0.19% | -0.78% |

**Panel D BELGIUM**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ >0 and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | -1.54% | -2.50% | -2.46% | 3.25% | -1.98% | -2.80% | -2.88% | 2.51% |
| **d AS2** | - | - | - | - | - | - | - | - |
| **d AS3** | -3.62% | -5.47% | -1.64% | 5.69% | -4.32% | -6.18% | -2.22% | 5.37% |
| **d AS4** | 0.31% | -0.64% | -1.19% | -3.83% | 0.17% | -0.71% | -1.15% | -3.91% |
| **d AS5** | -2.52% | -5.53% | -9.74% | -8.17% | -2.59% | -6.01% | -10.09% | -8.40% |
| **d AS1 vs d AS5** | 0.98% | 3.03% | 7.28% | 11.42%* | 0.61% | 3.21% | 7.21% | 10.91%* |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ <0 and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | -0.44% | -2.45% | -1.35% | 4.34% | -1.13% | -2.84% | -1.80% | 3.60% |
| **d AS2** | - | - | - | - | - | - | - | - |
| **d AS3** | -8.43% | -10.94% | -11.31% | -3.32% | -7.94% | -11.86% | -11.14% | -3.21% |
| **d AS4** | 0.26% | -0.61% | -0.85% | -2.79% | 0.11% | -0.67% | -0.91% | -2.97% |
| **d AS5** | -2.06% | -4.26% | -10.52% | -10.25% | -2.27% | -4.61% | -10.99% | -10.47% |
| **d AS1 vs d AS5** | 1.62% | 1.80% | 9.17% | 14.59%** | 1.14% | 1.77% | 9.19% | 14.07%** |

**Panel E FRANCE**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ >0 and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.34% | 0.19% | 0.65% | 1.55% | 0.07% | -0.27% | -0.64% | -1.16% |
| **d AS2** | 0.23% | 0.16% | 0.38% | 0.99% | 0.03% | -0.35% | -0.91% | -1.56% |
| **d AS3** | 0.21% | 0.15% | 0.08% | 0.59% | 0.02% | -0.24% | -0.95% | -1.64% |
| **d AS4** | 0.17% | 0.05% | 0.45% | 0.56% | 0.04% | -0.30% | -0.56% | -1.38% |
| **d AS5** | 0.17% | 0.11% | 0.16% | 0.41% | -0.04% | -0.27% | -0.91% | -1.54% |
| **d AS1 vs d AS5** | 0.17% | 0.08% | 0.49% | 1.13%*** | 0.10% | 0.00% | 0.27% | 0.38% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ <0 and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | 0.13% | 0.04% | 0.40% | 0.81% | -0.14% | -0.43% | -0.78% | -1.42% |
| **d AS2** | 0.18% | 0.21% | 0.08% | 0.34% | -0.08% | -0.25% | -0.96% | -1.65% |
| **d AS3** | 0.12% | -0.07% | 0.51% | 0.66% | 0.00% | -0.40% | -0.64% | -1.64% |
| **d AS4** | 0.34% | 0.29% | 0.25% | 0.94% | 0.17% | -0.17% | -0.87% | -1.47% |
| **d AS5** | 0.74% | 0.11% | 1.68% | 3.84% | 0.39% | 0.06% | 0.05% | 1.19% |
| **d AS1 vs d AS5** | -0.61%** | -0.07% | -1.28%*** | -3.03%*** | -0.53%** | -0.49%*** | -0.83%*** | -2.61%*** |

**Panel F GERMANY**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^p_{i,t}-w^b_{i,t})-(w^p_{i,t-1}-w^b_{i,t-1})>0$ and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.74% | 1.03% | 2.12% | 3.76% | -0.06% | -0.41% | -0.82% | -1.45% |
| **d AS2** | 0.53% | 1.03% | 1.96% | 4.45% | -0.21% | -0.47% | -1.24% | -1.62% |
| **d AS3** | 0.46% | 0.73% | 1.50% | 2.56% | -0.23% | -0.61% | -1.25% | -2.34% |
| **d AS4** | 0.42% | 0.76% | 2.10% | 3.43% | -0.21% | -0.27% | -0.41% | -1.16% |
| **d AS5** | 0.62% | 0.62% | 1.20% | 2.27% | 0.06% | -0.44% | -1.15% | -1.90% |
| **d AS1 vs d AS5** | 0.13% | 0.41% | 0.92%*** | 1.49%*** | -0.12% | 0.03% | 0.33% | 0.46% |
| **Subpanel 2: Selling decisions with $(w^p_{i,t}-w^b_{i,t})-(w^p_{i,t-1}-w^b_{i,t-1})<0$ and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | 0.73% | 0.92% | 1.71% | 3.31% | 0.05% | -0.41% | -1.08% | -1.69% |
| **d AS2** | 0.61% | 1.06% | 2.29% | 4.24% | -0.07% | -0.36% | -0.70% | -1.30% |
| **d AS3** | 0.79% | 1.16% | 2.17% | 3.65% | 0.08% | -0.14% | -0.72% | -1.44% |
| **d AS4** | 0.29% | 0.40% | 1.22% | 2.98% | -0.38% | -0.57% | -1.10% | -1.94% |
| **d AS5** | 0.38% | 0.70% | 1.62% | 2.32% | -0.29% | -0.70% | -1.21% | -2.03% |
| **d AS1 vs d AS5** | 0.35%* | 0.22% | 0.09% | 1.00%* | 0.34% | 0.29% | 0.13% | 0.33% |

**Panel G ITALY**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^p_{i,t}-w^b_{i,t})-(w^p_{i,t-1}-w^b_{i,t-1})>0$ and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.11% | 0.05% | 0.02% | -0.09% | -0.03% | -0.30% | -0.79% | -1.90% |
| **d AS2** | 0.30% | 0.06% | -0.04% | 0.09% | 0.16% | -0.14% | -0.61% | -1.44% |
| **d AS3** | 0.23% | 0.39% | 0.52% | 0.68% | 0.08% | 0.05% | -0.19% | -0.75% |
| **d AS4** | 0.10% | -0.03% | -0.02% | -0.22% | 0.01% | -0.19% | -0.48% | -1.37% |
| **d AS5** | 0.09% | -0.04% | 0.06% | -0.35% | 0.00% | -0.20% | -0.47% | -1.61% |
| **d AS1 vs d AS5** | 0.02% | 0.09% | -0.04% | 0.27% | -0.03% | -0.10% | -0.32%* | -0.29% |
| **Subpanel 2: Selling decisions with $(w^p_{i,t}-w^b_{i,t})-(w^p_{i,t-1}-w^b_{i,t-1})<0$ and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | 0.23% | 0.12% | 0.14% | -0.01% | 0.10% | -0.21% | -0.60% | -1.68% |
| **d AS2** | 0.19% | 0.27% | 0.26% | 0.54% | 0.06% | -0.03% | -0.37% | -0.91% |
| **d AS3** | 0.16% | 0.00% | 0.06% | -0.01% | 0.03% | -0.20% | -0.46% | -1.30% |
| **d AS4** | 0.11% | 0.07% | 0.07% | -0.29% | -0.04% | -0.18% | -0.52% | -1.63% |
| **d AS5** | 0.13% | -0.03% | 0.02% | -0.05% | 0.05% | -0.15% | -0.59% | -1.48% |
| **d AS1 vs d AS5** | 0.10% | 0.15% | 0.12% | 0.04% | 0.04% | -0.06% | -0.01% | -0.21% |

**Panel H SPAIN**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ >0 and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.24% | 0.26% | 0.60% | 0.63% | -0.05% | -0.18% | -0.45% | -1.49% |
| **d AS2** | 0.12% | 0.17% | 0.50% | 0.83% | -0.04% | -0.20% | -0.42% | -1.04% |
| **d AS3** | 0.15% | 0.15% | 0.22% | 0.36% | 0.00% | -0.11% | -0.53% | -1.26% |
| **d AS4** | 0.06% | 0.08% | 0.11% | 0.10% | -0.03% | -0.16% | -0.56% | -1.36% |
| **d AS5** | 0.00% | -0.10% | -0.16% | -0.03% | -0.13% | -0.29% | -0.66% | -1.21% |
| **d AS1 vs d AS5** | 0.24%** | 0.36%** | 0.76%*** | 0.65%** | 0.08% | 0.11% | 0.21% | -0.28% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ <0 and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | -0.02% | -0.03% | -0.07% | -0.45% | -0.15% | -0.29% | -0.76% | -2.03% |
| **d AS2** | 0.26% | 0.20% | 0.21% | 0.42% | 0.09% | -0.11% | -0.58% | -1.09% |
| **d AS3** | 0.06% | 0.13% | 0.44% | 0.78% | -0.04% | -0.13% | -0.27% | -0.84% |
| **d AS4** | 0.19% | 0.26% | 0.49% | 0.74% | -0.06% | -0.16% | -0.45% | -1.11% |
| **d AS5** | -0.02% | -0.40% | -0.29% | -0.20% | -0.16% | -0.47% | -0.91% | -1.92% |
| **d AS1 vs d AS5** | 0.00%* | 0.37% | 0.22% | -0.24% | 0.01%* | 0.19% | 0.15% | -0.12% |

**Panel I FINLAND**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ >0 and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | 0.31% | 0.43% | 0.50% | 0.88% | -0.15% | -0.44% | -1.08% | -2.31% |
| **d AS2** | 0.31% | 0.35% | 0.46% | 0.99% | -0.10% | -0.35% | -1.07% | -1.92% |
| **d AS3** | 0.32% | 0.36% | 0.78% | 1.22% | -0.06% | -0.47% | -0.97% | -1.84% |
| **d AS4** | 0.36% | 0.41% | 0.70% | 1.60% | -0.15% | -0.43% | -0.95% | -1.58% |
| **d AS5** | 0.38% | 0.47% | 0.61% | 1.18% | -0.02% | -0.18% | -0.80% | -1.66% |
| **d AS1 vs d AS5** | -0.07% | -0.05% | -0.11% | -0.30% | -0.13% | -0.26% | -0.28% | -0.65%* |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ <0 and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | 0.34% | 0.21% | 0.48% | 1.12% | -0.06% | -0.40% | -0.91% | -1.78% |
| **d AS2** | 0.42% | 0.48% | 0.80% | 1.49% | -0.06% | -0.31% | -0.79% | -1.58% |
| **d AS3** | 0.39% | 0.40% | 0.74% | 1.67% | -0.15% | -0.23% | -0.89% | -1.66% |
| **d AS4** | 0.36% | 0.78% | 0.88% | 1.01% | -0.20% | -0.49% | -1.07% | -2.17% |
| **d AS5** | 0.09% | -0.10% | -0.17% | 0.34% | 0.05% | -0.41% | -1.26% | -2.15% |
| **d AS1 vs d AS5** | 0.25% | 0.31% | 0.65% | 0.78% | -0.11% | 0.01% | 0.35% | 0.36% |

**Panel J PORTUGAL**

| | CAPM alpha | | | | Carhart alpha | | | |
|---|---|---|---|---|---|---|---|---|
| **Subpanel 1: Buying decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ >0 and a higher overweight in period *t*** | | | | | | | | |
| | **t+1** | **t+3** | **t+6** | **t+12** | **t+1** | **t+3** | **t+6** | **t+12** |
| **d AS1** | -0.64% | -1.49% | -2.93% | -3.36% | -0.67% | -1.30% | -2.30% | -2.42% |
| **d AS2** | -0.19% | -0.69% | -1.77% | -2.57% | 0.05% | -0.25% | -1.00% | -1.72% |
| **d AS3** | -0.23% | -0.48% | -1.16% | -1.36% | -0.15% | -0.12% | -0.42% | -0.53% |
| **d AS4** | -0.16% | -0.78% | -1.84% | -3.17% | 0.05% | -0.54% | -1.23% | -2.49% |
| **d AS5** | -0.09% | -0.76% | -1.74% | -2.98% | 0.01% | -0.53% | -1.15% | -2.26% |
| **d AS1 vs d AS5** | -0.55% | -0.73% | -1.20% | -0.38% | -0.68% | -0.77% | -1.16% | -0.16% |
| **Subpanel 2: Selling decisions with $(w^{p}_{i,t}-w^{b}_{i,t})-(w^{p}_{i,t-1}-w^{b}_{i,t-1})$ <0 and a higher underweight in period *t*** | | | | | | | | |
| **d AS1** | -0.31% | -1.01% | -1.95% | -2.49% | -0.27% | -0.61% | -1.22% | -1.47% |
| **d AS2** | -0.33% | -0.70% | -1.97% | -2.67% | -0.18% | -0.38% | -1.29% | -1.66% |
| **d AS3** | -0.25% | -0.98% | -1.93% | -2.61% | -0.10% | -0.80% | -1.29% | -1.87% |
| **d AS4** | -0.27% | -0.73% | -1.76% | -2.99% | -0.13% | -0.54% | -1.13% | -2.19% |
| **d AS5** | -0.18% | -0.89% | -2.01% | -2.94% | -0.08% | -0.57% | -1.38% | -2.48% |
| **d AS1 vs d AS5** | -0.13% | -0.12% | 0.06% | 0.44% | -0.19% | -0.04% | 0.16% | 1.01% |

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# Main Conclusions

In this section, we summarize the main conclusions of this dissertation. Its main objectives were to contribute to the topic of the Active Share (AS) as applied to mutual funds in Eurozone countries. This investigation was mainly motivated by the need to analyse how both the level of concentration of the benchmarks and the level of concentration of the mutual fund industries in the Eurozone affect active management. Due to the scarce number of studies focused on this topic in Europe our results have relevant implications to investors, market supervisors, and policymakers.

In Chapter 1, we analysed how article 52 in Directive 2009/65/EC (UCITS IV) on risk of portfolio diversification could distort the accuracy of AS due to the higher level of concentration in Eurozone domestic benchmarks. In this chapter, we were able to identify truly active management in Eurozone mutual funds. Thus, we developed an algorithm to capture the spurious AS (sAS), which is defined as the minimum AS, that is not a consequence of active decisions made by equity fund managers. The results provide evidence that the Directive negatively influences the accuracy of the AS shown for managers who work with very concentrated domestic Eurozone benchmarks such as the PSI 20 (Portugal), ATX 20 (Austria), and IBEX 35 (Spain). In contrast, the evidence from the sAS for the least concentrated domestic Eurozone benchmarks shows that AS reported by managers who work in France, Germany, and Finland are much more accurate. Hence, these results prove that direct AS comparisons in the Eurozone are not feasible and lead us to obtain three AS thresholds per domestic equity benchmark, which are the minimum values of AS needed to confirm that domestic equity funds are significantly active at 90%, 95%, and 99% confidence levels.

We also analysed the level of active management in the domestic equity funds registered in each Eurozone country. Our findings also show that the high concentration level and the heterogeneity present in the domestic equity funds in the Eurozone prevent the direct comparability of the AS. Therefore, we had to consider the level of AS over the spurious level and the characteristics of each market that produces significant and different styles of active management. For that, we formulated an actual active share (aAS) that considered the level of concentration in the domestic equity funds of the Eurozone markets and the limits of the portfolio concentration on European regulation. We define aAS as the difference between the monthly AS obtained for each domestic equity fund minus its monthly AS threshold obtained previously at 90%, 95%, and 99% confidence levels. Focusing on the most relevant mutual fund industries in the Eurozone countries, we find that France is the most active domestic equity fund market. Spanish and Italian markets also show high levels of actual active management despite the large concentration in their domestic benchmarks. Conversely, domestic equity funds registered in Germany show lower levels of active management. Our research results support the hypothesis that aAS corrects the potential bias in the original AS caused by both the domestic benchmark concentration and the EU portfolio diversification rules.

In summary, our study is the first to evaluate the consequences of both the assorted characteristics of domestic Eurozone benchmarks and the European regulation that prevents portfolio concentration (UCITS IV) in the appropriate estimation of AS. Furthermore, our study identifies truly active management in domestic equity funds in the Eurozone markets. This chapter has important implications for policymakers and practitioners of the domestic equity funds in the Eurozone. In the strongly regulated European markets, our unbiased approach allows both investors and market supervisors to identify the accurate levels of active management of each industry after considering

both the regulation of portfolio diversification and the concentrated domestic equity benchmarks. Market supervisors will have a better picture of the active management map to develop appropriate regulations for the mutual fund industry. In addition, our approach should help practitioners and investors to effectively find out the level of active management of domestic equity funds and therefore provide information for fund management companies to replace actual performing managers. Further, our results should help to reduce the opacity in the management fees that funds charge by providing accurate measures of active management.

In Chapter 2, we analysed how some market and fund characteristics play a crucial role in explaining the portfolio concentration default on Directive 2009/65/EC (UCITS IV). This chapter should help market supervisors to improve the monitoring process of defaults by domestic equity funds in the Eurozone mutual fund industries.

On the one hand, the origin of UCITS directives was considered the beginning towards market protection and increased transparency in the Eurozone. On the other hand, the structure of mutual funds allows retail investors to access sophisticated active strategies that comply with liquidity and transparency restrictions protected by regulatory oversight. Their rules are based on a certain degree of portfolio diversification with the goal of reducing their vulnerability to portfolio risks. This chapter is the first to analyse how concentrated strategies could lead to non-compliance with article 52 in UCITS IV.

First, we analysed several market characteristics that may influence the probability of a fund manager failing to meet the portfolio concentration limits. Using a logic panel data model (fixed effects), we estimated the probability of incurring defaults. Our findings provide evidence that should lead market supervisors to pay attention to concentrated fund industries with concentrated domestic benchmarks to prevent defaults on Eurozone concentration limit. The level of concentration of the domestic equity benchmarks would

make the defaults almost twice as likely to occur. The level of concentration of the domestic fund industry also has positive and significant effects on the likelihood of incurring defaults. That is, defaults are approximately 12% to 17% more likely to occur when the level of concentration in the domestic fund industry increases. This evidence is consistent with the findings in the literature that link competition with active management strategies such as concentrated portfolios (see Dyck *et al.*, 2013).

Second, in the same line of Chapter 1, we analysed several funds characteristics that may influence the probability of a fund manager failing to meet the portfolio concentration limits. In Eurozone markets, market supervisors should especially monitor the most experienced funds that are solo-managed to prevent portfolio weights over the 10% limit. This finding is in accordance with Goldman *et al*., (2016) who shows that individual managers have much more concentrated portfolios than management teams. The fund's age has a positive and significant influence on the likelihood of defaults. That is, the probability of incurring defaults is approximately 18% to 26% higher among older funds. Thus, this evidence is in accordance with the literature that links older funds with higher levels of idiosyncratic risk as a consequence of having more concentrated portfolios (see Amihud and Goyenko, 2013).

Further, we analysed the characteristics of those stocks that were especially subject to more concentrated strategies and, therefore, more vulnerable to mutual funds' investment policies. For that, we applied a multinomial logic panel data model (fixed effects) and found that the weight of the stocks in their benchmarks had a positive and significant effect on default on the EU portfolio concentration limit. The results show how the probability of a stock being subject to default is approximately 8% to 25% higher when the stock weight in the domestic benchmark increases. Thus, market supervisors should monitor stocks with large weights in domestic equity benchmarks.

In addition, we also find how the stocks of domestic benchmarks that have been held longer are likely to be subject to concentration defaults. That is, defaults are approximately 13% to 24% more likely to occur when choosing stocks that belong to the benchmarks during the last 24 months. Thus, this result is consistent with the literature that argues the local advantage of reducing information asymmetry problems.

Thus, we find how stocks that present low volatility have a greater likelihood of being subject to non-compliance with EU portfolio concentration limits. In terms of percentages, the probability approximately lowers between 19% to 27% when stock volatility increases. This finding is in accordance with the commitment to controlled risk strategies (see Huang *et al.*, 2011). Therefore, market supervisors should pay more attention to these stock characteristics to monitor stocks that are more frequently overweighted above EU concentration limits.

In summary, this chapter is the first to both analyse and identify the determinants of domestic equity funds' failure to comply with the portfolio concentration limits of EU Directive 2009/65/EC. Furthermore, our study also determines the characteristics of the stocks subject to these non-compliant portfolios in domestic equity funds in the Eurozone. This chapter has important implications for market supervisors and policymakers in the mutual fund industries of the Eurozone. Our approach allows market supervisors with limited resources to identify and control non-compliant domestic equity funds by monitoring only some fund-specific characteristics. The improvement of this monitoring process should contribute to the financial stability of the EU asset management industry in terms of investor protection and market transparency. That is, mutual fund unitholders should be completely certain that their money is allocated to portfolios fulfilling the concentration limits required by the EU. Our findings also show a tool to assist EU market supervisors in identifying some explanatory mechanisms for stock weights that are over

the EU concentration limits. Thus, our results may help supervisors identify what kind of domestic equity funds are more inclined to default and what kind of stocks are likely overweighted by these funds. Market supervisors could especially monitor these stocks to verify that domestic equity funds are meeting the concentration limits. Market supervisors should focus their limited resources on these types of stocks held by domestic equity funds to prevent defaults in portfolio concentration. Finally, our approach could also help retail investors control their risk profiles in terms of exceeding portfolio concentration limits. This application is in line with the reinforcement of investor protection of portfolio concentration. Investors could be sure that domestic equity funds fully follow the diversification requirements and market transparency provided by the UCITS directives.

Chapter 3 presents a new perspective in the analysis of active management. We introduced dynamism by proposing a new version of AS that considers how the managers deviate their portfolios in two consecutive periods. We define dynamic Active Share (dAS) as a measure to capture over time the actual level of activity by comparing the differences against the benchmark in two consecutive periods. Our measure captures not only the long and short static positions in each stock included in the benchmark but also the previous long (short) positions that have been overweighted (underweighted) in the next period. Thus, dAS allows us to divide between investment decisions driven to spread portfolio weights closer to the benchmark (i.e., decisions that lead to a lower differentiation to the benchmark) and the other which is further from the benchmark (i.e., decisions that lead to a higher differentiation).

Focusing on the most relevant fund industries in the Eurozone, we analysed the predictive power of AS first. The best results were found in the Spanish industry and, with less robustness, in Germany, the Netherlands, Austria, and Belgium. France only

shows this relationship in the long term when we consider the CAPM alpha; while Italy, Finland, Portugal, and Greece fail to offer significant results or even present negative relationships. These results indicate that the prediction ability of AS presents assorted results as this relation is less clear than that presented in the literature (Cremers and Petajisto, 2009)

Second, we examined the influence on the prediction power for performance of AS by splitting stocks in the portfolios of our sample into benchmark and non-benchmark . The results allow us to identify how the high proportion of prediction ability for performance of AS is explained by the investment in non-benchmark stocks. Although the AS's share of overweight or underweight benchmark stocks is really related to stock picking ability, investing in overweighted stocks may mean distortions in their performance evaluations that can lead to spurious contributions to portfolio performance.

Third, we applied and analysed the predictive power of dAS. The results provided evidence that the performance of non-benchmark stocks in high AS funds did not extend to mutual funds with high dAS. Thus, this measure is less sensitive to the weight of the portfolio that is invested in non-benchmark securities that is very relevant in Eurozone countries where domestic benchmarks are highly concentrated.

The main advantage of the dAS compared to the AS is that our measure provides more information and can be split according to different investment decisions. For that reason, we proposed splitting up the dAS to examine which trading decisions add value to the portfolio. Our most interesting results showed that German funds presents a robust relationship between selling investment decisions and subsequently better performance. This relationship was also found for Dutch, Austrian, and Portuguese funds but with actual limited significance. This finding is in accordance with the level of activity showed by these industries in Chapter 1.

Further, we analysed the contributions to dAS that was generated by those trading decisions that might be considered as managers' bets. These bets could be those decisions that increased holdings that were already overweighted (buy bets) or decrease those holdings that were already underweighted (sell bets). Our findings show as in Germany and in some cases in the Austrian and Portuguese industries that there is subsequent significantly better performance in buying decisions. Focusing on selling decisions, only Finnish funds show positive and strong beliefs and performance. The results for predicting performance show that those portfolios with a higher concentration of these bets offer subsequent abnormal returns as this prediction ability is even higher than the seminal AS in some of the markets in this study.

Accordingly, the results shown in this chapter are an interesting addition to Cohen *et al.* (2010) who try to identify the trades in which the managers have more confidence. The empirical findings show that those mutual funds with trading decisions with a stronger belief from the manager (i.e., decisions that lead them to deviate even more from the benchmark) outperform the remaining funds, especially when buying decisions are considered. This evidence is consistent with Karoui and Patel (2020) who show that the benefit of AS lies in the selection decision rather than the weighting decision.

In summary, Chapter 3 is the first to introduce a dynamic perspective on AS to capture managers' activity and skill. This chapter is relevant for investors who should be interested in knowing whether their fund manager is active and whether their decisions on new investment opportunities add value to the portfolio (i.e., undervalued assets) or on the contrary, the fund manager is passive. The common argument is related to the fees because the management fees charged by these two types of funds should be different. In addition, the chapter is also relevant to regulators in order to adjust the management fees

charged by management companies to the actual level of activity carried out by mutual funds.

Several fields for further investigation have been identified in this dissertation. Regarding the EU Directive, an extensive test of the level of enforcement that the UCITS IV has implemented in each Eurozone country (including emerging markets) could be useful for making decisions about possible changes in the regulation. Furthermore, a complementary analysis of chapter VII in UCITS IV in terms of its appropriateness with the characteristics of each Eurozone country could allow a more complete assessment of the limits of portfolio concentration and the implementation of the protection to investors. In addition, this dissertation makes an important advance in the topic of active management to help further an analysis in other areas or regions with similar characteristics that could be relevant to the financial literature.

# Resumen y Conclusiones

En esta sección se va a presentar un resumen en español de la tesis doctoral desarrollada. Esta inclusión se realiza para dar cumplimiento a la normativa (RD 99/2011, de 28 de enero, por el que se regulan las enseñanzas oficiales de Doctorado) de tesis doctorales de la Universidad de Zaragoza, que determina que las tesis que no están redactadas en español deben incluir un resumen extenso en ese idioma. Por lo tanto, el objetivo de este resumen es mostrar una visión general de la tesis, pero sin el nivel de detalle de la versión completa redactada en inglés, por lo que muchas referencias bibliográficas y las tablas de resultados y gráficos se omiten.

La tesis está compuesta por tres capítulos en los que nos adentramos en un análisis completo de las industrias de los fondos de inversión colectivos domésticos de los diez países más relevantes de eurozona. Estos son: Austria, Bélgica, Grecia, Portugal, España, Italia, Francia, Alemania, Finlandia y Países Bajos. Los resultados obtenidos pueden usarse como una herramienta útil para proteger a los inversores minoristas ya que pueden ser de interés para los supervisores de mercados y a los creadores de leyes que tienen un papel crucial en dicha protección a los minoristas. Además las medidas desarrolladas permiten valorar correctamente el nivel de actividad generado por los gestores de fondos de inversión en Europa que es la segunda a nivel mundial, solo por detrás de Estados Unidos y también nos permite abrir una nueva línea de trabajo, nunca antes analizada que incluye características específicas de concentración y de normativa común cuya relación acaba influyendo directamente en los resultados de nivel de actividad y de rentabilidad y riesgo que muestran los gestores de los fondos de inversión de la eurozona.

A continuación, se detalla la información más relevante de cada uno de los capítulos de la tesis.

# Capítulo 1

## Identificación de la parte del AS que puede considerarse real usando benchmarks concentrados de la eurozona

En este capítulo se desarrolla, de manera detallada una medida capaz de captar el nivel de actividad real de los gestores de fondos de inversión colectiva, y que surge de ajustar las medidas existentes a las características implícitas de los mercados domésticos en Europa, concretamente en las industrias de la eurozona. Este capítulo y el desarrollo completo de la tesis se centra en los fondos de inversión colectiva, ya que es un vehículo de inversión cuyo crecimiento ha sido exponencial en los últimos 50 años, destacando sobre todo en los últimos 20. Tradicionalmente, la gestión activa realizada por parte de los gestores de fondos de inversión solía medirse con variables más estadísticas como el ratio de Sharpe, el ratio de Jensen y el Tracking Error (TE), hasta que Cremers y Petajisto (2009) propusieron la medida de Active Share (AS) capaz de captar el nivel de actividad como diferencia entre la composición de la cartera de un fondo de inversión y su índice de referencia. Fue una medida tan sencilla de aplicar y tan clara de entender que supuso una revolución en la industria y abrió una línea de investigación en la que la actividad se podía medir como distanciamiento con el índice de referencia, asumiendo esas diferencias como decisiones de selección activa y por lo tanto como nivel de actividad. El AS junto con él TE eran capaces de abarcar varias dimensiones de análisis y numerosos papers avalaban su bondad. (ver, por ejemplo, Schlanger *y otros* (2012), Muller y Weber (2014), Jiang *y otros* (2014), Lee y Morri (2015), Cremers y Pareek (2016), Cremers *y otros* (2016), Frijns y Indriawan (2018)). Pero al ser una medida tan famosa, también encontró sus detractores, siendo las críticas más fuertes las presentadas por Frazzini *y otros* (2016), quienes informaban de la sensibilidad que presentaba la medida de AS en función del

índice de referencia que se elegía, lo que podía sesgar los resultados y reflejar de manera inapropiada los estilos de inversión de una cartera.

Este capítulo va más allá de un análisis propio de la medida de AS y se adentra en las características que presentan, los índices de referencia de la eurozona, cuyos niveles de concentración son muy elevados si los comparamos con los índices de referencia de otras áreas (por ejemplo, en Estado Unidos (EE. UU), e incluso dentro de la muestra de índices de referencia europeos que analizamos, se ven grandes diferencias. Por ello, esta observación preliminar nos lleva a reconocer que las comparaciones directas que se hacen con los resultados de AS entre fondos de inversión de diferentes partes del mundo no son exactas y que pueden llevar a error a terceros que las quieran comparar. Es decir, ¿Vale lo mismo obtener un 20% de AS con un fondo de inversión domiciliado en Francia (una de las industrias menos concentradas de la eurozona) que hacerlo con un fondo domiciliado en España (una de industrias más concentradas de la eurozona)? Y, por ende, ¿Vale lo mismo obtener un AS del 20% con un fondo domiciliado en los EE. UU que hacerlos con un fondo domiciliado en Francia? La respuesta es NO. Esta apreciación de los valores que se obtienen de AS teniendo en cuenta las características propias de los índices de referencia que se utilizan para su obtención, por si misma es reseñable, pero si además tenemos en cuenta la normativa europea que intenta proteger a los inversores en el sentido de la diversificación de las carteras, podemos introducir una nueva limitación, que nos lleva a centrar la historia principal en este capítulo. Actualmente está en vigor la directiva europea 2009/65/CE (UCITS IV) que es la cuarta versión de la directiva 85/611/CEE (UCITS I). Esta fue la primera directiva que introdujo de manera detallada en la sección V los límites de concentración de sus carteras. Esos límites, ahora incluidos en el artículo 52 nos muestran como un fondo de inversión no debería invertir más del 5% de sus activos en un mismo título. Esta proporción se amplía hasta el 10% de los

activos, siempre que la suma de estas posiciones (con un peso entre el 5% y el 10%) no sumen más del 40% del total de activos de la cartera. Como se ha indicado previamente, estos porcentajes pretenden proteger a los inversores, e intentan limitar la concentración de las carteras, primando la diversificación de las mismas. Si enfrentamos estas limitaciones en el sentido de la inversión con los altos niveles de concentración de los índices de referencia de los países de la eurozona nos encontramos una controversia digna de analizar. ¿Qué sucede cuando un gestor de fondos de inversión domésticos desarrolla su estrategia de inversión en países de la eurozona? En primer lugar, tiene que cumplir la normativa UCITS IV para la composición de sus carteras. En segundo lugar, dispone de un índice doméstico, denominado benchmark, que le sirve de referencia (esto no significa que se realice una réplica del mismo) y que además debe anunciar como tal en su folleto de información. Por último, el gestor puede aplicar la medida de AS para analizar su nivel de desviación del benchmark (que sirve también de proxy sesgada a la gestión activa). Y aquí surge la primera cuestión: Si el benchmark presenta grandes niveles de concentración que chocan con los límites de diversificación de la normativa UCITS IV, ¿Qué parte de la desviación de los pesos de las carteras con respecto de su benchmark es decisión propia del gestor del fondo y qué parte está relacionada con el cumplimiento de la normativa? Todas estas cuestiones van a tratarse en las siguientes secciones de este capítulo 1.

## Datos y Metodología (A nivel de benchmarks)

Para este estudio, vamos a trabajar tanto con datos de los benchmarks (obtenidos de Datastream-Eikon) como con datos de fondos de inversión domésticos (obtenidos de Morningstar). Se empieza con la base de datos de los benchmarks.

A partir de la identificación de los benchmarks más incluidos por los fondos de inversión en sus folletos informativos, obtenemos la composición mensual de dichos benchmarks desde enero de 2002 a diciembre de 2016, lo que supone trabajar con un total de 45.735 componentes. Los seleccionados son ATX (Austria), BEL 20 (Bélgica), ATHEX 20 (Grecia), PSI 20 (Portugal), IBEX 35 (España), CAC 40 (Francia), DAX 30 (Alemania), FTSE MIB (Italia), OMXH (Finlandia), AEX 20 (Países Bajos).

Los primeros análisis nos llevan a identificar el número de componentes por mes y benchmark, que tienen un peso superior al 10%, los cuales ya estarían incumpliendo los límites del Artículo 52 si fueran incluidos en la cartera de un fondo de inversión. Además, identificamos los componentes cuyo peso se encuentra entre el 5% y el 10%, ya que son posiciones para revisar por su posible incumplimiento de la misma directiva y por último se obtienen los niveles de concentración mensual a través de la media de Herfindahl (Herfindahl-Hirschman index (HHI)).

Toda la información obtenida con los primeros análisis culmina con el desarrollo de un algoritmo que permite identificar esa parte del AS que no se ha obtenido por una desviación activa por parte del gestor del fondo de inversión, sino que viene impuesta, por el cumplimiento de la normativa, a la vez que nos sirve de instrumento para obtener benchmarks cuya composición esté menos concentrada y se ajuste mejor a los límites de concentración. En este apartado se muestra un resumen del desarrollo del algoritmo ya que todos los pasos detallados están incluidos en la sección 1.3 de la presente Tesis. Todo algoritmo necesita una información de partida y unas condiciones o requisitos que se

deben cumplir para poder continuar entre los diferentes niveles. Por ello, empezamos con la primera parte que permite obtener el nivel de active share espurio (sAS). Partimos de la información mensual de los pesos de los componentes que forman los benchmarks y comprobamos que la suma de todos los componentes mensuales de cada benchmark es de 100%. A partir de este punto y teniendo en cuenta los límites de concentración de carteras del artículo 52 de UCITS IV se crean 3 grupos independientes, el grupo 1 para componentes con un peso superior al 10%, el grupo 2 para componentes con un peso entre 5% y 10%, y el grupo 3 para componentes con un peso menor de 5%. Además, se incluye la condición de que el peso acumulado de los componentes incluidos en los grupos 1 y 2 no puede ser superior al 40% y la condición de que los componentes siempre se organizaran de mayor a menor peso. Durante el proceso, primero se extrae el peso excedente de los componentes con un peso superior al 10%, ya que directamente están incumpliendo la normativa. En el segundo nivel, sumamos los pesos de los componentes ajustados del grupo 1 con los pesos de los componentes originales del grupo 2 y obtenemos la suma acumulada, que debe ser igual o inferior a 40%. Si el valor de la suma acumulada es mayor al 40% habrá que ajustar el peso del resto de los componentes del grupo 2 hasta el límite de 5%. Si no, se mantendrá como está. En el siguiente nivel se incluye ya al grupo 3 y se define *w* como la suma acumulada de los componentes ajustados del grupo 1, del grupo 2 y los originales del grupo 3. En este momento ya estamos en disposición de definir el sAS como la diferencia entre el 100% menos el valor de *w*.

En la segunda parte del algoritmo se van a repartir los pesos extraídos de los componentes en los niveles anteriores entre los componentes del grupo 3 que todavía pueden recibir ese extra de peso. El reparto de dicho peso se realizará en proporción a su peso original, para no interferir en las proporciones de los componentes, del componente

con mayor peso al que tiene menor peso y se tendrán siempre presentes los límites de concentración del artículo 52 ya indicados previamente. Para ir comprobando que todo el reparto se está haciendo correctamente se obtendrá el sAS en cada vuelta del reparto. El proceso de reparto de los pesos se terminará cuando el sAS sea 0.

Por último, con la información de los Benchmarks que obtenemos tras haber pasado por el algoritmo desarrollamos umbrales de AS usando inferencia estadística y de acuerdo con los valores de los percentiles 90, 95 y 99. Estos tres umbrales serán los valores mínimos de AS requeridos para confirmar que la cartera analizada es significativamente activa a niveles de confianza del 90%, 95% y 99%. (Los valores disponibles se muestran en el apéndice 1.3).

## Datos y Metodología (A nivel de fondos de inversión colectiva)

Esta sección tiene como objetivo medir el nivel de gestión activa de los fondos de inversión colectiva domésticos registrados en cada industria de la eurozona. Analizamos una muestra completa de fondos de inversión colectiva de renta variable de la eurozona categorizados como fondos de renta variable nacionales por Morningstar (Los fondos de renta variable nacionales se definen como fondos con al menos el 70% de los activos invertidos en acciones nacionales). Obtenemos la composición mensual de las carteras, el valor total de los activos (TNA) y la información de los benchmarks publicados en los folletos. La muestra cubre el mismo período que la sección anterior, de enero de 2007 a diciembre de 2016. La muestra está libre de sesgo de supervivencia porque incluye tanto fondos activos como liquidados y para evitar posibles problemas de heterogeneidad en la muestra de fondos que podrían dar lugar a resultados de AS no comparables, excluimos aquellos fondos de renta variable de nuestra muestra inicial cuyos benchmarks no están claramente definidos o son diferentes de los incluidos anteriormente en nuestra muestra de referencia nacional. También excluimos los fondos indexados y otras categorías (por

ejemplo, fondos de fondos) porque su política de inversión entra en conflicto con los objetivos de nuestro análisis. Nuestra muestra final incluye 23.749 composiciones de carteras de 381 fondos de inversión colectivos de renta variable que han incluido como benchmarks uno de los diez que trabajamos en la sección anterior. La base de datos utilizada en este análisis trabaja con la composición mensual de las carteras desde enero de 2007 hasta diciembre de 2016. Las industrias de fondos mutuos más relevantes de la eurozona, como Francia, Alemania, España e Italia, también son obviamente importantes en nuestra muestra.

A partir de la medida original de AS de Cremers y Petajisto (2009), desarrollamos un nuevo enfoque que muestra el nivel de actividad real (actual Active Share: aAS) que incorpora el nivel de concentración existente en los fondos de inversión colectiva domésticos de renta variable en la eurozona y los límites de concentración de la cartera incluidos en UCITS IV. Para ello, definimos aAS como la diferencia entre el AS mensual obtenido para cada fondo de inversión de renta variable domestico menos su umbral de AS mensual obtenido en la sección anterior a niveles de confianza del 90%, 95% y 99%. Es decir, aAS es el nivel de gestión activa significativa sobre el nivel espurio impulsado por la concentración de los benchmarks y los límites de concentración de la UE. Cada valor obtenido por cada fondo de inversión y mes no es sensible al número de fondos incluidos en cada mercado porque estas medidas de gestión activa se aplican individualmente a cada fondo.

Para terminar el análisis y teniendo en cuenta la diversidad de mercados con los que trabajamos intentamos identificar si el nivel de gestión activa en los mercados de la eurozona presenta diferencias significativas. Utilizando la prueba de Kruskal-Wallis, se prueba la relevancia del aAS en fondos de inversión colectiva doméstica de renta variable.

Para ello, se aplica la prueba con el aAS 95% mensual estandarizado desde enero de 2007 hasta diciembre de 2016.

Además, se aplica el test de Nemenyi, comparando las industrias dos a dos, con el objetivo de detectar qué mercados están produciendo las diferencias significativas en el nivel de gestión activa (aAS).

## Resultados

El primer análisis que presenta el capítulo nos permite obtener de forma preliminar, los valores de AS espurio usando los benchmarks de referencia para las 10 industrias más relevantes de la eurozona. Encontramos variedad de resultados motivados en parte por los diferentes niveles de concentración en los benchmarks domésticos de la eurozona. PSI 20 (Portugal), ATX 20 (Austria) e IBEX 35 (España) obtienen los valores medios de sAS más altos, con 22,4%, 18,60% y 17,99%, respectivamente. Por el contrario, existen benchmarks que presentan niveles mucho más bajos de sAS, como son CAC 40 (Francia), DAX 30 (Alemania) y OMXH 25 (Finlandia), con 3,31%, 5,50% y 5,80%, respectivamente. Estos resultados proporcionan evidencia de que la Directiva 2009/65/CE influye negativamente en la precisión del AS que se muestra para los gestores que trabajan con benchmarks muy concentrados de la eurozona. Por el contrario, la evidencia de sAS para los benchmarks de la eurozona menos concentrados muestra como los datos de AS informados por los gestores que trabajan en Francia, Alemania y Finlandia son mucho más precisos. Por lo tanto, nuestros resultados confirman que los valores de AS obtenidos en diferentes mercados nacionales de la eurozona no son comparables.

El segundo análisis de este capítulo nos ha permitido desarrollar una nueva herramienta para identificar valores de AS mucho más precisas para países con benchmarks concentrados. Conseguimos ajustar la medida de AS de Cremers y Petajisto

(2009), para una muestra de fondos de inversión colectivos domésticos entre los años 2007 y 2016.

La medida de aAS corrige significativamente el sesgo potencial que produce el AS original motivado tanto por la concentración del benchmark como por las normas de diversificación de cartera de la UE. Este hallazgo es más evidente en aquellos mercados con mayor AS como son el mercado belga, el mercado griego y el mercado portugués con valores de AS de 57,63%, 53,43% y 52%, respectivamente. Estos valores disminuyen a niveles mucho más bajos de aAS $_{95\%}$, 29,62%, 22,74% y 19,45%, respectivamente. Además, se encuentra disparidad entre de las medidas AS y aAS. Hay mercados en los que los fondos de inversión colectiva domésticos de renta variable con valores elevados en estas medidas de gestión activa no son claramente diferentes de otros fondos con valores AS y aAS bajos.

A partir de la aplicación del test de Nemenyi se observa como Francia, Italia y España son los mercados económicamente más importantes que impulsan estos resultados. El mercado francés presenta diferencias significativas en la gestión activa en comparación con el resto de los fondos de inversión colectiva domésticos de renta variable de la eurozona. La principal implicación de este resultado, junto con el promedio de AS y el aAS del 95% es que los fondos de inversión colectiva domésticos de renta variable nacionales en Francia son, significativamente, los más activos de la eurozona. A continuación, le siguen los fondos españoles e italianos presentan niveles de gestión activa similares, pero diferencias significativas con el resto de la eurozona. Aunque el benchmark español IBEX 35 obtiene un AS espurio mayor que el italiano FTSE MIB 40, los niveles reales de gestión activa de los fondos de inversión colectiva domésticas de renta variable españoles e italianos son similares a través del $aAS_{95\%}$ y significativamente superiores al resto de fondos de la eurozona a excepción de los fondos franceses.

Al igual que el benchmark francés, los bajos niveles de concentración del DAX 30 alemán deberían anticipar niveles más altos de aAS de los fondos de inversión colectiva domésticos de renta variable en este mercado. Es decir, las normas de diversificación de la UE no deberían entrar en conflicto con el DAX 30, que está bien diversificado. Sin embargo, se han obtenido pruebas de lo contrario. Este mercado no presenta diferencias significativas, en términos de gestión activa si lo comparamos con otros benchmarks mucho más concentrados.

Para concluir podemos indicar que las industrias de fondos más relevantes de la eurozona, desde el punto el vista económico, muestran diferencias significativas en los niveles reales de gestión activa.

# Capítulo 2

## Determinantes que controlar para evitar la concentración de las carteras sobre los límites establecidos en UCITS IV

En este capítulo se desarrolla, de manera detallada, un estudio sobre un tema inexplorado dentro de la extensa literatura sobre concentración de carteras. Los resultados nos permiten identificar 1) tanto las características de los mercados financieros como específicas de los fondos de inversión colectiva domésticos que juegan un papel importante en la explicación de la concentración de la cartera versus los límites de concentración de dichas carteras incluidos en la normativa europea UCITS IV, y 2) determinar las principales características de las acciones que componen esas carteras concentradas. Por lo tanto, se documenta la controversia entre la prevención de la concentración de cartera por parte de las directivas europeas y la evidencia de fondos de inversión colectiva domésticos en la eurozona que no cumplen estos límites de concentración de cartera (ver Dick *y otros*, 2013; Cremers *y otros*, 2016; Hoberg *y otros*, 2018). Los resultados aportan información relevante a los supervisores de mercados en su labor de protección a los inversores, sobre todo, a los inversores minoristas no profesionales, que utilizan estos vehículos como gran apuesta de inversión.

Como sucedía con el capítulo 1, el estudio se centra en las diez industrias de la eurozona con mayor relevancia económica y con mayor proporción de fondos de inversión colectiva domésticos. Y como también sucedía en ese capítulo, el eje general también incluye las políticas gubernamentales en Europa (UCITS) que han proporcionado un marco legal armonizado que brinda transparencia en los fondos de inversión además

de ofrecer mayores niveles de protección de los inversionistas (Ver más información en: Anderberg y Bolton, 2006; Cumming *y otros*, 2011).[62]

Tanto la relevancia económica como la gran significancia de inversores minoristas en la estructura de propiedad de la industria europea de fondos de inversión (EFAMA, 2020) nos llevan a analizar cómo las carteras concentradas podrían desarrollar patrones conflictivos con las regulaciones de la UE que protegen a los inversores al establecer límites de concentración de carteras.

Los fondos de inversión colectiva están estructurados para permitir que los inversionistas minoristas accedan a estrategias activas más sofisticadas cumpliendo con las restricciones de liquidez y transparencia exigidas por la supervisión regulatoria. Sus reglas se basan en ciertos niveles de diversificación de la cartera con el objetivo de reducir el riesgo de la misma. Sin embargo, en relación con la performance (rentabilidad obtenida y riesgo asumido) existe controversia entre los efectos de la diversificación y la concentración de la cartera. Por un lado, Pollet y Wilson, 2008 informan de que un mayor nivel de diversificación de la cartera se asocia con un mejor desempeño. Sin embargo, según Cremers *y otros,* 2019 el aumento de la competencia podría repercutir a las estrategias de gestión activa para crear oportunidades de inversión rentables y, por lo tanto, afectar la diversificación de la cartera. Además, Kacperczyk *y otros* (2005) encuentran que, dentro de ciertas industrias, el nivel de concentración de la cartera tiende a afectar positivamente el desempeño. Huij y Derwall (2011), Hiraki *y otros* (2015), Choi *y otros* (2017) y Fulkerson y Riley (2019) respaldan el poder predictivo de la concentración de la cartera para el rendimiento. Por lo tanto, aquellos gestores que sigan estrategias más concentradas para la gestión de sus fondos tienen mayor probabilidad de

[62] Todas las directivas sobre UCITS se han transpuesto al marco legal de cada estado miembro de la UE en tiempo y forma.

incluir posiciones con un peso superior al determinado por la normativa europea y por lo tanto confrontarse con ella.

Como ya hemos visto en el capítulo 1, en términos de restricciones de inversión, el Articulo 52 de la UCITS IV informa que una cartera no podrá tener una o varias posiciones invertidas en activos con un peso superior al 10%. Además, informa que el valor total de las participaciones de la cartera que representen más del 5% cada una no podrá superar en conjunto más del 40% del valor total de la cartera, lo que nos marca unos límites que deberemos tener en cuenta a la hora de revisar la composición de las carteras de los fondos de inversión colectiva domésticos analizados en este capítulo.

Varios pueden ser los motivos que lleven a los gestores a no cumplir con los requisitos legales de concentración de carteras. En primer lugar, los mercados financieros actuales son muy diferentes de los que existían cuando los límites de concentración se incluyeron en la Directiva original UCITS I (1985). En segundo lugar, la gestión tradicional de carteras en la industria de fondos de inversión colectivos domésticos informa sobre el benchmark que mejor se adapta a la estrategia de inversión real que está desarrollando y como hemos demostrado en la capítulo 1, el peso acumulado de los componentes de los benchmarks en los mercados domésticos de la eurozona está muy concentrado en un menor número de componentes que por ejemplo en otros índices de referencia como por ejemplo los estadounidenses, lo que podría crear un problema en la gestión de un nivel de diversificación adecuado para la gestión tradicional de carteras. Por tanto, los límites de concentración de la UE podrían entrar en conflicto con las estrategias de gestión de fondos centradas en benchmark concentrados.

En este capítulo, desarrollamos varias hipótesis para probar si las características de los mercados financieros, las características propias de los fondos y/o las características de acciones que lo componen aumentan la probabilidad de que los fondos de inversión

colectiva domésticos obtengan niveles de concentración de la cartera superior a los límites definidos por el Articulo 52 de la UCITS IV.

# Datos y metodología

## (En relación con los mercados y los fondos de inversión colectiva)

Para este estudio, vamos a justificar y definir variables generales relacionadas con los mercados financieros y con los fondos de inversión colectiva domésticos que pueden influir en el incumplimiento de las restricciones legales de la UE sobre la concentración de cartera. La muestra incluye datos obtenidos desde Datastream-Eikon y de Morningstar para el periodo diciembre 2002 a diciembre 2018, con información mensual para el 84,33% de los casos y trimestral para el resto. La base de datos de fondos de inversión colectiva domésticos que se utiliza está libre de sesgos de supervivencia porque incluye tanto fondos activos como desaparecidos. Se eliminan además fondos no domésticos (por ejemplo, fondos domiciliados en Luxemburgo o Irlanda), fondos pasivos, fondos indexados y fondos cotizados en bolsa (ETF), además de fondos de fondos, fondos internacionales y fondos sectoriales para evitar conflictos con el objetivo de nuestro análisis. Nuestra muestra final incluye 39,096 carteras de 536 fondos de inversión colectiva domésticos. Las industrias de fondos de inversión más relevantes de la eurozona, como Francia, Alemania, Italia y España, tienen un total de 28.480 carteras y gestionan una media de 16.060 millones de euros. Los fondos franceses representan el 30% de la muestra en términos del número de carteras analizadas, pero en promedio, el tamaño de sus fondos es menor que el de otras industrias de fondos relevantes. Además, los fondos alemanes representan el 15% de la muestra en términos del número de carteras analizadas y cuentan con el tamaño medio de fondo más grande. Otras industrias de fondos relevantes con un gran número de carteras son España e Italia, que representan el 18% y el 10% del número total de carteras de nuestra muestra, respectivamente. Los

fondos italianos presentan, en promedio, el mayor número de participaciones en cada cartera (71 componentes). En cambio, países como Holanda, Portugal y Finlandia presentan carteras mucho más concentradas (28, 30 y 37 componentes, respectivamente).

El objetivo de este análisis es proporcionar evidencia de varias características de los mercados y de los fondos que pueden influir en la probabilidad de que la composición de una cartera no cumpla con los límites de concentración impuesto por la normativa para dicha cartera. Para ello definimos, a partir de la composición de las carteras y siguiendo el peso de sus componentes, 3 tipos excluyente de grupos a los que llamaremos grupo/incumplimiento, en los que incluiremos a los componentes según su naturaleza y que tienen en cuenta los límites de concentración de carteras definidos por el Artículo 52 de UCITS IV. El grupo/incumplimiento 1 incluye carteras con al menos un componente con una ponderación o peso superior al 10%. El grupo/incumplimiento 2 incluye carteras en las que hay componentes con una ponderación dentro del rango (5% -10%) y que en conjunto suman más del 40% de la ponderación total de la cartera. El grupo/incumplimiento 3 incluye carteras con componentes que podrían incluirse tanto en el grupo 1 como en el grupo 2. Todos los detalles de la muestra están incluidos en el apartado 2.2 y siguientes de la presente tesis.

Además, se establecen dos hipótesis alternativas:

-H1: Las características de los mercados financieros de la eurozona influyen en la probabilidad de que las carteras incumplan la normativa europea.

-H2: Las características de los fondos de inversión colectiva domésticos influyen en la probabilidad de que las carteras incumplan la normativa europea.

En el capítulo 2 se detallan por separado las hipótesis para cada una de las variables.

En cuanto a la justificación de las variables específicas incluidas en el capítulo se definen las siguientes:

1) El nivel de concentración de cada uno de los benchmarks domésticos más representativos de los diez mercados analizados.

Para ello se utiliza una adaptación del índice Herfindahl-Hirschman (HHI), que es un indicador común del nivel de concentración dentro de una industria, mercado, o sector y en el que se incluyen para las referencias mensuales la suma de los pesos al cuadrado de cada componente de referencia. Con esta variable se quiere probar si el nivel de concentración del benchmark podría afectar a la probabilidad de incurrir en los tipos de incumplimientos definidos previamente debido al conflicto entre los límites de concentración de la cartera y los índices de referencia altamente concentrados (benchmarks concentrados).

2) La condición en la que se encuentran cada uno de los mercados analizados.

Según Kacperczyk *y otros* (2014) las habilidades de la gestión activa no son las mismas durante un mercado bajista que en un mercado alcista. Por ello los gestores de fondos podrían desarrollar diferentes estrategias de gestión en función de las tendencias del mercado. Para ello se utiliza el promedio del rendimiento mensual de los benchmarks domésticos durante los últimos 12 meses. Con esta variable examinamos si las diferentes condiciones del mercado pueden aumentar la probabilidad de incurrir en incumplimientos 1, 2 o 3.

3) El nivel de concentración de cada industria/mercado de fondos de inversión colectiva domésticos.

Dyck *y otros* (2013) muestran que si la industria es competitiva aumentan los niveles de presión en los gestores de fondos de inversión para obtener mejor performance. Por lo tanto, el nivel de concentración de la industria de los fondos podría influir en la concentración de las carteras y por tanto generar conflictos con los límites expuestos en

UCITS IV. Para ello, seguimos a Cremers *y otros* (2008) y Feldman *y otros* (2020) y utilizamos el índice Herfindahl-Hirschman normalizado (NHHI) con datos mensuales.

4) El exceso de rentabilidad obtenido por los fondos de inversión colectiva domésticos.

En línea con el argumento de que los rendimientos positivos y significativos nos lleva a pensar que los gestores podrían aumentar la propensión de mantener esa composición de cartera ganadora independientemente de los límites de concentración de dicha cartera. Para ello, asociamos esta propensión al sesgo de exceso de confianza de acuerdo con Polkovnichenko (2005) y Fuertes *y otros* (2014) que muestran que los inversores que parecen confiar en el resultado positivo de su estrategia tienden a diversificar en menor medida sus carteras. Por tanto, el exceso de confianza como resultado de buenos registros de exceso de rentabilidad podría generar carteras más concentradas y entrar en conflicto con los límites de concentración de la UE. Para ello, se utiliza la información del exceso de rendimiento mensual de los fondos durante los 12 meses anteriores.

5) El tamaño de los fondos de inversión colectiva domésticos.

Pese a ser una variable controvertida por los resultados que de ella se han mostrado, es una de las más incluidas en la literatura financiera. Cremers y Petajisto (2009) encuentran que los fondos pequeños son más activos que el 80% de los fondos grandes. Mientras que los fondos pequeños pueden concentrarse en unas pocas posiciones de inversión, los fondos grandes pueden beneficiarse de oportunidades de inversión que no están disponibles para fondos más pequeños. Esta evidencia nos lleva a suponer que los fondos pequeños podrían presentar valores de acciones activas más altos que los grandes como resultado de tener carteras más concentradas (sobre ponderando sus posiciones). Para ello, incluimos la información normalizada de los activos netos totales (TNA) mensuales de los fondos como variable en nuestro estudio.

6) Los flujos que se generan en los fondos de inversión colectiva domésticos.

Pollet y Wilson (2008) encuentran que cuando el fondo recibe entradas, tiende a sobre ponderar sus posiciones en lugar de diversificarse en nuevas posiciones, por lo que los flujos grandes de entrada podrían dar lugar a decisiones de gestión que pueden afectar a la concentración de la cartera. Para ello, y siguiendo a Sirri y Tufano (1998), obtenemos los flujos normalizados para cada industria, como el crecimiento porcentual en los activos totales netos bajo la administración del fondo de inversión entre el comienzo y el final del período de 12 meses anterior al final del mes (asumiendo la reinversión de dividendos y distribuciones).

7) La antigüedad de los fondos de inversión colectiva domésticos.

La literatura presenta resultados controvertidos sobre la antigüedad de los fondos y la concentración de la cartera. Por un lado, Kacperczyk *y otros* (2014); Hung *y otros* (2020) encuentran que los fondos más jóvenes tienen carteras más concentradas. Además, Cremers *y otros* (2016) muestran que los fondos de inversión más jóvenes presentan niveles más altos de tracking error (TE) y participación, que son potencialmente consistentes con niveles más altos de concentración de cartera. Por el contrario, Amihud y Goyenko (2013) sugieren que los fondos de inversión más antiguos son más activos y selectivos, lo que a su vez mejora su desempeño y contribuye a su longevidad. Para ello definimos esta variable normalizada por mercados, como el número de meses desde la fecha de lanzamiento del fondo de inversión.

8) La estructura de gestión de los fondos de inversión colectiva domésticos.

El equipo de gestión se define cuando hay más de una persona involucrada en la gestión del fondo de inversión y lo administran juntos (Karagiannidis, 2010). Una extensa literatura ha analizado la relación entre las estructuras de gestión de fondos mostrando diversos resultados. Chen *y otros* (2004) y Massa *y otros* (2010) encuentran que la

estructura organizacional influye en el proceso de toma de decisiones del fondo, lo que puede ayudar a explicar la construcción del fondo. Además, Goldman *y otros* (2016) muestran que los gerentes individuales tienen carteras mucho más concentradas que los gestionados por equipos de gestión. Por ello, analizamos cómo la estructura de gestión podría aumentar la probabilidad de incurrir en incumplimientos 1, 2 o 3 y la incluimos como una variable dummy dicotómica que toma el valor de uno cuando el fondo de inversión es administrado por una persona y el valor de cero en el caso contrario.

Para el análisis empírico se utiliza un modelo de datos de panel logit de efectos fijos con el que estimar la probabilidad de incurrir en incumplimientos 1, 2 o 3 y en él se incluyen todas las variables definidas previamente. La aplicación de los diversos modelos logit organiza la información, primero, teniendo en cuenta aquellas variables propias de los mercados. Segundo teniendo en cuenta aquellas variables propias de los fondos y, por último, los modelos que incluyen todas las variables. Todo ello para los tres tipos de incumplimientos.

# Datos y metodología

## (En relación con las acciones que forman parte de los fondos de inversión colectiva)

En esta sección nos vamos a centrar en identificar las características de las acciones que son seleccionadas para formar parte de las carteras y por lo tanto se consideran los instrumentos que están a disposición de las políticas de inversión de los fondos de inversión. La hipótesis alternativa que se establece es:

- H3: Las características de las acciones que forman parte de los fondos de inversión colectiva domésticos influyen en la probabilidad de que las acciones estén sujetas a incumplimientos.

La muestra utilizada incluye las acciones que presentan un peso dentro de la cartera superior al 5% en los fondos de inversión colectiva domésticos analizados en la sección anterior. Lo que supone trabajar con más de 195.000 posiciones de 1605 acciones que se encuentran al menos una vez en las carteras analizadas durante el periodo período de muestra (diciembre de 2002 a diciembre de 2018). Las industrias de fondos de inversión de mayor importancia económica de la eurozona, como son las de Francia, Alemania, Italia y España, tienen un total de 134.086 participaciones, lo que representa el 68,76% de nuestra muestra. Si nos centramos en el número de acciones en las que al menos un fondo en una fecha concreta ha reportado una ponderación de cartera superior al 5% los fondos de inversión franceses presentan en promedio más de 130 acciones diferentes. Por el contrario, los fondos en países como Bélgica, Portugal y Austria tienen menos acciones con una ponderación de cartera superior al 5%, probablemente debido al menor número de acciones que cotizan en estos mercados domésticos. Excluyendo la información de 2002, que se ve afectada por la cantidad de meses disponibles en este año, todos los países muestran patrones estables en el número promedio de acciones con un peso en la cartera superior al 5%.

En cuanto a la justificación de las variables específicas a incluir en el estudio se definen las siguientes:

1) El tamaño de las acciones dentro del benchmark doméstico.

Desde los trabajos de Fama y French (1993, 1995), el tamaño de las acciones ha sido considerado como una variable clave que influye en la composición y el rendimiento de la cartera que las incluye. La literatura muestra que los fondos de inversión colectiva tienen una clara preferencia por las grandes acciones (por ejemplo, Chen *y otros*, 2000; Gompers y Metrick, 2001). En la misma línea, la liquidez es otra variable que influye en la composición de la cartera. La literatura sostiene que tanto los inversores institucionales

como los minoristas prefieren los activos líquidos a los ilíquidos en sus carteras (por ejemplo, Amihud y Mendelson, 1986; Gompers y Metrick, 2001). Y la unión de estos dos argumentos nos llevan a citar a Ding *y otros* (2016) quienes encuentran que las acciones con un mayor free float tienen un mayor nivel de liquidez. Además, como ya hemos demostrado en el capítulo 1, los benchmarks domésticos de la eurozona presentan altos niveles de concentración en un número reducido de sus componentes con mayor free float, por lo tanto, es más probable que las acciones con mayores pesos en los benchmarks domésticos estén sobre ponderadas en las carteras de fondos de inversión colectiva domésticos que incluyen a ese benchmark en su política de inversión Lo que podría llevar a aumentar la probabilidad de un mayor número de incumplimientos de los límites de concentración de carteras en la UE. Para incluir esta variable, utilizamos la información de la ponderación mensual de las acciones en relación con el peso que muestran en su Benchmark.

2) La permanencia de las acciones dentro del benchmark doméstico.

Que las acciones presenten un largo historial de permanencia en el benchmark doméstico de cada país analizado, nos informa no solo del free float y la liquidez que pueden tener asociados, sino también de la calidad de dicha información. Bae *y otros* (2008) argumentan que la importancia de la ventaja local está inversamente relacionada con la calidad de la información que brindan las empresas. Ding *y otros* (2016) encuentran que las empresas incluidas en los benchmarks presentan menores problemas de asimetría de información y Kacperczyk y Seru (2007) muestran cómo las recomendaciones de los analistas suelen realizarse sobre las empresas que forman parte de los benchmarks, reduciendo por un lado los posibles problemas de asimetrías de la información y por el otro aumentando la probabilidad de que las acciones puedan ser objeto de inclusión en

las carteras. Para incluirla en el modelo usamos la proporción de meses que las acciones se han mantenido en el benchmark en los últimos 24 meses.

3) El peso acumulado de las industrias en el benchmark doméstico.

También se considera el peso acumulado de cada industria en el benchmark como un factor potencial para explicar los diferentes incumplimientos. Fulkerson (2013) encuentra que los administradores de fondos tienden a seleccionar acciones grandes dentro de industrias económicamente relevantes. Más recientemente, Narayan *y otros* (2017) muestran que los mismos sectores que dominan los rendimientos de las estrategias comerciales dinámicas se incluyen en las carteras, independientemente de las diferentes restricciones de la cartera. Cremers y Petajisto (2009) muestran que los gerentes pueden tomar grandes posiciones específicas de acciones si simultáneamente diversifican sus posiciones activas en todas las industrias, produciendo un error de seguimiento bajo y una gestión activa alta. Además, encontramos que los benchmarks domésticos presentan altos niveles de correlación de rendimiento dentro de las acciones incluidas en cada industria. Por lo tanto, esta evidencia de correlación podría considerarse un incentivo de los gestores para diversificar las acciones sobre ponderadas en la misma industria que exceden los límites de concentración de cartera de la UE. Para ello, incluimos el peso mensual acumulado en el benchmark para cada una de las industrias proporcionadas por Datastream y que son, Materiales básicos, Consumo discrecional, Consumo básico, Energía, Finanzas, Atención médica/sanitaria, Industriales, Bienes de inversión inmobiliaria, Tecnología, Telecomunicaciones y Servicios públicos.

4) El tipo de acciones seleccionadas en las carteras.

La literatura muestra como los fondos de inversión suelen preferir las acciones de crecimiento (por ejemplo, Carhart, 1997; Wermers, 1999; Chen *y otros*, 2000; Kacperczyk *y otros,* 2005; Franzzini y Lamont, 2008). Además, Brands *y otros* (2005)

encuentran que los fondos más concentrados tienden a implementar estrategias de crecimiento. Por lo tanto, las estrategias de crecimiento podrían generar carteras más concentradas e implicar conflictos con los límites de concentración de la UE. Para ello, incluimos esta variable en el modelo con la información mensual suministrada por Datastream como el cociente entre el valor de mercado y el valor en libros de acción.

5) El exceso de rentabilidad de las acciones.

El rendimiento de las acciones es una variable ampliamente utilizada. En este análisis, incluimos el rendimiento y el riesgo por separado para capturar la información específica proporcionada por cada factor de rendimiento. Examinamos cómo el rendimiento de las acciones puede influir en la probabilidad de que esas acciones estén sujetas a incumplimientos 1, 2 o 3 por parte de los fondos de inversión colectiva domésticos. Jegadeesh y Titman (1993) muestran cómo las acciones que se han comportado relativamente bien en el pasado tienen un rendimiento positivo posterior. Grinblatt *y otros* (1995) encuentran que la tendencia a incluir acciones en función de su rendimiento anterior podría ser común entre los administradores. Además, Carhart (1997) encuentra rentabilidades anormales persistentes en las estrategias de gestión de carteras basadas en la continuidad de las tendencias del mercado, es decir, estrategias de impulso. Además, Chen *y otros* (2000) muestran que los gestores de fondos de inversión prefieren mantener a las acciones con buen rendimiento previo. Para ello, utilizamos la información del exceso de rentabilidad de las acciones durante los 12 meses anteriores.

6) El nivel de riesgo que presentan las acciones.

La relación entre el rendimiento de la acción y su riesgo es un tema importante en la investigación financiera. Hay trabajos importantes que encuentran una relación significativa y positiva entre diferentes especificaciones de rentabilidad y riesgo de las acciones (por ejemplo, Merton, 1980; French *y otros*,1987; Chou *y otros*, 1992). Sin

embargo, también hay hallazgos contrarios al respecto (por ejemplo, Black, 1976; Cox y Ross, 1976; Bekaert y Wu, 2000; Li *y otros,* 2005). Por lo tanto, analizamos cómo el riesgo podría afectar a la probabilidad de que esas acciones fueran incluidas en carteras que presentan niveles de incumplimiento de la normativa de la UE. Por ello, incluimos en el modelo la variable del riesgo medida como la varianza del exceso de rendimiento de las acciones durante el período de 12 meses anteriores.

Para el análisis empírico se utiliza un modelo de datos de panel logit multinomial de efectos fijos. Este modelo es una variación de los datos del panel logit en el que la variable dependiente puede tomar más de dos valores. En este estudio hay tres variables dependientes, el grupo/incumplimiento 1, el grupo/incumplimiento 2 y del grupo/incumplimiento 3 y el modelo además permite controlar la frecuencia con la que una acción está sujeta a incurrir en los incumplimientos evitando así la duplicidad de las acciones incluidas en cada modelo con el que estimar la probabilidad de incurrir en incumplimientos 1, 2 o 3 y en él se incluyen todas las variables definidas previamente. Para el desarrollo empírico aplicados los diversos modelos logit multinomial, primero, teniendo en cuenta aquellas variables propias de las acciones, de sus características intrínsecas. Segundo, teniendo en cuenta aquellas variables de la relación de las acciones con el mercado al que pertenecen y por último los últimos modelos que incluyen todas las variables a la vez para los tres tipos de incumplimientos.

# Resultados

Los resultados obtenidos en la primera sección del capítulo nos permiten asegurar como el nivel de concentración de los benchmarks domésticos aumenta significativamente la probabilidad de incurrir en incumplimientos 1, 2 o 3. Esta significación es robusta para las diferentes especificaciones del modelo y para los diferentes tipos de incumplimientos. Específicamente, los benchmarks concentrados hacen que los incumplimientos tengan

una probabilidad de más del doble de ocurrir. Por lo tanto, los supervisores de mercado deben poner más recursos especialmente en la supervisión de los fondos de inversión colectiva domésticos domiciliados en países con benchmarks domésticos altamente concentrados.

El nivel de concentración de la industria de fondos de inversión colectiva domésticos también tiene efectos positivos y significativos sobre la probabilidad de incurrir en los incumplimientos 1, 2 o 3. Esta evidencia es consistente con hallazgos previos en la literatura que vinculan la competencia con estrategias de gestión activa como carteras concentradas. De acuerdo con las diferentes especificaciones del modelo, los incumplimientos tienen aproximadamente entre un 12% y un 17% más de probabilidades de ocurrir cuando aumenta el nivel de concentración de la industria de fondos de inversión colectiva domésticos. Por lo tanto, la promoción de la competencia en la industria de estos fondos debería reducir la probabilidad de incumplimiento de los límites de concentración de la cartera de la UE.

Además, encontramos que la antigüedad del fondo de inversión tiene una influencia positiva y significativa en la probabilidad de incurrir en los incumplimientos 1, 2 o 3. Esta significancia positiva es robusta para las diferentes especificaciones del modelo y para los diferentes tipos de incumplimientos. Es decir, la probabilidad de incurrir en incumplimientos es aproximadamente entre un 18% y 26% mayor entre los fondos de inversión colectiva domésticos más antiguos.

Finalmente, si consideramos la estructura de gestión, encontramos resultados diversos. Es decir, los efectos de la estructura organizacional sobre el proceso de toma de decisiones son diferentes en términos de los diferentes tipos de incumplimientos. Los supervisores del mercado deben monitorear los fondos de inversión colectiva gestionados individualmente en los que las decisiones se toman sin el consenso del equipo para evitar

ponderaciones/pesos de la cartera por encima del límite del 10%. Por el contrario, cuando los incumplimientos involucran un mayor número de posiciones de la cartera, por ejemplo, en los incumplimientos 2 o 3, el consenso del equipo juega un papel importante. Estos resultados potencialmente contradictorios pueden explicarse por el hecho de que los tipos de incumplimiento son diferentes y requieren diferentes procesos de toma de decisiones.

Para evitar incumplimientos en los límites de concentración de la cartera de la UE, los resultados de esta sección deberían llevar a los supervisores del mercado a prestar más atención a las industrias de fondos de inversión colectiva concentradas con benchmarks domésticos concentrados. Además, los fondos de inversión colectiva domésticos con más antigüedad que se gestiona individualmente deben ser monitoreados especialmente para evitar ponderaciones de la cartera por encima del límite del 10%.

En la segunda sección del capítulo nos centramos en las características de las acciones que pueden ser seleccionadas y con las que producir incumplimientos. En relación con las características de las acciones con sus benchmarks, encontramos una relación positiva y significativa entre el peso de las acciones en sus benchmarks domésticos y la probabilidad de que esa acción esté sujeta a incumplimiento por parte de los fondos de inversión colectiva domésticos. Esta significancia positiva es robusta entre las diferentes especificaciones de los modelos y los diferentes tipos de incumplimiento. Los resultados muestran cómo la probabilidad de que una acción esté sujeta a incumplimiento es aproximadamente entre un 8% y un 25% mayor cuando aumenta el peso de la acción en el benchmark doméstico. Por lo tanto, los supervisores del mercado deben tener más en cuenta las acciones con pesos más grandes en los benchmarks domésticos.

La permanencia de las acciones en el benchmark también tiene un efecto positivo y significativo sobre la probabilidad de que una acción esté sujeta a los incumplimientos 1 o 3 con valores de aproximadamente entre un 13% y un 24%. Por el contrario, esta variable presenta un efecto negativo sobre la probabilidad de que una acción esté sujeta al incumplimiento 2. Para este último resultado, consideramos que la necesidad de que un mayor número de acciones incurra en este incumplimiento nos lleva a plantear la hipótesis de que los gestores pueden no analizar solo los valores incluidos en sus índices de referencia para este tipo de incumplimiento y por ello este resultado no es tan claro.

Finalmente, también encontramos que el riesgo tiene un efecto negativo y significativo sobre la probabilidad de que las acciones estén sujetas a incumplimientos 1, 2 o 3. Esta significancia es robusta para las diferentes especificaciones del modelo y para los diferentes tipos de incumplimiento. Los resultados confirman que la probabilidad de que una acción esté sujeta a incumplimiento es aproximadamente entre un 19% y un 27% menor cuando aumenta la volatilidad de dichas acciones.

Para identificar las acciones sujetas a los límites de concentración de cartera predeterminados de la UE, los resultados de esta sección deberían alentar a los supervisores del mercado a prestar más atención a las acciones más líquidas, domésticas (nacionales) y de gran capitalización con registros de baja volatilidad. Además, los supervisores del mercado deben vigilar especialmente este tipo de acciones en poder de fondos de inversión colectiva domésticos de renta variable nacionales para evitar el incumplimiento de la concentración de cartera.

# Capítulo 3

# Inclusión de la perspectiva dinámica en el AS para captar decisiones comerciales que aportan valor

En este capítulo, incluimos la perspectiva dinámica sobre la medida Active Share (AS) al considerar el valor añadido que puede aportar la variación de la diferencia entre las ponderaciones de los pesos de la cartera y del benchmark en dos períodos consecutivos. A lo largo de todo el capítulo 1 ya se ha profundizado en el análisis de la medida de AS y en este resumen, para no repetir algunos de los argumentos ya mostrados, vamos a centrarnos en la vertiente de gestión realmente activa y como valorarla.

La literatura financiera a veces relaciona AS con habilidad de selección, pero como expone Cremers, (2017) esa comparación no es exacta. Tener un alto AS no indica que tenga una alta capacidad de selección de acciones, más bien, es que te estás distanciando mucho del benchmark. Además, la medida de AS solo muestra una perspectiva estática de la gestión de carteras al considerar las diferencias de pesos entre la cartera y el benchmark en un momento determinado de tiempo y por lo tanto este enfoque ofrece información limitada sobre la actividad realizada por los gestores.

Nuestra medida supone una mejora para el AS ya que tiene en cuenta como el AS varia con el tiempo al comparar las desviaciones en dos periodos consecutivos de tiempo. El Active Share dinámico (dAS) puede detectar si los gestores realizan apuestas verdaderas y a lo largo de este capítulo vamos a exponer todos los pasos para lograrlo. Además, el dAS nos permite diferenciar entre las decisiones que conducen a una diferenciación menor al benchmark y aquellas que conducen a una mayor diferenciación con el benchmark.

Otra ventaja del dAS es que proporciona información útil acerca del valor añadido que aporta cada una de las decisiones que toma el gestor y que es un factor clave para los futuros inversores. (ver Cremers y Pareek, 2016)

Para el desarrollo del trabajo vamos a utilizar una muestra de datos parecida a la que utilizamos en el capítulo 1. Vamos a analizar la capacidad predictiva e informativa del dAS en la industria domestica de fondos de inversión de la eurozona. Lo países con los que trabajamos son los mismos que en los capítulos 1 y 2 y, por lo tanto, vamos a poder contrastar como funciona nuestra medida cuando se trabajan con benchmarks concentrados e industrias concentradas. (ver Loban y otros, 2020, para más detalles).

La introducción del dinamismo hace que nuestra medida se diferencie de las existentes y aporte información relevante para los inversores quienes estarán interesados en conocer si la persona que gestiona el fondo de inversión doméstico es activa y hábil en sus decisiones de inversión.

Uno de los objetivos de este capítulo es comprobar si la capacidad predictiva que tiene el AS en mercados EEUU para fondos que se comparan con benchmarks de gran capitalización se obtendría también con índices y mercados de fondos de inversión domésticos en Europa, específicamente en países de la eurozona. Los resultados que hemos obtenido nos llevan a argumentar que la capacidad de predicción del AS está realmente relacionada con la capacidad de selección de valores fuera del benchmark que a su vez podría implicar una distorsión en la valoración del rendimiento que se muestra. De hecho, nuestros resultados muestran que cuanto mayor es la inversión en acciones que no son de referencia, mayor es el rendimiento del fondo. Por otro lado, el dAS nos permite aislar las contribuciones a esta medida generadas por aquellas decisiones comerciales que son consideradas como apuestas en firme de los gestores. Estas apuestas podrían ser

aquellas decisiones que aumentan las tenencias que ya están sobre ponderadas (apuestas de compra) o disminuyen las tenencias ya infra ponderadas (apuestas de venta).

# Datos

## (A nivel de fondos de inversión colectiva, de benchmarks y de rentabilidades)

Para este capítulo, ser trabaja con una amplia muestra de fondos de inversión colectiva domésticos registrados en los diez países que utilizamos en los dos capítulos anteriores debido a su gran relevancia tanto en términos económicos por el capital gestionado como en número de fondos de inversión existentes en las industrias[63]. El periodo de la muestra en este caso engloba desde enero de 2003 a diciembre de 2018 y usamos valores mensuales de composición de las carteras en casi un 70% de los fondos y con el resto trabajamos con información trimestral (según el año fiscal). La información de la composición de las carteras se ha obtenido de Morningstar (en euros totales invertidos en cada activo) y para poder obtener tanto el AS como el dAS se han transformado estos valores de euros a porcentaje que implican en la cartera (% de las posiciones) trabajando al final solo con la parte de activos positivos de la cartera, es decir, solo con acciones.

De Morningstar, también seleccionamos los índices de referencia de gran capitalización más frecuentes de los principales folletos registrados en los fondos de inversión colectiva domésticos de la eurozona. Los seleccionados son los mismos que los utilizados para los dos capítulos anteriores y desde Refinitv Eikon-Datastream obtenemos los datos mensuales de composición de dichos benchmarks.

[63] Se han extraído de la muestra aquellos fondos que son indexados, que son ETFs o que son offshore, etc. (es decir, aquellos que nos son fondos de inversión de renta variable activos). También se han excluido los que tenían como benchmark un índice de pequeña o mediana capitalización.

Por último, los datos de rentabilidad de los fondos de inversión colectivos los obtenemos en frecuencia diaria a partir del valor liquidativo. También tenemos la rentabilidad diaria de los benchmarks y como activo libre de riesgo utilizamos los valores de la cotización del Euribor a una semana. Además, controlamos el precio diario de las 3572 acciones diferentes que en algún momento han formado parte de las carteras (de más de un millón de holdings).

## Capacidad de predicción del AS

En esta sección, lo primero que obtenemos son los valores de AS para toda la muestra de fondos de inversión domésticos explicados en el apartado anterior. Los resultados de la tabla 3.2 del capítulo 3 muestran como los fondos belgas obtienen altos niveles de AS (75%) y, por el contrario, los fondos alemanes obtienen el nivel mínimo de AS con un valor promedio del 32%.

Para poder obtener la capacidad predictiva del AS, trabajamos con las alphas de CAMP (de mercado) y de 4 factores (4F). Las alfas de 4F se obtienen haciendo una regresión de los rendimientos ajustados a la rentabilidad libre de riesgo de cada fondo en el modelo de cuatro factores propuesto por Carhart (1997). Es decir, el modelo de 4F controla el mercado, el tamaño, el valor y el impulso. Estos factores se han calculado para cada país siguiendo el mismo procedimiento detallado de Kenneth French. Además, seguimos el mismo planteamiento de clasificación de la información por quintiles de AS que se desarrolla en el artículo original de Cremers y Petajisto (2009). Y el rendimiento medio se calcula para el mes siguiente (período t + 1), el trimestre siguiente (t + 3), el semestre siguiente (t + 6) y el año siguiente (t + 12) y para cada métrica de rendimiento. Los resultados que se muestran para el AS de los fondos de inversión domésticos de la eurozona proporcionan una capacidad limitada de predicción del rendimiento, más baja que la que muestra la literatura previa en otros mercados (ver, por ejemplo, Cremers y

Curtis (2016), Muller y Weber (2014), Lee y Morri (2015), Cremers y otros. (2016) y Frijns e Indriawan (2018)). Los resultados con mayor significancia se encuentran en la industria española y con menor significancia en Alemania, Países Bajos, Austria y Bélgica. Por otro lado, Francia solo muestra esta relación a largo plazo y cuando consideramos CAPM alfa, mientras que Italia, Finlandia, Portugal y Grecia no ofrecen resultados significativos o incluso presentan relaciones negativas. Por todas estas evidencias, podemos sugerir que la capacidad de predicción de AS es menos clara que la presentada en el artículo de Cremers y Petajisto (2009) para fondos de EEUU.

# Capacidad de predicción del AS

## (Diferencia entre los títulos que pertenecen y no pertenecen al benchmark)

Para profundizar en la capacidad predictiva del AS en cada país, se analiza por separado la influencia sobre el poder de predicción de la performance entre la parte que proviene de los títulos que forman parte del benchmark y aquella que se genera de los títulos que no forman parte del mismo. La tabla 3.4 del capítulo 3 de este documento muestra los resultados por paneles. En el panel A los resultados muestran como la capacidad de predicción de AS es nula o incluso negativa. Francia, Alemania, Italia, Países Bajos y Finlandia son claros ejemplos de este efecto contrario y significativo en el rendimiento posterior del fondo. Solo la industria española da resultados positivos a largo plazo y cuando utilizamos CAPM alphas.

Por otra parte, el panel B de la Tabla 3.4 nos permite argumentar que la capacidad de predicción del AS viene de parte de la inversión en acciones que no pertenecen al benchmark.

## Capacidad de predicción del dAS

En el apartado anterior analizamos el poder predictivo del AS en torno al rendimiento en las industrias más relevantes de fondos de inversión domésticos de la eurozona. En este apartado analizamos esa misma capacidad predictiva para el dAS.

En primer lugar, definimos la medida de dAS que intenta capturar el nivel real de "actividad" a lo largo del tiempo y no solo las diferencias estáticas con el benchmark. La fórmula detallada está disponible en el capítulo 3 de este documento. Para cada uno de los fondos de inversión domésticos en los periodos que disponemos de datos (la primera fecha de cada fondo se pierde por no poder hacer la comparativa) calculamos los valores de dAS. La tabla 3.5 del capítulo 3 muestra como los fondos austriacos y los holandeses obtiene los valores de dAS más bajos de la muestra (con 7,95% y 7,65%, respectivamente). Por el contrario, los fondos italianos muestran el mayor nivel de dAS con un valor promedio de 13,92%.

Para obtener los efectos de predicción del rendimiento futuro, seguimos los mismos pasos que en la sección anterior y los resultados incluidos en la tabla 3.6 del capítulo 3 muestran una escasa capacidad de predicción de dAS, siendo significativos solo para las industrias alemana y holandesa. Tras analizar los niveles de comisiones que se cobran a los inversores, podemos suponer que estos resultados podrían estar sesgados por las altas comisiones cobradas que consumen parte del rendimiento predicho. En cada industria y en orden ascendente se presenta el promedio de las comisiones que se cobraron en 2018. Países Bajos 0,61%; Bélgica 0,78%; Alemania 1,29%; Italia 1,38%; Austria 1,44%; Finlandia 1,46%; Portugal 1,64%; Francia 1,73%; España 2,00% y Grecia 2,22%. (Fuente: Morningstar). Como puede observarse, los países que menores comisiones cobran son los que mayor capacidad predictiva mostraban. Estos resultados se revisarán en las siguientes versiones del capítulo.

Tras haber demostrado como la capacidad predictiva del AS proviene en gran medida de los títulos que no forman parte del benchmark, estos resultados son muy relevantes para las industrias que forman parte de Europa sobre las que ya hemos demostrado en los capítulos 1 y 2 como el nivel de concentración de los benchmarks afecta a los resultados y conclusiones obtenidos.

La principal ventaja del dAS en comparación con el AS es que nuestra medida proporciona más información y se puede diferenciar de acuerdo con las diferentes decisiones de inversión. Por esa razón, proponemos dividir la métrica dAS para examinar más a fondo qué decisiones comerciales agregan valor a la cartera y dichos análisis se exponemos en los siguientes apartados.

## Análisis por tipo de negociación y su contribución al dAS

Para el desarrollo de esta sección definimos que se considera como una "decisión de compra" y que se considera como una "decisión de venta". Será compra cuando en una determinada acción se ha incrementado el número de existencias en poder en dos períodos consecutivos (*t-t-1*) Será una venta cuando el número de acciones mantenidas en la cartera ha disminuido (venta parcial) o se ha convertido en 0 (venta final/definitiva) en dos períodos consecutivos (*t-t-1*). Para las decisiones de compra, adicionalmente se requiere una desviación positiva del benchmark en dos períodos consecutivos (es decir, estas decisiones de compra contribuyen positivamente al dAS porque provocan un aumento en el peso de la cartera que es mayor que el aumento del peso en el benchmark. Por lo tanto, estas decisiones de inversión representan claramente las apuestas de gestor, y deben ser las decisiones de inversión las que agreguen valor a la cartera cuando el gestor tiene habilidades para seleccionar dichas acciones. De manera similar, para las decisiones de venta, adicionalmente se requiere una desviación negativa del benchmark en dos períodos consecutivos (es decir, estas decisiones de venta contribuyen negativamente al dAS

capturan las ventas que causan una disminución en el peso de la cartera que es mayor que la disminución del peso en el benchmark, Por lo tanto, estas decisiones de inversión representan claramente las apuestas del gestor y deben ser las decisiones de inversión que eviten reducir el valor de la cartera cuando el gestor tiene habilidades de selección de valores.

Finalmente, se calculan estas diferencias tanto las compras como las ventas para cada fondo de inversión colectiva doméstico incluido en nuestra muestra. Luego, clasificamos los fondos en quintiles en función de la diferencia con el benchmark en dos periodos consecutivos y calculamos el rendimiento futuro del fondo ponderado por quintiles para el mes siguiente (período t + 1), el próximo trimestre (período t +3), el próximo semestre (período t + 6) y el próximo año (período t + 12). Los resultados se muestran en la tabla 3.7 del capítulo 3. Se observa una escasa evidencia de las habilidades de predicción del desempeño. Nos encontramos con una fuerte relación entre las decisiones de inversión de ventas y la posterior habilidad de rendimiento futuro en los fondos alemanes, austriacos y portugueses. Por otro lado, con respecto a las habilidades de compra, solo los fondos portugueses parecen ofrecer alguna evidencia en el medio plazo. Tanto estos resultados detallados por quintiles e industrias, como todos los resultados de los apartados anteriores están incluidos de manera completa en la sección de apéndices del capítulo 3.

## Análisis por tipo de negociación según su contribución al dAS y su desviación del benchmark

En este estudio, introducimos un requisito adicional a los expuestos en el apartado anterior, en concreto para las compras, habrá compra si el número de acciones en la cartera ha aumentado, si la contribución es positiva (apuesta del gestor) y si sus valores están sobre ponderados con respecto al benchmark tanto en *t-1* como en *t*, siendo el valor

de la sobre ponderación en t mayor que en *t-1*. Estas son las decisiones de compra relevantes para nuestro estudio porque demuestran una apuesta fuerte del gestor y aportan valor a la cartera.

Con respecto a las ventas, se habrá producido una venta, si se disminuye el número de acciones en la cartera. Si además presentan diferencias negativas en el dAS, es decir, si el gestor está vendiendo un título, lo que lleva a una disminución del peso de la cartera superior a la disminución en el benchmark llegando incluso a que suceda que el gestor este vendiendo la acción cuando su peso en el benchmark ha aumentado. Además, estos valores deberán estar infra ponderados con respecto al benchmark en *t-1* e infra ponderados en *t*, siendo el valor de la infra ponderación en *t* más alto que en *t-1*. Estas son las decisiones de venta relevantes para nuestro estudio porque, con estos requisitos, podemos aislar las decisiones de inversión en las que el gestor muestra una fuerte convicción sobre la falta de interés en esa acción. Por lo tanto, con estos requisitos, podríamos capturar decisiones de venta relevantes en las que el gestor ha mostrado un fuerte desinterés. Luego, clasificamos los fondos en quintiles en función las condiciones definidas y mientras se cumplan en dos periodos consecutivos y calculamos el rendimiento futuro del fondo ponderado por quintiles para el mes siguiente (período t + 1), el próximo trimestre (período t +3), el próximo semestre (período t + 6) y el próximo año (período t + 12). Los resultados se incluyen en la tabla 3.8 del capítulo 3 y vuelven a mostrar una evidencia limitada sobre las capacidades potenciales de predicción del rendimiento de aquellas carteras que concentran decisiones de inversión que cumplen con los requisitos indicados. En cuanto a las decisiones de compra en las que el gestor ha mostrado fuertes creencias, encontramos cierta tendencia a un posterior mejor desempeño, sin embargo, esta relación solo es significativa en Alemania y, en algunos

casos, en las industrias de Austria y Portugal. Con respecto a las ventas solo los fondos finlandeses muestran una relación positiva y significativa.

## Resultados

Los resultados obtenidos en la primera parte de este estudio nos permiten detectar algunos problemas con la capacidad de predicción del rendimiento en la medida del AS dado que el rendimiento aparente de los fondos más activos está sesgado por la parte de las carteras invertidas en acciones no incluidas en el benchmark. Además, nuestros resultados también muestran que la capacidad de predicción de AS presenta resultados variados siendo esta relación menos clara que la presentada en la literatura financiera (ver Cremers y Petajisto, 2009; Cremers, 2017).

Los resultados de dAS nos permiten capturar las decisiones de inversión que aportan valor al rendimiento y además esta medida es menos sensible al AS ya que capta la variación en las diferencias en lugar de directamente las diferencias entre el peso de las acciones invertidas en la cartera y en el benchmark. Este argumento es más relevante en los países de la eurozona, donde los benchmarks domésticos están muy concentrados.

Centrándonos en la decisión de venta, los fondos alemanes presentan una relación sólida con un mejor rendimiento posterior. Con respecto a las decisiones de compra en las que los gestores desarrollan importantes apuestas, las industrias alemana, austriaca y portuguesa muestran un mejor rendimiento posterior.

Nuestro enfoque imparcial tiene importantes implicaciones para los inversores en cuanto a la identificación de un mapa de gestión activa de las industrias más representativas de fondos de inversión colectiva domésticos de la eurozona y son consistentes con los mostrados por Karoui y Patel (2020), quienes sugieren que los beneficios de AS derivan de la decisión de selección más que de la decisión de ponderación.

🎁La última dedicatoria también es para ti, Lau, gracias por venir a mi casa cuando nada tenía sentido, porque sin ti esto no hubiera sido posible. Gracias por tu apoyo incondicional, por tus abrazos reparadores y tus palabras envueltas de verdad.

Te quiero con todo mi corazón. *Lidia*