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Treasure hunt in emerging markets: Empirical evidence for European pension funds

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ABSTRACT

This research analyzes the European pension funds' exposure to emerging markets, its evolution over time, and its impact on financial performance. For this aim, we study a sample formed by 822 European pension funds with an international equity investment vocation, covering the period from June 2008 to June 2024. To assess the impact of emerging markets exposure on financial performance, we employ panel regression models with time and fund fixed effects and robust standard errors. Our findings indicate that the average weight of the emerging markets in the portfolios analyzed is 25.44 %, with the highest weight reached in 2017 (28.5 %). When focusing on specific emerging markets/regions, the findings show that the weight of Asia Emerging has increased over time to the detriment of other markets such as Europe Emerging, Africa, or Latin America. The impact of the emerging market exposure on financial performance is mixed depending on the market analyzed and the period considered. Overall, greater exposure to the BRICS markets positively affects the performance achieved by pension funds' managers. Another finding reveals that pension fund managers seem to adjust their portfolio's country/regional allocation over time, increasing the weight of emerging markets that positively impact financial performance, which provides added value to investors.

1. Introduction

European public pension systems face serious challenges arising from a growing aging population. More people surviving until retirement age and living longer and, consequently, demanding their public pension for a longer period, along with low birth rates that lead to aging of the population pyramid, cutting the workforce, challenge the system's sustainability. Some data from Eurostat illustrate these trends. Projections indicate that between 2022 and 2100 the population in Europe may fall by around 6 %. The ratio between the population aged over 65 and the population aged 14–64 stood at 33.3 % in 2023. Projections for this ratio point to 38 % in 2030 and 50.4 % in 2050.[1]

Since the 90 s of the last century, European countries have performed several reforms to guarantee pension systems' viability. Furthermore, the financial crisis of 2008 prompted the implementation of these measures, especially in countries that subsequently had problems with their sovereign debt (Naczyk and Domonkos, 2016; Hinrichs, 2021). Hinrichs (2021) explains that these reforms

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[1] Report available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/753953/EPRS_BRI(2023)753953_EN.pdf

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could be classified into two types, that is, parametric and structural reforms. The first type involves performing adjustments to the system parameters to ensure the sustainability of pay-as-you-go schemes (PAYG), in which the incomes obtained from the current working population are immediately spent to cover today's elderly generation pensions. The parametric adjustments could shape three forms: i) those aiming to reduce the B/C ratio (Beneficiaries/Contributions ratio), e.g., by delaying the retirement age; ii) those aiming to reduce the P/W ratio (Pension/Average Wage ratio), e.g., by considering a longer reference period to compute the pension amount instead of the beneficiary's last years of work, which are also usually those in which she or he received the highest salary; and iii) those seeking to increase the tax-funded share of the scheme's expenditure. The second type (structural reforms) entails systemic changes supposing the partial or full privatization of public pension systems (Mesa-Lago, 2002).

Nowadays, most pension systems are featured by a public-private combination based on three pillars, the first one being the public pension provided by the state, the second one consisting of employer-sponsored occupational schemes, and the third one being personal provision through voluntary privately managed pension funds (Batty and Hailichova, 2012; Leimgruber, 2012; Hinrichs, 2021).

According to data from the European Central Bank (ECB),[2] Euro area pension funds managed approximately €3 trillion in 2019 representing 25 % of the GDP, doubling the figures of 2008. Pension funds allow people to save for old age by allocating long-term capital efficiently across companies, sectors, and markets. Thus, a part of the retirement incomes of pension funds' investors becomes asset-backed, "*resulting in participants being exposed to uncertainties of investment markets to determine the level of benefits that they will ultimately receive*" (p.1, Rudolph et al., 2010). In this vein, the financial performance achieved by pension funds arises as a very relevant topic, being a key factor in the achievement of an adequate income for savers during their retirement.

Bonizzi and Kaltenbrunner (2019) draw attention to a growing demand for emerging market assets by insurance companies and pension funds (ICPF) in developed countries. Based on 22 semi-structured interviews with European ICPF executives, and taking as the lens of analysis a Minskyan framework, these authors point out that these investment decisions would be motivated by a return-seeking behavior of pension fund managers in a context of structural funding deficits and low-interest rates, which would make it difficult to cover these deficits by investing in more traditional assets. In their own words, "*Low interest rates create balance sheet-induced pressures on ICPF to generate returns, which is however constrained by the need to match liabilities. This pushes ICPF towards non-traditional asset classes, which can promise sufficiently high returns, whilst providing diversification benefits between them*" (p.15, Bonizzi and Kaltenbrunner, 2019). Twenty-five years earlier, Fischer and Reisen (1994) argued that the rapid aging of the population in rich countries would boost the growth of pension funds and pointed out that investment in emerging markets could be a good opportunity to achieve proper diversification and an optimal combination of the risk-return binomial.

Investment in emerging markets seems to be a hot investment strategy that is consolidating within the pension fund industry and is expected to gain strength in the coming years. On December 16, 2024, a news article appeared on the specialized portal Funds Europe[3] that reflected the result of a study carried out on 157 global pension funds that highlighted how private markets and Asian emerging markets are arising as key investment priorities over the next three years. Specifically, one of the data provided in the news highlighted that 62 % of these funds were already exposed to Asian emerging markets. Besides, 76 % of respondents were planning to increase investments in Asian emerging markets over the next three years.

Thus, the main aim of our study is twofold: (i) to analyze the relevance of emerging markets in the portfolios of European pension funds, and (ii) to assess the impact of exposure to different emerging markets on the financial performance of these funds. Although pension funds have attracted academic interest in the field of finance, the specific issues addressed in this study have, as far as we know, been largely neglected.

Previous studies have predominantly focused on pension funds investing in their domestic (typically developed) markets. In contrast, our research examines how European pension funds, as long-term institutional investors, engage with emerging markets as part of their international diversification strategies. The existing literature on pension fund involvement in emerging markets has generally concentrated on funds domiciled within those markets, rather than on foreign pension funds allocating capital to them. Although some studies have examined mutual funds investing in emerging markets, pension funds differ in investment objectives, regulatory constraints, and investment horizons. These differences justify a separate analysis, as the behavior and performance implications of emerging market exposure for pension funds may diverge from those observed in mutual fund settings. With this study, we aim to fill a notable gap in the literature and contribute new insights into how long-term institutional investors interact with the growth potential and volatility of emerging markets.

The issues analyzed are particularly relevant due to the significant social impact that the financial performance of private pension funds has on retirees' wealth. In Europe, demographic and social trends, along with growing fiscal pressures, are increasing the importance of the third pillar of pension systems, making the effective management of privately managed savings vehicles essential to ensuring adequate income in retirement. Emerging markets offer a valuable opportunity for portfolio diversification, which can help European pension funds achieve better risk-adjusted returns for their beneficiaries. In addition, our findings provide insights into an investment strategy that seems to be gaining momentum within the pension fund industry, namely increased exposure to emerging markets. As such, this study may be particularly relevant to several key stakeholders interested in this trend, including pension fund managers, individual savers, and policymakers.

To this end, we analyze a sample of European pension funds with an international equity investment vocation. We consider 822 pension funds from 8 different European countries (those with available data in the Morningstar Database being Belgium, Denmark, Finland, France, Italy, Norway, Spain, and Sweden) in the period spanning from June 2008 to June 2024. More concretely, we study

[2] https://www.ecb.europa.eu/press/economic-bulletin/articles/2020/html/ecb.ebart202007_03~5ead7cb1dc.en.html

[3] Information consulted on February 1, 2025 at: https://funds-europe.com/private-markets-and-Asian-emerging-markets-attract-pension-funds/

the exposure to Brazil, Russia, India, China, South Africa, BRICS, Africa, Asia Emerging, Europe Emerging, Latin America, the Middle East, and all Emerging markets together by studying the weights of these markets/regions in the monthly portfolios held by these pension funds. In total, we have available information for 48,940 monthly portfolios. We also study the impact of exposure to each one of these emerging countries/regions on pension funds' risk-adjusted financial performance. Our contribution to the literature is threefold. First, we offer new empirical evidence on the dynamic allocation patterns of European pension fund managers toward emerging markets. Second, we show that exposure to specific emerging regions can significantly improve portfolio performance. Third, we find that pension fund managers adjust their regional allocations over time in response to performance feedback, suggesting an active and potentially value-adding approach to international diversification.

The rest of the paper is structured as follows. The second section makes a literature review and poses the research questions; the third section describes the data and methods used; the fourth section shows the empirical findings; the fifth section ends the paper with the main conclusions, limitations and avenues for further research.

2. Literature review

Pension funds have been a research object of interest for financial academic literature. We can find a plethora of papers that have dealt with different issues for pension funds, such as their financial performance, the managers' behavior, the investors' behavior, the shareholder activism, or their contribution to developing the financial markets and promoting economic growth, among others. Some of the most notable researches are discussed below.

Ippolito and Turner (1987) analyze the financial performance of 1500 private pension funds in the period 1977–1983 concluding, in a CAPM theoretical framework, that in average terms, after fees and other expenses, these portfolios underperformed(outperformed) the S&P500 (a weighted stock-bond index) by approximately 44(38) basis points per year. Lakonisbok et al. (1991) study the existence of window-dressing practices among pension fund managers. Based on a sample of 769 pension funds that managed $129 billion in 1989, these authors observe that managers tended to oversell stocks that have performed poorly, especially in the fourth quarter, just before being examined by the sponsors. Coggin et al. (1993) analyze the financial performance of a sample of US pension fund managers, finding that these managers showed good (bad) selectivity (timing) skills. Davis (1993) examines the structure, regulation, and performance of nine pension fund markets, however, the performance analysis in this research is focused on real returns, neglecting the impact of transaction costs and the portfolio management process.

Brown et al. (1997) study the persistence of UK pension funds' financial performance. These authors make rankings to study the tendency of pension funds to stay in the same quartile as they were in the previous period. The findings obtained show limited empirical evidence of performance's persistence, both for raw return and a risk-adjusted performance basis. Blake et al. (1999) explore the asset allocation dynamics of 300 UK pension funds and their impact on financial performance. The findings reveal little cross-sectional variation in the average returns resulting from the strategic asset allocation, market-timing, and stock-picking decisions of the fund managers. Besides, the authors conclude that strategic asset allocation is much more relevant to explaining time-series variation in portfolio returns than market timing and stock-picking managers' decisions.

Ferson and Khang (2002) propose a new performance measure combining portfolio holdings and conditioning information. This new indicator avoids the bias provoked by interim trading. For the sample analyzed, these authors find abnormal performance from traditional return-based measures that is smaller than the potential effects of interim trading bias. Growth funds seem to outperform value funds when analyzed through unconditional weight-based measures, but abnormal performance becomes non-significant when using the conditional weight-based measure. Del Guercio and Tkac (2002) compare the flow-performance relationship of mutual funds and pension funds' investors. The latter are more sensitive to poor financial performance and withdraw to a greater extent funds delivering poor performance. Besides, they do not overreact to recent winners. This pattern of behavior impacts pension fund managers' behavior, having fewer incentives to engage in risk-shifting practices. Tonks (2005) also analyzes the financial performance persistence of UK pension funds, using a sample less affected by survivorship bias, finding strong evidence of persistence over 1-year time horizons but weaker evidence over longer periods.

Bikker and De Dreu (2009) analyze the costs of pension funds for a Dutch sample across the 1992–2004 period and find that administrative and investment costs show strong dispersion mainly determined by the size of the fund, obtaining empirical evidence supporting the existence of economies of scale. Bikker et al. (2012) wonder how the age distribution of beneficiaries affects the asset allocation of pension funds, finding for a sample of Dutch funds that a 1-year higher average age in participants leads to a reduction of the strategic equity exposure by around 0.5 % age point. Sievänen et al. (2013) study the determinants of responsible investments of pension funds from 15 European countries. By using multinomial logistic regressions, these authors find that the main determinants of pension funds' responsible investment are the legal origin of the country, the ownership structure, and the fund size. Sialm et al. (2015) study the dynamics describing the behavior of the money flow of defined contribution (DC) pension plans. These authors find that money flows into mutual funds from DC plans show a more volatile behavior and exhibit more performance sensitivity than non-DC flows. These findings would be driven by the adjustments made by the plan sponsors to the investment options.

Blake et al. (2017) provide empirical evidence of the herding behavior of pension fund managers in the UK. Besides, these authors find that herding occurs in subsets of funds defined by the size and the type of sponsor. Alda (2019) analyzes the role of pension funds in promoting Environmental, Social, and Governance (ESG) performance in investee companies. This author finds for a sample of UK pension funds that those companies in which pension funds hold a larger percentage of ownership show better ESG records. More concretely, those companies in which pension funds are more relevant in the ownership structure are more likely to use renewable energies and disclose environmental information, improving transparency for stakeholders. Alda (2020) studies the determinant of ESG scores for a sample of pension funds in the UK. She also analyzes the impact of ESG scores in money flows and returns, finding that

ESG scores of both conventional and socially responsible (SR) pension funds are driven by common characteristics such as age, turnover, and expenses and that ESG scores relate positively to flows and returns. Martí-Ballester (2020) examines the financial performance obtained by pension funds focused on sectors related to Sustainable Development Goals (SDGs), such as agribusiness, technology, healthcare, or energy, among others, from different markets in the period spanning from January 2007 to December 2018. The findings obtained by this author show that pension funds investing in technology(energy) achieve the largest(lowest) mean risk-adjusted return.

Babalos and Stavroyiannis (2020) study the impact of pension funds' investment in equity and stock market development in 29 OECD countries performing a panel vector autoregressive model (VAR), finding that pension fund investments in equities enhance stock market development. Alda (2021) compares the ESG profile of the companies held by conventional and SR pension funds and obtains that the former hold firms in which SRI funds invest to integrate ESG criteria, but the latter compose their portfolios with larger ESG-firm standards, being consistent with their SR nature. Egli et al. (2022) analyze the determinants of fossil fuel divestment for a sample of the 1000 largest European pension funds finding that the size, the ownership structure, and the market competition are the key drivers for divestment decisions. Bregnard and Salva (2023) explore the impact of board governance of pension funds in their asset allocation decision. Their findings reveal that well-governed boards are featured by showing greater international diversification, and lower cash holdings. Another finding is that small pension funds hold riskier assets. Peksevim and Ercan (2024) deal with the relationship between pension funds and financial stability in 25 European countries, finding that pension funds significantly alleviate financial stress both in crisis and non-crisis periods, but only in those countries enjoying robust governance. More recently, Alda (2025) studies the portfolio concentration of both SR and conventional pension funds in the UK. She finds that SR pension funds show a lower portfolio concentration than conventional pension funds. Another finding reveals that concentration strategies, both in the case of SR and conventional pension funds, positively impact financial performance meaning the use of information advantage.

Although pension funds have been broadly analyzed in previous academic literature, and the topics covered are diverse, as can be seen in the literature review performed above, the exposure of pension funds to emerging markets and the impact of this exposure on the financial performance of these funds are topics more rarely analyzed. Some related papers are the following.

Chan-Lau (2005) provides some insights into the factors that could spur the investment of developed countries' pension funds in emerging countries. Davis (2005) reflects on how the shifting of retirement income schemes from PAYG to funding fosters the development of pension funds and the role of these funds as institutional investors in the development of financial markets, especially, in emerging markets.

Some other papers have analyzed pension funds from emerging markets. Thus, Catalán (2004) analyzes the reforms from PAYG to fully funded systems in developing countries, finding that these reforms positively impact the stock market development. Pfau (2011) assesses the benefits of international diversification by determining the optimal asset allocation for pension funds in emerging markets, using as a theoretical framework the modern portfolio theory. Kurach (2012) makes a literature review studying the potential consequences of pension funds' foreign assets allocation focusing on the experience of emerging markets. Kumara and Pfau (2013) conclude that over half of the pension portfolios of emerging market countries should be in international assets in order to maximize the expected utility of moderate and conservative pension fund participants. Morina and Grima (2022) find that the investment of pension funds in assets positively impacts economic growth in a selected sample of non-OECD countries. Bayar et al. (2022) show that pension funds have a positive impact on the development of stock markets in Brazil, Chile, Hungary, Mexico, Peru, and South Africa.

Beyond the academic literature focused specifically on pension funds, a broader examination of the portfolio management literature provides the theoretical framework that can explain the interest of pension fund managers in investing in emerging markets. This interest is rooted in Modern Portfolio Theory (Markowitz, 1952) and relates to the benefits of portfolio diversification. The seminal paper by Levy and Sarnat (1970), building on the portfolio selection models of Markowitz (1952) and Tobin (1958), demonstrates the positive impact of expanding the investable universe for U.S. investors to include developing countries. The authors show that, while the addition of other developed markets provides only marginal gains in portfolio performance, the inclusion of developing economies leads to substantial improvements. This effect is primarily driven by the low correlation between developing and developed markets, which enhances the benefits of international diversification. Since this paper, many other studies have documented the benefits of investing in emerging markets in terms of diversification.

Thus, Errunza (1977) also presents empirical findings supporting that diversification through investing in stocks from less developed markets, is desirable from an investor's perspective. Bekaert and Urias (1996) analyze diversification benefits by studying a broad sample of closed-end funds investing in emerging markets from the U.S. and U.K. The authors find significant diversification benefits for U.K. country funds, but not for U.S. funds, attributing this difference to portfolio holding decisions. Li et al. (2003) assess how short-sale constraints affect the international diversification benefits for U.S. investors from 1976 to 1999 finding that while such constraints significantly reduce diversification benefits in G7 countries, substantial benefits remain when investing in emerging markets. Driessen and Laeven (2007) analyze the benefits of international diversification for a broad sample of 52 countries from the perspective of local investors. They conclude that significant regional and global diversification benefits exist for domestic investors in both developed and developing countries, and these findings remain robust even after accounting for the restriction that investors cannot short sell in developing markets. Gupta and Donleavy (2009) find that, in the case of Australian investors, although the correlation between Australian and emerging markets has increased over time, there are still potential benefits to diversifying into emerging markets. Huij and Post (2011) argue that, since emerging markets offer access to a diverse set of investment opportunities that are only weakly correlated with one another, fund managers specializing in these markets may have a competitive advantage over those focused on developed markets, where asset returns tend to move more closely in line with aggregate market movements. Christoffersen et al. (2012) find that correlations have increased significantly over time in both developed and emerging markets, although they remain lower in the latter. Consequently, they conclude that the benefits of international diversification have decreased

considerably over time, especially in developed markets, while emerging markets still offer meaningful diversification benefits. Bekaert and Harvey (2017) ask whether it makes sense to segregate global equities into developed and emerging market categories, and their answer is yes. They explain that although the correlation between developed and emerging markets has increased over time, the integration of these markets into global markets remains incomplete, suggesting that this segregation could still be relevant for portfolio allocation. Kiymaz and Simsek (2017) analyze the financial performance of a broad sample of U.S. mutual funds investing in emerging markets, finding that diversified emerging market funds generate some significant alphas for their investors during the period considered. The authors explain that, although trading in emerging markets involves operating and economic environments that differ from those of developed markets, such markets provide opportunities for mutual fund managers to achieve superior financial performance. Bae et al. (2019) analyze the benefits of international diversification through investments in multinational companies exposed to emerging economies, providing empirical evidence of a positive impact on financial performance from this strategy.

Many other authors have also explored the impact of industry diversification, comparing its effects to the benefits of country diversification. Thus, Griffin and Karolyi (1998) conclude that country effects are more relevant than industry effects in variation of international returns, being this advantage greater than in other studies, due to the inclusion of emerging markets. Serra (2000) analyze the factors behind stock returns in emerging markets, finding that returns are mainly driven by country factors being industry factors less significant. These findings have important implications for international portfolio diversification meaning that cross-market allocations seem to be more effective than cross-industry strategies. Hargis and Mei (2006) ask whether country diversification is better than industry diversification, finding empirical evidence that supports country diversification as more relevant, especially when considering emerging markets. Lee and Hooy (2013) analyze the role of country and industry effects on international diversification potential in ASEAN (Association of Southeast Asian Nations) stock markets, finding that country effects are more relevant. More recently, Attig and Sy (2023) compare the benefits of international and industry diversification using a broad sample of 48 markets (both developed and developing) over the period 1995–2021. They find that international diversification generally outperforms industry diversification, particularly when investors include emerging markets. However, for those investing only in developed markets, industry diversification slightly outperforms international diversification. This is mainly due to the higher level of integration among developed markets, which reduces the benefits of geographical diversification.

Based on the arguments provided above, this research aims to answer the following two key research questions:

RQ1: How much are European pension funds exposed to emerging markets?

RQ2: How does exposure to emerging markets influence the financial performance of pension fund managers?

3. Data and methods

We analyze a sample formed by 822 European pension funds with an international equity investment vocation in the period spanning from June 2008 to June 2024. We obtained most of the data used in this research from the Morningstar Database. We consider the following universes of pension funds included within the labels Global Database/Insurance and Pension Funds[4]: Belgium pension funds, Denmark pension funds, Finland pension funds, French Life Insurance funds, Italy pension funds, Norway pension funds, Spain pension funds, and Sweden pension funds.[5] We select all the funds from these universes with “global equity” or “global emerging markets equity” status in the label “global category”. Our sample is free of survivorship bias.

For these funds, we download the following information: monthly return, monthly total net assets, inception date, expense ratio, firm name, firm name ID, the monthly net allocation of the fund’s portfolio across 51 different countries,[6] and the monthly net allocation of the fund’s portfolio across different emerging regions.

More concretely, the emerging regions considered are Africa, Asia emerging, Europe emerging, Latin America, Middle East, and all Emerging countries (Appendix plots the countries included within each region). We also obtained information about the monthly net allocation of the fund’s portfolio across 11 different economic sectors.[7]

To approach the risk-adjusted financial performance of pension funds (Alda and Ferruz, 2012; Adami et al., 2014; Otero-González et al., 2021), we compute the 6-factor alpha (Fama and French, 2018) for each fund in each month. To do it, we perform

[4] These labels encompass different financial products, all aimed at retirement savings, though they vary by national pension systems. In Sweden, for instance, the Premium Pension System is a mandatory defined contribution scheme and part of the Swedish state pension. Each year, 2.5 % of pensionable income and taxable benefits are allocated to a savings account managed by the Swedish Pensions Agency. Savers can invest in up to five mutual funds from a selection platform overseen by the Fund Selection Agency, which procures funds, reviews managers, and ensures compliance with regulations. More details are available at: https://www.ftn.se/english/en/the-swedish-premium-pension-system.html

[5] Sometimes, the same fund appears in multiple universes. For example, the “Swedbank Robur Aktiefond Pension” appears in the universes of “Belgium pension funds” and “Sweden pension funds”. Another example is the “Nordea Maailma Osinko” which is available in the universes of “Finland pension funds”, “Norway pension funds”, and “Sweden pension funds”. In these cases, we eliminate the duplicates to consider each fund as a unique entity in our sample.

[6] The countries included in the Morningstar Database are Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Malaysia, Mexico, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Russia, Singapore, Slovakia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Kingdom, United States, Venezuela and Vietnam.

[7] These economic sectors are Basic Materials, Communication Services, Consumer Cyclical, Consumer Defensive, Energy, Financial Services, Healthcare, Industrials, Real Estate, Technology, and Utilities.

rolling-window regressions in a window of 36 months. We obtain the information on the international factors from the Kenneth French's website[8] (Fleta-Asín and Muñoz, 2023; Fleta-Asín and Muñoz, 2025). The specification of the 6-factor model is provided in Eq. 1.

$$r_{j,t} = \alpha_j + \beta_{MKT}\left(R_{M,t} - R_{f,t}\right) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{MOM}MOM_t + \beta_{RMW}RMW_t + \beta_{CMA}CMA_t + \varepsilon_{j,t} \quad (1)$$

where $r_{j,t}$ is the excess return of the fund j on the free-risk asset in month t; ($R_{M,t}$-$R_{f,t}$) is the excess return of the market benchmark on the free-risk asset in month t; SMBt, HMLt, MOMt, RMWt, and CMAt are respectively the size, book-to-market, momentum, profitability and investment factors in month t (see Fama and French, 2018, for a more detailed explanation).

We aim to analyze the impact of exposure to emerging markets on the financial performance of pension funds. Thus, we regress the monthly estimated alphas on several control variables such as the net money flows, the size, the age, the expense ratio, the family size, the portfolio country and sector concentration measures (Alda and Ferruz, 2012; Choi et al., 2017; Otero-González et al., 2021; Alda, 2025) and the exposure to different emerging markets. Given the structure of our data, we perform several panel regression models with time and fund fixed effects with robust standard errors. All the explanatory variables are one-month lagged following academic literature (Fleta-Asín and Muñoz, 2023; Fleta-Asín and Muñoz, 2025; Alda, 2025). The base model is as follows:

$$\alpha_{j,t} = \alpha_0 + \beta_1 * NCF_{j,t-1} + \beta_2 * SIZE_{j,t-1} + \beta_3 * AGE_{j,t-1} + \beta_4 * ER_{j,t-1} + \beta_5 * FAM_{j,t-1} + fundfixedeffects + timefixedeffects + \varepsilon_{j,t} \quad (2)$$

where $NCF_{j,t-1}$ is the relative net cash flows,[9] $SIZE_{j,t-1}$ is the size of the fund approached by the log of total net assets expressed in $ millions, $AGE_{j,t-1}$ is the age of the fund measured in log years, $ER_{j,t-1}$ is the net expense ratio, and $FAM_{j,t-1}$ is the size of the family at which the pension fund belongs being expressed in log total net assets expressed in $ millions of all the funds belonging to the same family.[10]

From the base model, we first analyze how the country/sector portfolio concentration impacts pension funds' performance (Hiraki et al., 2015; Choi et al., 2017; Otero-González et al., 2021; Alda, 2025). We compute different proxies for these concentration measures. First, we compute for each month and pension fund the Herfindahl index of the portfolio, both from monthly portfolio country and sector allocation data.

$$HC_{j,t} = \sum_{i=1}^{51} \omega_{i,t}^2 \quad (3)$$

$$HS_{j,t} = \sum_{i=1}^{11} \omega_{i,t}^2 \quad (4)$$

where $\omega_{i,t}$ is the exposure of fund j to country/sector i in month t.

We also compute measures representing the deviation of the portfolio country/sector allocation for each pension fund in each month regarding the average portfolio country/allocation obtained from all pension funds in the sample.

$$DCA_{j,t} = \sum_{i=1}^{51} \left(\omega_{i,t} - \overline{\omega_{i,t}}\right)^2 \quad (5)$$

$$DSA_{j,t} = \sum_{i=1}^{11} \left(\omega_{i,t} - \overline{\omega_{i,t}}\right)^2 \quad (6)$$

where $\omega_{i,t}$ is the exposure of fund j to country/sector i in month t and $\overline{\omega_{i,t}}$ is the average exposure of all the pension funds in the sample in period t to country/sector i.

Finally, we compute the deviation of portfolio country/sector allocation for each pension fund in each month regarding an international equity benchmark. We consider the MSCI ACWII Index.

$$DCB_{j,t} = \sum_{i=1}^{51} \left(\omega_{i,t} - \omega_{i,b,t}\right)^2 \quad (7)$$

[8] We use developed (emerging) market factors to compute the estimated alphas for pension funds under the label global equity (global emerging markets equity). We thank Kenneth French for making available these factors on his website: https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[9] $NCF_{l,t}$= [$TNA_{j,t}$-$TNA_{j,t-1}$(1+$r_{j,t}$)]/$TNA_{j,t-1}$, where $TNA_{j,t}$ is total net assets of fund j in month t and $r_{j,t}$ is the return of fund j in month t (see among others, Muñoz, 2019, Alda et al., 2022, or Alda et al., 2024).

[10] The 822 pension funds in the sample are managed by 250 companies. To compute the total net assets managed for each company, we aggregate the total net assets managed by all the pension funds belonging to the same company, including those with an investment vocation different from international equity. Thus, the number of pension funds considered to compute family size is 7828.

$$DSB_{j,t} = \sum_{i=1}^{11} \left(\omega_{i,t} - \omega_{i,b,t}\right)^2 \tag{8}$$

where $\omega_{i,t}$ is the exposure of fund j to country/sector i in month t and $\omega_{i,b,t}$ is the weight of country/sector i in month t in the MSCI ACWII Index.

We add separately the different concentration proxies to the base model to avoid multicollinearity problems.

$$\alpha_{j,t} = \alpha_0 + \beta_1 * NCF_{j,t-1} + \beta_2 * SIZE_{j,t-1} + \beta_3 * AGE_{j,t-1} + \beta_4 * ER_{j,t-1} + \beta_5 * FAM_{j,t-1} + \beta_6 * HS_{j,t-1} + \beta_7 * HC_{j,t-1} + fundfixedeffects + timefixedeffects + \varepsilon_{j,t} \tag{9}$$

$$\alpha_{j,t} = \alpha_0 + \beta_1 * NCF_{j,t-1} + \beta_2 * SIZE_{j,t-1} + \beta_3 * AGE_{j,t-1} + \beta_4 * ER_{j,t-1} + \beta_5 * FAM_{j,t-1} + \beta_6 * DSA_{j,t-1} + \beta_7 * DCA_{j,t-1} + fundfixedeffects + timefixedeffects + \varepsilon_{j,t} \tag{10}$$

$$\alpha_{j,t} = \alpha_0 + \beta_1 * NCF_{j,t-1} + \beta_2 * SIZE_{j,t-1} + \beta_3 * AGE_{j,t-1} + \beta_4 * ER_{j,t-1} + \beta_5 * FAM_{j,t-1} + \beta_6 * DSB_{j,t-1} + \beta_7 * DCB_{j,t-1} + fundfixedeffects + timefixedeffects + \varepsilon_{j,t} \tag{11}$$

Finally, we include in the models with controls and concentration country/sector measures the exposure to different emerging countries/regions,[11] to analyze the impact of this exposure on the financial performance achieved by pension funds' managers.

$$\alpha_{j,t} = \alpha_0 + \beta_1 * NCF_{j,t-1} + \beta_2 * SIZE_{j,t-1} + \beta_3 * AGE_{j,t-1} + \beta_4 * ER_{j,t-1} + \beta_5 * FAM_{j,t-1} + \beta_6 * HC_{j,t-1} + \beta_7 * HS_{j,t-1} + \beta_8 * \omega_{i,t-1} + fundfixedeffects + timefixedeffects + \varepsilon_{j,t} \tag{12}$$

where $\omega_{i,t-1}$ is the exposure of fund j to the emerging country/region i in month t-1.

Table 1 reports the summary statistics[12] and Table 2 provides the correlation matrix of the variables considered across models.

4. Empirical findings

4.1. Exposure to emerging markets

In this subsection, we analyze the weight of different emerging markets in the portfolios of the European pension funds in the sample. Table 3 reports the summary statistics for the weights of Brazil, Russia, India, China, South Africa, BRICS, Africa, Asia emerging, Europe emerging, Latin America, Middle East, and all Emerging markets considered together in the period (June 2008 to June 2024) and in two symmetric cohorts (June 2008 to May 2016 and June 2016 to June 2024).

Panel A shows the summary statistics for the full period. As can be seen, China is the market of the BRICS countries with a greater presence in the portfolios analyzed with an average weight of 8.06 %, followed by India (3.58 %), Brazil (3.35 %), Russia (2.09 %) and South Africa (1.57 %). Thus, the average weight of BRICS markets in the portfolios analyzed is 18.65 %.

Regarding the average weight of different emerging regions, Asia emerging is the region with a greater relevance in the portfolios analyzed with an average weight of 13.89 %, followed by Latin America (4.92 %), Europe emerging (4.05 %), Africa (1.89 %) and Middle East (0.72 %). The average weight of all emerging markets in the European pension funds' portfolios analyzed is 25.44 %.

Panel B/C shows the same information as panel A but for the sub-periods June 2008-May2016 and June 2016-June 2024, respectively. The analysis for sub-periods allows us to check the evolution of the weights of the different emerging countries/regions over time. As can be seen, the relevance of BRICS markets in the portfolios of the European pension funds increases over time, being 18.03 %/19.25 % in the first/second sub-period. The Chinese and Indian markets gained weight over time, while Brazil, Russia, and South Africa lost it.

The relevance of all emerging markets as a whole in the portfolios of the European pension funds analyzed decreases, being greater in the first sub-period (26.00 %) than in the second one (24.90 %). Asia emerging and the Middle East gained relevance over time whereas Africa, Latin America, and especially Europe emerging lost it.

To further provide insights into the dynamics in the evolution of the relevance of the different emerging markets in the portfolios of the European pension funds, we perform an analysis of the average weights on an annual basis. Fig. 1 plots the average weight of the BRICS countries in each year.

The average weight of Brazil in the European pension funds analyzed reached the maximum value in 2011 (4.94 %), Russia in 2011 (3.75 %), India in 2024 (4.76 %), China in 2020 (13.08 %) and South Africa in 2015 (2.17 %). China's weight grows uninterruptedly until 2020 when its relevance begins to decline. The maximum value of the average weight of BRICS countries is 21.83 %, reached also in 2020. Thus, it seems that the crisis triggered by the COVID-19 pandemic marks a turning point in this growth, jeopardizing the

[11] For the sake of brevity, we only report the results when considering the first approach for concentration measures (HC and HS). However, the estimated coefficients on emerging countries/regions mostly hold signs and significance when estimated from models including the other portfolio concentration proxies.

[12] Following previous academic literature, variables are winsorized at the 1 % and 99 % levels to avoid a large potential influence of outliers (see among many others Barber et al., 2005; Blitz and Vidojevic, 2017; Agarwal et al., 2018; Li et al., 2019; Wang, 2019).

Table 1
Summary statistics.

	Obs	Mean	SD	25th	Median	75th
6-factor alpha	48,940	−0.00273	0.005302	−0.00507	−0.0022629	−0.00013
Flows	48,940	0.005635	0.085161	−0.0156	−0.0024244	0.012948
TNA (million $)	48,940	651.8374	2208.194	33.96625	121.1392	428.7078
Age (years)	48,940	12.28906	8.335119	6.287671	10.59178	16.07808
Family Size (million $)	48,940	30460.16	55804.86	2997.566	11992.68	36087.32
Expense ratio (%)	48,940	1.726356	0.627733	1.49222	1.83	2
HS	48,940	0.168204	0.061807	0.129602	0.1493329	0.18237
HC	48,940	0.257974	0.123342	0.154445	0.2421364	0.339304
DSA	48,940	0.049635	0.063467	0.013652	0.0287333	0.054433
DCA	48,940	0.125111	0.108541	0.048907	0.085027	0.172464
DSB	48,940	0.050613	0.064271	0.013726	0.0295477	0.056479
DCB	48,940	0.169854	0.198466	0.014009	0.0441242	0.342187

This table reports the descriptive statistics for the sample analyzed. Specifically, it provides information about the monthly six-factor estimated alphas considering a 36-month rolling window as well as net money flows, the monthly TNA (total net assets) in $ millions, the age of the pension fund expressed in years, the family size expressed as the sum of the TNA of all the pension funds managed by the same family, the portfolio sector and country Herfindahl index, the portfolio sector and country deviation measures regarding the average allocation of the pension funds considered in the sample, and the portfolio sector and country deviation measures regarding the average allocation in the MSCI ACWII Index. The mean, the 25th percentile, the median, the 75th percentile, and the standard deviation are provided for each variable. The number of observations is also reported.

weight of the BRICS in the following years to that event. Another noteworthy aspect is that Russia's weight falls to practically zero from 2022 onwards when the war with Ukraine begins. When comparing the figures in 2008 and 2024, we can conclude that China and India have gained weight, while Brazil, Russia, and South Africa have lost it.

Fig. 2 plots the average weight of the different emerging regions in each year.

The exposure to Africa reached its maximum in 2015 (2.59 %), Asia emerging in 2020 (18.66 %), Europe emerging in 2009 (7.26 %), Latin America in 2011 (6.26 %) and the maximum value of the Middle East's average weight occurs in 2022 (1.06 %). When considering the exposure to all the emerging markets, we can observe that the maximum exposure occurred in 2017 (28.50 %) and that this begins to fall significantly from 2020 onwards. When comparing the figures in 2008 and 2024, we can conclude that Asia emerging and the Middle East have gained weight in the portfolios of the European pension funds, while Africa, Latin America, and, especially, Europe emerging have lost it.

4.2. Impact of emerging markets exposure on European pension funds' financial performance

In this section, we study the impact of exposure to emerging markets on the financial performance of European pension funds. First, we analyze the output obtained from the base model including only controls and the models that include portfolio country and sector concentration measures. Table 4 reports the results.

For each model, it is provided the estimated coefficients on independent variables obtained from panel regressions with time and fund fixed effects and the robust standard errors assessing the significance of these coefficients. Besides, for each model, it is reported several diagnosis tests. Model 1 is the base model. Diagnosis tests reveal the significance of the model (model F-test being significant), that the fixed effect model is preferred to a pooled ordinary least squares (OLS) regression (Fixed effect F-test being significant), and discard multicollinearity problems (VIF being below the limit of 10 suggested by Kennedy, 1992, or Studenmund and Cassidy, 1992, and the stricter limit of 5.3 proposed by Hair et al., 1998).[13]

Focusing on the estimated coefficients of independent variables, we obtain that two of them, i.e., the net money flows and fund size, have a positive and significant coefficient. This means that those pension funds receiving the largest money flows and managing more money achieve better financial performance. The positive coefficient on money flows could be a sign of the smart money effect (Zheng, 1999; Muñoz, 2019), that is, pension funds' investors in our sample seem to be able to identify those funds that will subsequently show superior financial performance and direct their money flows towards them. This result differs from that obtained previously by Sialm et al. (2015) for the US market who test whether mutual fund flows from defined contribution or non-defined contribution pension plans investors can predict funds' subsequent financial performance obtaining empirical evidence that in both cases they are not able to do so.

The positive and significant coefficient estimated for the SIZE variable points out the existence of economies of scale in the administration of the pension funds included in our sample that would have a positive effect on the financial performance delivered to investors. This result aligns with others in the previous academic literature that have also found empirical evidence supporting the existence of economies of scale in the pension funds industry (Bikker and De Dreu, 2009; Agostini et al., 2014; Broeders et al., 2016; Alserda et al., 2018).

Models 2–4 test the impact of sector and country portfolio concentration measures on the financial performance of pension funds.

[13] The same conclusions are reached for the rest of the models performed. For the sake of brevity, we omit the comments on diagnoses test outcomes in the rest of the tables.

Table 2
(Part I): correlation matrix.

	6-factor alpha	Flows	Size (log TNA)	Age (log age)	Family Size (log)	Expense ratio (%)	HS	HC
Flows	**0.0892**							
Size (log TNA)	**0.0981**	**−0.0141**						
Age (log age)	**−0.0132**	**−0.0899**	**0.2443**					
Family Size (log)	**0.0188**	−0.0006	**0.4239**	**0.0787**				
Expense ratio (%)	**−0.0497**	**−0.0307**	**−0.2937**	**0.0281**	**−0.2598**			
HS	−0.0031	−0.0009	**−0.0346**	0.004	**−0.0922**	**0.1691**		
HC	**0.175**	**0.0258**	**0.0282**	**−0.0111**	**0.0438**	**−0.1436**	**0.0919**	
DSA	**0.0084**	−0.0064	**−0.0282**	**−0.0299**	**−0.0992**	**0.147**	**0.9362**	**0.0431**
DCA	**−0.099**	**−0.0379**	**−0.0763**	**0.0368**	**−0.0409**	**0.1256**	**0.1647**	**0.1264**
DSB	−0.0007	−0.0055	**−0.0307**	**−0.0319**	**−0.1045**	**0.1541**	**0.9446**	**0.031**
DCB	**−0.1891**	**−0.0483**	**−0.0638**	**0.0486**	**−0.031**	**0.1572**	**0.1159**	**−0.2797**
Brazil	**−0.0522**	**−0.0261**	**0.0611**	0.0057	**−0.0179**	**0.1159**	**−0.0498**	**−0.4309**
Russia	**−0.0828**	**−0.0422**	**−0.0376**	0.004	**−0.0469**	**0.1534**	**0.0227**	**−0.1454**
India	**−0.1599**	**−0.0273**	**0.0204**	**0.0596**	−0.0004	**0.0943**	**0.0292**	**−0.4172**
China	**−0.152**	**−0.0206**	**−0.0167**	**0.0309**	**0.0571**	**0.0568**	**0.0367**	**−0.3639**
SouthAfrica	**−0.1767**	−0.0014	**0.0273**	−0.0017	−0.0029	**0.0255**	**−0.04**	**−0.5218**
BRICS	**−0.1593**	**−0.0307**	0.0061	**0.0308**	**0.0131**	**0.109**	**0.0132**	**−0.4582**
Africa	**−0.1564**	**−0.0114**	**0.0091**	**−0.0373**	−0.0029	**0.0667**	**0.0139**	**−0.4426**
Asia Emerging	**−0.1883**	**−0.0284**	**−0.0255**	**0.0179**	**0.0279**	**0.0923**	**0.0392**	**−0.4483**
EuropeEmerging	**−0.1177**	**−0.0417**	**−0.0845**	0.0021	**−0.0741**	**0.1813**	**0.0669**	**−0.0289**
Latin America	**−0.1003**	**−0.0284**	**0.0352**	−0.005	**−0.0312**	**0.1373**	**−0.0276**	**−0.4981**
Middle East	**0.023**	**−0.0128**	−0.0064	**−0.0697**	**0.0535**	**0.0177**	**0.055**	**−0.1297**
Emerging Markets	**−0.1939**	**−0.0421**	**−0.0377**	**0.0091**	**−0.0158**	**0.161**	**0.0525**	**−0.4117**

(Part II): Correlation Matrix.

	DSA	DCA	DSB	DCB	Brazil	Russia	India	China
DCA	**0.1342**							
DSB	**0.9971**	**0.1271**						
DCB	**0.083**	**0.8993**	0.0836					
Brazil	**−0.0654**	**0.3548**	−0.0619	0.5641				
Russia	**0.0379**	**0.4605**	**0.0324**	**0.5278**	**0.4822**			
India	**−0.0513**	**0.4019**	**−0.0424**	**0.613**	**0.6545**	**0.3269**		
China	**−0.0449**	**0.4695**	**−0.0365**	**0.6744**	**0.6142**	**0.3476**	**0.7071**	
SouthAfrica	**−0.0784**	**0.1979**	**−0.0634**	**0.4412**	**0.5432**	**0.2272**	**0.4753**	**0.4579**
BRICS	**−0.0496**	**0.5129**	**−0.042**	**0.7489**	**0.8293**	**0.5776**	**0.8407**	**0.9019**
Africa	**−0.0208**	**0.3042**	**−0.0101**	**0.4904**	**0.4657**	**0.1888**	**0.3975**	**0.3565**
Asia Emerging	**−0.041**	**0.534**	**−0.0321**	**0.7595**	**0.6762**	**0.351**	**0.8447**	**0.9112**
Europe Emerging	**0.0895**	**0.5546**	**0.0787**	**0.5431**	**0.2407**	**0.7965**	**0.1505**	**0.1387**
Latin America	**−0.0528**	**0.3859**	**−0.0466**	**0.616**	**0.9317**	**0.4151**	**0.6673**	**0.6096**
Middle East	**0.0529**	**0.2998**	**0.0476**	**0.3254**	**0.0948**	**0.0296**	**0.146**	**0.1652**
Emerging Markets	0.0063	**0.682**	**0.0091**	**0.8695**	**0.7527**	**0.624**	**0.7399**	**0.758**

(Part III): Correlation Matrix

	SouthAfrica	BRICS	Africa	Asia Emerging	Europe Emerging	Latin America	Middle East
BRICS	**0.6144**						
Africa	**0.866**	**0.5071**					
Asia Emerging	**0.5676**	**0.9203**	**0.5455**				
EuropeEmerging	**0.1588**	**0.3342**	**0.1721**	**0.1805**			
Latin America	**0.6167**	**0.8103**	**0.5947**	**0.7309**	**0.2278**		
Middle East	**0.1826**	**0.1616**	**0.3956**	**0.2766**	**0.0801**	**0.1957**	
Emerging Markets	**0.6178**	**0.9007**	**0.6276**	**0.875**	**0.5726**	**0.8083**	**0.2893**

This table reports the correlation coefficient between the different variables considered across models. Significant correlations at 10 % are highlighted in bold.

Table 3
Average weight of different emerging markets in European pension funds' portfolios.

	Obs	Mean	SD	25th	Median	75th
			Panel A: June 2008-June 2024			
Brazil	48,940	3.35 %	5.37 %	0.00 %	0.43 %	5.08 %
Russia	48,940	2.09 %	4.92 %	0.00 %	0.00 %	1.71 %
India	48,940	3.58 %	5.86 %	0.00 %	0.15 %	5.48 %
China	48,940	8.06 %	11.51 %	0.00 %	2.36 %	11.82 %
South Africa	48,940	1.57 %	2.88 %	0.00 %	0.00 %	1.80 %
BRICS	48,940	18.65 %	24.38 %	0.82 %	5.44 %	40.73 %
Africa	48,940	1.89 %	3.53 %	0.00 %	0.00 %	2.25 %
Asia Emerging	48,940	13.89 %	18.14 %	2.25 %	4.01 %	28.77 %
Europe Emerging	48,940	4.05 %	10.70 %	0.00 %	0.00 %	3.86 %
Latin America	48,940	4.92 %	7.19 %	0.00 %	1.05 %	8.49 %
Middle East	48,940	0.72 %	1.59 %	0.00 %	0.00 %	0.67 %
Emerging	48,940	25.44 %	31.44 %	1.41 %	6.95 %	61.96 %
			Panel B: June 2008-May 2016			
Brazil	24,023	3.98 %	6.23 %	0.00 %	0.71 %	5.46 %
Russia	24,023	2.96 %	6.08 %	0.00 %	0.00 %	3.11 %
India	24,023	3.11 %	5.43 %	0.00 %	0.01 %	4.30 %
China	24,023	6.20 %	9.24 %	0.00 %	1.96 %	7.82 %
South Africa	24,023	1.78 %	3.21 %	0.00 %	0.00 %	1.85 %
BRICS	24,023	18.03 %	23.70 %	1.00 %	5.71 %	33.57 %
Africa	24,023	2.07 %	3.78 %	0.00 %	0.00 %	2.17 %
Asia Emerging	24,023	11.42 %	15.53 %	0.20 %	3.47 %	3.47 %
Europe Emerging	24,023	6.07 %	14.19 %	0.00 %	0.31 %	6.96 %
Latin America	24,023	5.55 %	8.05 %	0.00 %	1.25 %	8.88 %
Middle East	24,023	0.66 %	1.40 %	0.00 %	0.00 %	0.67 %
Emerging	24,023	26.00 %	32.02 %	1.67 %	7.32 %	61.80 %
			Panel C: June 2016-June 2024			
Brazil	24,917	2.74 %	4.31 %	0.00 %	0.11 %	4.86 %
Russia	24,917	1.25 %	3.23 %	0.00 %	0.00 %	0.40 %
India	24,917	4.03 %	6.21 %	0.00 %	0.46 %	6.92 %
China	24,917	9.86 %	13.10 %	0.01 %	2.89 %	18.55 %
South Africa	24,917	1.36 %	2.51 %	0.00 %	0.00 %	1.74 %
BRICS	24,917	19.25 %	25.00 %	0.66 %	5.20 %	45.18 %
Africa	24,917	1.72 %	3.26 %	0.00 %	0.00 %	2.31 %
Asia Emerging	24,917	16.28 %	20.06 %	0.63 %	4.73 %	37.67 %
Europe Emerging	24,917	2.10 %	4.78 %	0.00 %	0.00 %	2.26 %
Latin America	24,917	4.32 %	6.20 %	0.00 %	0.91 %	8.31 %
Middle East	24,917	0.79 %	1.76 %	0.00 %	0.00 %	0.67 %
Emerging	24,917	24.90 %	30.86 %	1.15 %	6.57 %	62.09 %

This table reports the summary statistics for the weights of the exposure to different emerging markets/regions of the portfolios held by pension funds included in our sample. More concretely, it is reported the exposure to Brazil, Russia, India, China, South Africa, BRICS, Africa, Asia Emerging, Europe Emerging, Latin America, Middle East, and Emerging markets overall. For each one, the mean, standard deviation, 25th percentile, median and 75th percentile, are reported. Panel A shows the summary statistics in the full sample. Panel B/C shows the summary statistics from June 08-May 16/June 16-June 24.

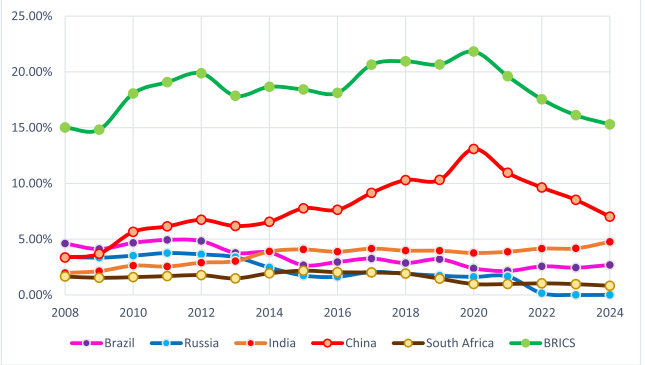

Fig. 1. Annual evolution of the average weight of different emerging countries in the European pension funds' portfolios. Fig. 1 plots the annual evolution from 2008 to 2024 of the average weight of different emerging markets (Brazil, Russia, India, China, South Africa, and BRICS) in the portfolios held by the European pension funds considered in our sample.

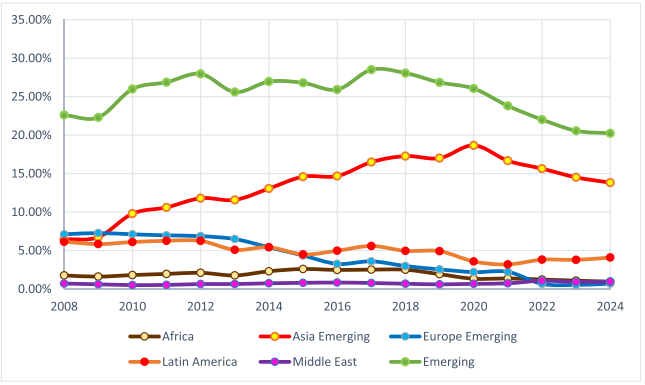

Fig. 2. Annual evolution of the average weight of different emerging regions in the European pension funds' portfolios. Fig. 2 plots the annual evolution from 2008 to 2024 of the average weight of different emerging regions (Africa, Asia emerging, Europe emerging, Latin America, Middle East, and Emerging markets overall) in the portfolios held by the European pension funds considered in our sample.

Table 4
Base model and portfolio country and sector concentration measures.

	Model 1: Base Model	Model 2: HS & HC	Model 3: DSA & DCA	Model 4: DSB & DCB
Sector Concentration		−0.0053*	−0.0018	−0.0029
		(−1.73)	(−0.58)	(−0.92)
Country Concentration		0.0082***	0.0082***	−0.0013
		(5.61)	(3.35)	(−0.66)
NCF	0.0023***	0.0023***	0.0023***	0.0023***
	(6.39)	(6.34)	(6.36)	(6.36)
SIZE	0.0005***	0.0005***	0.0006***	0.0005***
	(4.27)	(4.36)	(4.98)	(3.99)
AGE	−0.0006	−0.0006	−0.0006	−0.0006
	(−1.18)	(−1.36)	(−1.32)	(−1.18)
ER	0.0003	0.0003	0.0003	0.0003
	(1.06)	(0.96)	(1)	(0.92)
FAM	0.0002	0.0002	0.0002	0.0002
	(0.87)	(0.98)	(0.81)	(0.92)
Intercept	−0.0113**	−0.0125**	−0.0131**	−0.0109**
	(−2.12)	(−2.35)	(−2.45)	(−2.04)
Model F-test	12.1***	12.64***	12.18***	12.14***
Fixed Effects F-test	29.05***	27.28**	28.42**	25.37***
Adj-R2	0.3273	0.3362	0.3318	0.3278
Mean VIF	1.17	1.14	1.14	1.14
LR-Chi Test		655.07***	329.97***	39.06***
Obs	48,940	48,940	48,940	48,940

This table reports the results from the monthly panel regressions with time and fund fixed effects for Eq. 2 (model I), 9 (model 2), 10 (model 3), and 11 (model 4). The dependent variable is the monthly six-factor estimated alphas considering a 36-month rolling window. Across models, the explanatory variables include the following fund controls: relative net cash flows, size, age, expense ratio, and family size. Model 2 adds the portfolio sector and country Herfindahl index to model 1. Model 3 adds the deviation of the sector/country allocation regarding the average allocation in the sample to model 1. Model 4 adds the deviation of the sector/country allocation regarding the average allocation in the MSCI ACWII Index to model 1. All the explanatory variables are one-period lagged. The table shows the estimated coefficients, the t-ratios computed with robust standard errors, the model F-test, assessing the reliability of independent variables, the fixed-effect F-test, which verifies that the fixed-effect model is preferred to a pooled OLS regression, the adjusted R-squared, the mean VIF evaluating multicollinearity problems, the likelihood (LR chi test), which compares the goodness of fit between models (we compare models 2–4 with model 1), and the number of observations.
*** Significant at 1 %; ** significant at 5 %; * significant at 10 %.

Model 2 considers as a proxy the portfolio sector and country Herfindahl indexes. Model 3 adds to the base model the variables that measure the deviation of the portfolio's weights on different sectors/countries regarding the average weight of these sectors/countries in the industry. Model 4 considers the variables that approach the deviation of the portfolio's weights on the different sectors/countries regarding the weight of these sectors/countries in the MSCI ACWII Index.

As can be seen, in Model 2, the estimated coefficient on the HS variable is negative and significant meaning that holding a more concentrated portfolio in terms of economic sectors negatively impacts the financial performance of pension funds. This means that the potential informational advantages that could exist for specializing in a sector would be outweighed by the disadvantages arising from a lower diversification.

However, the estimated coefficients on HC and DCA are positive and significant, meaning that holding a more concentrated

portfolio at the country level and making a portfolio country allocation divergent regarding the average allocation in the pension fund industry positively impacts the financial performance of pension funds. The result on the HC variable suggests that pension fund managers in our sample could concentrate their operations in countries in which they enjoy an informational advantage that they exploit to achieve superior financial performance (Van Nieuwerburgh and Veldkamp, 2009; Choi et al., 2017; Fleta-Asín and Muñoz, 2023; Alda, 2025). The positive and significant estimated coefficient on the DCA variable points out that pension fund managers in our sample that make country asset allocation decisions more divergent regarding the industry create value and deliver better financial performance to investors (Cremers and Petajisto, 2009; Gimeno et al., 2022).

Table 5 reports the result for the base model and the models controlling for sector/country concentration measures when they are estimated in two symmetric cohorts, that is, June 08-May 16 and June 16-June 24. This allows us to analyze the consistency of our previous findings over time.

Models 5 and 6 report the results for the base model. As can be seen, the estimated coefficients on net money flows are positive and significant in the two sub-periods. However, the positive and significant coefficient on the SIZE variable obtained in the first half of the period analyzed becomes negative and non-significant in the second half, suggesting that the economies of scale identified in the previous analysis disappear over time.

Models 7 and 8 provide the results when considering the portfolio sector/country Herfindahl indexes. As can be seen, the sign of the estimated coefficients on the HS and HC variables hold in the two sub-periods but are only significant in the first one. Thus, the significant effects of the portfolio concentration on sectors/countries obtained for the full sample are determined by the behavior of pension funds' managers in the first half of the period analyzed, and these effects cease to be significant over time.

Models 9 and 10 provide empirical evidence for the deviation of the managers from the average sector/country allocation in the industry. As can be seen, the only estimated coefficient being significant is that on the DCA variable in the second half of the period analyzed (June 16 to June 24). This means that the positive impact on the financial performance of pension funds' managers making a divergent portfolio country asset allocation regarding the average country allocation of all pension funds in the sample is driven by their country allocation decisions in the second sub-period.

Interestingly, when analyzing the estimated coefficients of models 11 and 12, we can observe that the estimated coefficient on the DCB variable turns from negative and significant in the first half into positive and significant in the second one. This means that more differentiated management in terms of the country allocation of the portfolio regarding the MSCI ACWII Index turns from jeopardizing the financial performance of the pension funds in the first years of our sample to having a positive effect in recent years. This result, together with that obtained in models 9 and 10, reveals that the skill of the pension fund managers in our sample to provide superior financial performance by making divergent portfolio country allocation decisions increases over time.

Regarding the impact of emerging markets exposure on pension funds' financial performance, we first test the effect of BRICS markets. The results are reported in Table 6.

First, we notice that the estimated coefficients on control variables are mostly consistent in sign and significance across models. Regarding the impact of emerging market exposure, the empirical evidence obtained is mixed depending on the market considered. Thus, the estimated coefficients on the weights of Brazil and Russia are positive and significant, whereas the estimated coefficients on India and South Africa are negative and significant. The estimated coefficient for China is positive but non-significant. This means that overall, in the full period analyzed, greater exposure to Brazil and Russia (India and South Africa) positively (negatively) relates to the pension funds managers' financial performance. Model 18 tests the impact of the exposure to all five markets together. As can be seen, the estimated coefficient on the BRICS variable is positive and significant, which means that greater exposure to these markets positively impacts financial performance.

To provide further insights, we analyze the impact of the exposure to different emerging regions. Table 7 provides the results.

Again, the empirical evidence obtained differs according to the region considered. As can be seen, the estimated coefficient on Africa is negative and significant whereas the estimated coefficients on Europe emerging, Latin America, and the Middle East are positive and significant. The estimated coefficient on the weights of Asia emerging and all the emerging markets considered together are negative but non-significant. These outcomes mean that overall, in the full period considered, a greater exposure to Europe emerging, Latin America, and the Middle East (Africa) positively (negatively) relates to the financial performance obtained by pension funds' managers in our sample.

Next, to analyze the consistency of the findings obtained in the full period, we studied the impact of being more or less exposed to the different emerging markets/regions in two different sub-periods, from June 2008 to May 2016 and from June 2016 to May 2024. Tables 8 and 9 report the empirical evidence of BRICS markets.

Table 8 provides the results for Brazil, Russia, and India. As can be seen, the estimated coefficients obtained on the weight of these countries in each sub-period reveal mixed impact. Thus, in the case of Brazil, the impact on financial performance turns from positive and significant to negative and significant. The exposure to Russia has a positive effect on financial performance both in the first and second half of the sample analyzed, although this effect is stronger in the first half than in the second one. In the case of India, the effect turns from negative and significant in the first half to positive but non-significant in the second half.

Table 9 provides the results for China, South Africa, and all BRICS markets. Again the empirical evidence is diverse. In the case of the exposure to China, the impact on financial performance turns from negative and significant in the first half to positive and significant in the second one. The estimated coefficient in South Africa's weight is positive but non-significant in the first sub-period and becomes negative and significant in the second one. Finally, the impact of the exposure to BRICS markets on financial performance is positive in both sub-periods but only significant in the second one.

Tables 10 and 11 provide the results when analyzing the impact of emerging regions' exposure on financial performance controlling for sub-periods.

Table 5
Base model and portfolio country and sector concentration measures in different sub-periods (June 08-May 16/June 16-June24).

	Model 5: Base Model June 08-May 16	Model 6: Base Model June 16-June 24	Model 7: HS & HC June 08-May 16	Model 8: HS & HC June 16-June 24	Model 9: DSA & DCA June 08-May 16	Model 10: DSA & DCA June 16-June 24	Model 11: DSB & DCB June 08-May 16	Model 12: DSB & DCB June 16-June 24
Sector Concentration			−0.0144***	−0.0018	−0.0078	0.0049	−0.0068	0.0044
			(−2.89)	(−0.51)	(−1.55)	(1.35)	(−1.37)	(1.19)
Country Concentration			0.0159***	0.0011	−0.0014	0.0206***	−0.0160***	0.0200***
			(6.05)	(0.64)	(−0.39)	(5.73)	(−4.11)	(6.65)
NCF	0.0016**	0.0011***	0.0016***	0.0011***	0.0016**	0.0011***	0.0015***	0.0011***
	(2.59)	(3.14)	(2.68)	(3.14)	(2.59)	(3.05)	(2.49)	(3.02)
SIZE	0.0020***	−0.0002	0.0020***	−0.0002	0.0020***	0.0000	0.0019***	0.0000
	(7.47)	(−1.35)	(7.52)	(−1.3)	(7.36)	(0.23)	(7.14)	(0.29)
AGE	−0.0010	0.0000	−0.0013	0.0000	−0.0009	−0.0002	−0.0008	−0.0002
	(−0.89)	(−0.08)	(−1.26)	(−0.08)	(−0.87)	(−0.5)	(−0.83)	(−0.47)
ER	0.0010***	−0.0001	0.0010***	−0.0001	0.0010***	−0.0001	0.0011***	−0.0002
	(2.81)	(−0.27)	(2.86)	(−0.27)	(2.88)	(−0.36)	(3.03)	(−0.58)
FAM	−0.0002	0.0000	−0.0001	0.0000	−0.0002	−0.0002	−0.0003	−0.0001
	(−0.43)	(−0.05)	(−0.13)	(−0.08)	(−0.43)	(−0.46)	(−0.76)	(−0.32)
Intercept	−0.0312***	−0.0015	−0.0336***	−0.0013	−0.0303***	−0.0040	−0.232**	−0.0057
	(−2.96)	(−0.17)	(−3.23)	(−0.16)	(−2.88)	(−0.55)	(−2.38)	(−0.8)
Model F-test	11.87***	13.25***	12.78***	13.1***	11.76***	14.39***	12.77**	15.15***
Fixed Effects F-test	27.37**	33.46***	27.89***	28.74***	26.32***	36.52***	25.79***	34.98***
Adj-R2	0.3951	0.2819	0.4149	0.2821	0.3964	0.3174	0.4136	0.3256
Mean VIF	1.15	1.21	1.13	1.18	1.13	1.17	1.13	1.17
LR-Chi Test			801.44***	10.5***	53.06***	1265.29***	748.5***	1568.44***
Obs	24,023	24,917	24,023	24,917	24,023	24,917	24,023	24,917

This table reports the results from the monthly panel regressions with time and fund fixed effects for Eq. 2 (model 5–6), 9 (model 7–8), 10 (model 9–10), and 11 (model 11–12) in the sub-period from June 2008 to May 2016 (models 5, 7, 9, and 11) and in the sub-period from June 16 to June 24 (models 6, 8, 10, and 12). The dependent variable is the monthly six-factor estimated alphas considering a 36-month rolling window. Across models, the explanatory variables include the following fund controls: relative net cash flows, size, age, expense ratio, and family size. Models 7/8 add the portfolio sector and country Herfindahl index to models 5/6. Models 9/10 add the deviation of the sector/country allocation regarding the average allocation in the sample to models 5/6. Models 11/12 add the deviation of the sector/country allocation regarding the average allocation in the MSCI ACWII Index to models 5/6. All the explanatory variables are one-period lagged. The table shows the estimated coefficients, the t-ratios computed with robust standard errors, the model F-test, assessing the reliability of independent variables, the fixed-effect F-test, which verifies that the fixed-effect model is preferred to a pooled OLS regression, the adjusted R-squared, the mean VIF evaluating multicollinearity problems, the likelihood (LR chi test), which compares the goodness of fit between models (we compare models 7, 9 and 11 with model 5 and models 8, 10 and 12 with model 6), and the number of observations.
*** Significant at 1 %; ** significant at 5 %; * significant at 10 %.

Table 6
Impact of the exposures to BRICS markets in the financial performance of European pension funds.

	Model 13: Brazil	Model 14: Russia	Model 15: India	Model 16: China	Model 17: South Africa	Model 18: BRICS
Emerging market	0.0273***	0.0152***	−0.0122***	0.0014	−0.0148**	0.0054**
	(4.75)	(3.82)	(−2.7)	(0.45)	(−2.04)	(2.35)
NCF	0.0023***	0.0023***	0.0023***	0.0023***	0.0023***	0.0023***
	(6.45)	(6.5)	(6.39)	(6.34)	(6.49)	(6.35)
SIZE	0.0004***	0.0004***	0.0005***	0.0005***	0.0005***	0.0005***
	(3.42)	(3.63)	(4.13)	(4.38)	(4.49)	(4.41)
AGE	−0.0006	−0.0007	−0.0006	−0.0006	−0.0006	−0.0006
	(−1.27)	(−1.39)	(−1.34)	(−1.34)	(−1.35)	(−1.32)
ER	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003
	(0.83)	(1)	(0.94)	(0.97)	(0.89)	(1.02)
FAM	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002
	(1.23)	(1.03)	(0.84)	(0.93)	(0.91)	(0.97)
HS	−0.0028	−0.0047	−0.0047	−0.0053*	−0.0057*	−0.0049
	(−0.89)	(−1.53)	(−1.56)	(−1.76)	(−1.88)	(−1.59)
HC	0.0082***	0.0080***	0.0076***	0.0082***	0.0078***	0.0086***
	(5.64)	(5.61)	(5.6)	(5.61)	(5.31)	(5.84)
Intercept	−0.0138***	−0.0120**	−0.0111**	−0.0126**	−0.0120**	−0.0135**
	(−2.67)	(−2.31)	(−2.05)	(−2.35)	(−2.25)	(−2.58)
Model F-test	13.66***	13.19***	13.3***	12.71***	12.69***	12.93***
Fixed Effects F-test	29.03***	27.10***	27.10***	26.41***	26.95***	26.80***
Adj-R2	0.3496	0.3401	0.3391	0.3364	0.3380	0.3388
Mean VIF	1.19	1.13	1.18	1.17	1.22	1.19
LR-Chi Test	992.91	289.48***	214.81***	9.23***	131.67***	190.91***
Obs	48,940	48,940	48,940	48,940	48,940	48,940

This table reports the results from the monthly panel regressions with time and fund fixed effects for Eq. 12. The dependent variable is the monthly six-factor estimated alphas considering a 36-month rolling window. Across models, the explanatory variables include the following fund controls: relative net cash flows, size, age, expense ratio, family size, the portfolio sector Herfindahl index, and the portfolio country Herfindahl index. Model 13/14/15/16/17/18 adds the weight of Brazil/Russia/India/China/South Africa/BRICS to model 2. All the explanatory variables are one-period lagged. The table shows the estimated coefficients, the t-ratios computed with robust standard errors, the model F-test, assessing the reliability of independent variables, the fixed-effect F-test, which verifies that the fixed-effect model is preferred to a pooled OLS regression, the adjusted R-squared, the mean VIF evaluating multicollinearity problems, the likelihood (LR chi test), which compares the goodness of fit between models (we compare models 13–18 with model 2), and the number of observations.
*** Significant at 1 %; ** significant at 5 %; * significant at 10 %.

Table 10 reports the results for Africa, Asia emerging, and Europe emerging. Again, the empirical evidence is mixed depending on the region analyzed. Thus, the exposure to Africa negatively impacts financial performance in the second sub-period being non-significant its effect in the first one. In the case of Asia emerging, the exposure to this region negatively impacts financial performance in the first sub-period but this effect becomes positive in the second half. In the case of Europe emerging, the impact on financial performance is positive and significant in the first sub-period but this impact becomes non-significant in the second one.

Table 11 shows the results for Latin America, the Middle East, and all the emerging markets. In the case of Latin America, the estimated coefficients on the weight of this region turn from positive and significant to negative and significant. In the case of the Middle East, the positive effect on financial performance occurs in the two sub-periods. When considering the exposure to all emerging markets, we obtain that the impact on financial performance is not significant in any of the sub-periods.

The above empirical evidence allows us to draw some conclusions. The impact that exposure to emerging markets has on the financial performance of pension funds depends on the market or region analyzed. Furthermore, this impact evolves over time for most of them. In the case of exposure to Russia and the Middle East, the positive effect is held in both sub-periods (although it is necessary to remember that since 2022, when the war in Ukraine began, exposure to Russia has practically fallen to zero, and in fact, the positive effect is stronger in the first sub-period).

Regarding markets/regions in which the result depends on the sub-period analyzed, it is observed that the positive effect of investing in Brazil, Latin America, or Europe emerging disappears in the second sub-period and, on the contrary, emerging markets that negatively affected financial performance in the first sub-period, such as China or Asia emerging, begin to have a positive effect in the second.

Additional insights can be drawn when considering the empirical evidence obtained in this subsection together with that obtained in subsection 4.1. In that subsection, we saw that the weight of markets such as Brazil, Latin America, or Europe emerging fell over time while the weight of other markets such as China or Asia emerging increased their relevance. It seems that pension fund managers in the sample have adjusted their exposure to emerging markets, raising(diminishing) the weight of those countries or regions that positively (negatively) impact financial performance. For example, in the case of Asia emerging, its average weight in the first sub-period (when it has a negative impact on performance) is 11.42 % and rises to 16.28 % in the second one (when it has a positive impact on financial performance). Meanwhile, the average weight of Europe emerging in the portfolios is 6.07 % in the first half of the period analyzed (when it has a positive effect on performance) and reduces to 2.10 % in the second sub-period (when its impact on financial performance ceases to be significant).

Table 7
Impact of the exposures to emerging regions in the financial performance of European pension funds.

	Model 19: Africa	Model 20: Asia emerging	Model 21: Europe emerging	Model 22: Latin America	Model 23: Middle East	Model 24: Emerging overall
Emerging market	−0.0156**	−0.0040	0.0093***	0.0107***	0.0527***	−0.0007
	(−2.19)	(−1.58)	(2.83)	(2.67)	(4.59)	(−0.4)
NCF	0.0023***	0.0023***	0.0023***	0.0023***	0.0023***	0.0023***
	(6.47)	(6.37)	(6.42)	(6.37)	(6.48)	(6.34)
SIZE	0.0005***	0.0004***	0.0004***	0.0004***	0.0005***	0.0005***
	(4.57)	(3.88)	(3.75)	(3.85)	(4.66)	(4.37)
AGE	−0.0007	−0.0007	−0.0006	−0.0006	−0.0007	−0.0007
	(−1.39)	(−1.38)	(−1.35)	(−1.26)	(−1.54)	(−1.37)
ER	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
	(0.9)	(0.93)	(0.99)	(0.9)	(1.01)	(0.96)
FAM	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002
	(0.91)	(1.02)	(1.03)	(1.14)	(0.61)	(0.97)
HS	−0.0056*	−0.0051*	−0.0046	−0.0047	−0.0055*	−0.0054
	(−1.87)	(−1.65)	(−1.51)	(−1.51)	(−1.88)	(−1.74)
HC	0.0079***	0.0079***	0.0079***	0.0086***	0.0084***	0.0082***
	(5.33)	(5.36)	(5.49)	(5.84)	(5.82)	(5.57)
Intercept	−0.0121**	−0.0117**	−0.0123**	−0.0135**	−0.0115**	−0.0123**
	(−2.27)	(−2.16)	(−2.34)	(−2.54)	(−2.15)	(−2.28)
Model F-test	12.75***	12.59***	12.85***	12.69***	12.2***	12.64***
Fixed Effects F-test	27.31***	26.45***	25.83***	27.62***	28.32***	25.71***
Adj-R2	0.3387	0.3377	0.3387	0.3395	0.3479	0.3303
Mean VIF	1.19	1.19	1.13	1.21	1.13	1.18
LR-Chi Test	184.29***	105.28***	184.39***	240.65***	866.56***	3.01*
Obs	48,940	48,940	48,940	48,940	48,940	48,940

This table reports the results from the monthly panel regressions with time and fund fixed effects for Eq. 12. The dependent variable is the monthly six-factor estimated alphas considering a 36-month rolling window. Across models, the explanatory variables include the following fund controls: relative net cash flows, size, age, expense ratio, family size, the portfolio sector Herfindahl index, and the portfolio country Herfindahl index. Model 19/20/21/22/23/24 adds the weight of Africa/Asia emerging/Europe emerging/Latin America/Middle East/Emerging markets overall to model 2. All the explanatory variables are one-period lagged. The table shows the estimated coefficients, the t-ratios computed with robust standard errors, the model F-test, assessing the reliability of independent variables, the fixed-effect F-test, which verifies that the fixed-effect model is preferred to a pooled OLS regression, the adjusted R-squared, the mean VIF evaluating multicollinearity problems, the likelihood (LR chi test), which compares the goodness of fit between models (we compare models 19–24 with model 2), and the number of observations.
*** Significant at 1 %; ** significant at 5 %; * significant at 10 %.

Table 8
Impact of the exposures to BRICS markets in the financial performance of European pension funds in different sub-periods (Part I).

	Model 25: Brazil June 08-May 16	Model 26: Brazil June 16-June 24	Model 27: Russia June 08-May 16	Model 28: Russia June 16-June 24	Model 29: India June 08-May 16	Model 30: India June 16-June 24
Emerging market	0.0724***	−0.0277***	0.0206***	0.0108*	−0.0425***	0.0016
	(11.14)	(−4.47)	(2.97)	(1.72)	(−5.38)	(0.32)
Fund Controls	YES	YES	YES	YES	YES	YES
Model F-test	18.02***	14.57***	13.39***	13.3***	13.35***	12.96***
Fixed Effects F-test	35.88***	27.80**	27.91***	28.27***	28.88***	28.40***
Adj-R2	0.4807	0.2954	0.4195	0.2849	0.4311	0.2822
Mean VIF	1.19	1.23	1.13	1.18	1.17	1.25
LR-Chi Test	2867,62**	465.75***	192.79***	98.09***	676.1***	2.58
Obs	24,023	24,917	24,023	24,917	24,023	24,917

This table reports the results from the monthly panel regressions with time and fund fixed effects for Eq. 12 in the sub-period from June 08 to May 16 (models 25, 27, and 29) and in the sub-period from June 16 to June 24 (models 26, 28 and 30). The dependent variable is the monthly six-factor estimated alphas considering a 36-month rolling window. Across models, the explanatory variables include the following fund controls: relative net cash flows, size, age, expense ratio, family size, the portfolio sector Herfindahl index, and the portfolio country Herfindahl index. Models 25, 27, 29/26, 28, 30 add the weight of Brazil, Russia, and India to model 7/8, respectively. All the explanatory variables are one-period lagged. The table shows the estimated coefficients, the t-ratios computed with robust standard errors, the model F-test, assessing the reliability of independent variables, the fixed-effect F-test, which verifies that the fixed-effect model is preferred to a pooled OLS regression, the adjusted R-squared, the mean VIF evaluating multicollinearity problems, the likelihood (LR chi test), which compares the goodness of fit between models (we compare models 25, 27, 29/26, 28, 30 with model 7/8), and the number of observations.
*** Significant at 1 %; ** significant at 5 %; * significant at 10 %.

Table 9
Impact of the exposures to BRICS markets in the financial performance of European pension funds in different sub periods (Part II).

	Model 31: China June 08-May 16	Model 32: China June 16-June 24	Model 33: South Africa June 08-May 16	Model 34: South Africa June 16-June 24	Model 35: BRICS June 08-May 16	Model 36: BRICS June 16-June 24
Emerging market	−0.0259***	0.0215***	0.0213	−0.0516***	0.0040	0.0116***
	(−5.06)	(6.45)	(1.48)	(−6.59)	(1.06)	(3.08)
Fund Controls	YES	YES	YES	YES	YES	YES
Model F-test	13.37***	16.27***	12.77***	16.27***	12.84***	13.04
Fixed Effects F-test	28.24***	33.45***	28.07***	27.66***	27.37***	29.26***
Adj-R2	0.4318	0.3311	0.4167	0.3130	0.4156	0.2997
Mean VIF	1.16	1.23	1.21	1.26	1.18	1.26
LR-Chi Test	706.18***	1762.8***	76.08***	1096.15***	30.85***	616.76***
Obs	24,023	24,917	24,023	24,917	24,023	24,917

This table reports the results from the monthly panel regressions with time and fund fixed effects for Eq. 12 in the sub-period from June 08 to May 16 (models 31, 33, and 35) and in the sub-period from June 16 to June 24 (models 32, 34 and 36). The dependent variable is the monthly six-factor estimated alphas considering a 36-month rolling window. Across models, the explanatory variables include the following fund controls: relative net cash flows, size, age, expense ratio, family size, the portfolio sector Herfindahl index, and the portfolio country Herfindahl index. Models 31, 33, 35/32, 34, 36 add the weight of China, South Africa, and BRICS to model 7/8, respectively. All the explanatory variables are one-period lagged. The table shows the estimated coefficients, the t-ratios computed with robust standard errors, the model F-test, assessing the reliability of independent variables, the fixed-effect F-test, which verifies that the fixed-effect model is preferred to a pooled OLS regression, the adjusted R-squared, the mean VIF evaluating multicollinearity problems, the likelihood (LR chi test), which compares the goodness of fit between models (we compare models 31, 33, 35/32, 34, 36 with model 7/8), and the number of observations.
*** Significant at 1 %; ** significant at 5 %; * significant at 10 %.

Table 10
Impact of the exposures to emerging regions in the financial performance of European pension funds in different sub periods (Part I).

	Model 37: Africa June 08-May 16	Model 38: Africa June 16-June 24	Model 39: Asia emerging June 08-May 16	Model 40: Asia emerging June 16-June 24	Model 41: Europe emerging June 08-May 16	Model 42: Europe emerging June 16-June 24
Emerging market	0.0155	−0.0516***	−0.0297***	0.0139***	0.0162**	−0.0004
	(1.11)	(−7.24)	(−7.25)	(4.5)	(2.35)	(−0.06)
Fund Controls	YES	YES	YES	YES	YES	YES
Model F-test	12.67***	15.1***	14.66***	13.07***	12.85***	12.98***
Fixed Effects F-test	28.00***	30.5***	30.39***	30.62***	26.95***	27.27***
Adj-R2	0.4161	0.3209	0.4493	0.3076	0.4200	0.2821
Mean VIF	1.19	1.22	1.19	1.26	1.14	1.18
LR-Chi Test	52.64***	1383.62***	1457.28***	902.3***	213.44***	0.16
Obs	24,023	24,917	24,023	24,917	24,023	24,917

This table reports the results from the monthly panel regressions with time and fund fixed effects for Eq. 12 in the sub-period from June 08 to May 16 (models 37, 39, and 41) and in the sub-period from June 16 to June 24 (models 38, 40 and 42). The dependent variable is the monthly six-factor estimated alphas considering a 36-month rolling window. Across models, the explanatory variables include the following fund controls: relative net cash flows, size, age, expense ratio, family size, the portfolio sector Herfindahl index, and the portfolio country Herfindahl index. Models 37, 39, 41/38, 40, 42 add the weight of Africa, Asia emerging, and Europe emerging to model 7/8, respectively. All the explanatory variables are one-period lagged. The table shows the estimated coefficients, the t-ratios computed with robust standard errors, the model F-test, assessing the reliability of independent variables, the fixed-effect F-test, which verifies that the fixed-effect model is preferred to a pooled OLS regression, the adjusted R-squared, the mean VIF evaluating multicollinearity problems, the likelihood (LR chi test), which compares the goodness of fit between models (we compare models 37, 39, 41/38, 40, 42 with model 7/8), and the number of observations.
*** Significant at 1 %; ** significant at 5 %; * significant at 10 %.

5. Conclusions

Pension systems in Europe are facing challenges that threaten their sustainability. According to a report by the European Parliament based on Eurostat figures, the population aged 65 and over was 22 % in 2022 and will account for 30 % in 2070. The population aged 20–64 will decrease from 59 % to 51 % in the same period. In this framework, the successful management of pension funds is a key driver to ensure that savers have adequate income when they retire.

Academic literature and industry have identified emerging markets as a good opportunity for European pension funds aiming to achieve optimal financial outcomes. Pension fund managers could obtain diversification benefits by investing in emerging stock markets. Furthermore, exposure to emerging markets by European pension funds could be a symbiotic relationship, as huge amounts of money would be channeled into triggering the development of these emerging markets and their economic growth.

In this research, we have analyzed the exposure to emerging markets of a broad sample of European pension funds with an

Table 11
Impact of the exposures to emerging regions in the financial performance of European pension funds in different sub periods (Part II).

	Model 43: Latin America June 08-May 16	Model 44: Latin America June 16-June 24	Model 45: Middle East June 08-May 16	Model 46: Middle East June 16-June 24	Model 47: Emerging June 08-May 16	Model 48: Emerging June 16-June 24
Emerging market	0.0563***	−0.0308***	0.0616***	0.0353***	0.0014	−0.0017
	(9.62)	(−7.38)	(3.49)	(2.95)	(0.45)	(−0.96)
Fund Controls	YES	YES	YES	YES	YES	YES
Model F-test	15.89***	15.94***	13.06***	13.3***	12.66***	13.13***
Fixed Effects F-test	34.16***	29.10***	28.49***	29.21***	26.59***	27.02***
Adj-R2	0.4669	0.3167	0.4244	0.2905	0.4150	0.2825
Mean VIF	1.21	1.26	1.12	1.17	1.15	1.27
LR-Chi Test	2239.84***	1231.83***	395.77**	293.7***	4.53**	14.04***
Obs	24,023	24,917	24,023	24,917	24,023	24,917

This table reports the results from the monthly panel regressions with time and fund fixed effects for Eq. 12 in the sub-period from June 08 to May 16 (models 43, 45, and 47) and in the period from June 16 to June 24 (models 44, 46 and 48). The dependent variable is the monthly six-factor estimated alphas considering a 36-month rolling window. Across models, the explanatory variables include the following fund controls: relative net cash flows, size, age, expense ratio, family size, the portfolio sector Herfindahl index, and the portfolio country Herfindahl index. Models 43, 45, 47/44, 46, 48 add the weight of Latin America, Middle East, and Emerging markets overall to model 7/8, respectively. All the explanatory variables are one-period lagged. The table shows the estimated coefficients, the t-ratios computed with robust standard errors, the model F-test, assessing the reliability of independent variables, the fixed-effect F-test, which verifies that the fixed-effect model is preferred to a pooled OLS regression, the adjusted R-squared, the mean VIF evaluating multicollinearity problems, the likelihood (LR chi test), which compares the goodness of fit between models (we compare models 43, 45, 47/44, 46, 48 with model 7/8), and the number of observations.
*** Significant at 1 %; ** significant at 5 %; * significant at 10 %.

international equity investment vocation in the period spanning from June 2008 to June 2024. We have also studied how this exposure impacts the financial performance of pension fund managers. The empirical findings obtained provided mixed empirical evidence according to the market and period considered.

Regarding the exposure to emerging markets, we obtain that the average exposure to all emerging markets considered together is 25.44 % however this figure evolves over time. Thus, in 2008, this exposure was 22.61 %, being 20.23 % in 2024, and reaching the maximum relevance in 2017 (28.50 %). In general terms, both the COVID-19 crisis and the war in Ukraine seem to have jeopardized European pension funds' investment in emerging markets, as these events represent turning points for exposure to different markets. Comparing the average weight of different emerging markets in 2008 and 2024, we can observe that China, India, and Asia emerging have gained relevance over time, while other markets such as Brazil, Russia, South Africa, Africa, Latin America, and Europe emerging have lost weight.

Regarding the financial performance of pension funds, our findings reveal some interesting patterns. We observe that making divergent portfolio country allocation decisions, especially in the second half of the period studied, positively impacts the financial performance of pension funds' managers. Other findings related to control variables show the existence of economies of scale that disappear over time and that investors can detect the pension funds that subsequently will achieve better financial performance and channel their money towards them.

Additionally, the impact of emerging markets exposure on the financial performance of pension fund managers depends on the market/region analyzed and evolves over time. Overall, for the full period analyzed, greater exposure to Brazil, Russia, BRICS, Latin America, the Middle East, and Europe emerging positively relates to pension funds' financial performance. When controlling for different sub-periods, we detect that some markets that positively impact the financial performance in the first half no longer have a significant and even have a negative impact in the second half (e.g., Brazil, Latin America, or Europe emerging). At the same time, we observe the opposite phenomenon, that is, exposure to certain emerging markets goes from a negative impact on financial performance in the first years to a positive effect in the second one (e.g., China and Asia emerging). In this regard, an interesting finding is that pension fund managers seem to adjust their exposure to different emerging markets based on these financial performance results. That is, over time, markets such as China or Asia emerging gain relevance while others such as Brazil, Latin America, or Europe emerging lose it.

The results obtained in this article allow us to answer the two research questions posed and can be of interest to the different stakeholders involved in pensions, including regulators, insurance and pension fund companies, and savers. With a growing relevance in most European pension systems, the ability of pension fund managers to deliver superior financial performance becomes a key aspect to ensure adequate remuneration of the savers at the time of their retirement. In this sense, it is observed that emerging markets can constitute an opportunity to achieve such superior performance. However, this research suffers from some limitations that at the same time trace avenues for further research. This article has focused on equity pension funds. Further research should study the exposure to emerging markets and their impact on financial performance in the case of bonds. It would also be interesting to explore the opportunities existing in other asset classes such as private debt and private equity. In this research, we work with the percentage of the portfolio allocated to a specific market/region however empirical evidence obtained from holdings information could provide additional insights.

CRediT authorship contribution statement

Fernando Muñoz: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Yaolong Cui:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Rut Vicente:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT in order to improve readability and language of the text. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of Competing Interest

None.

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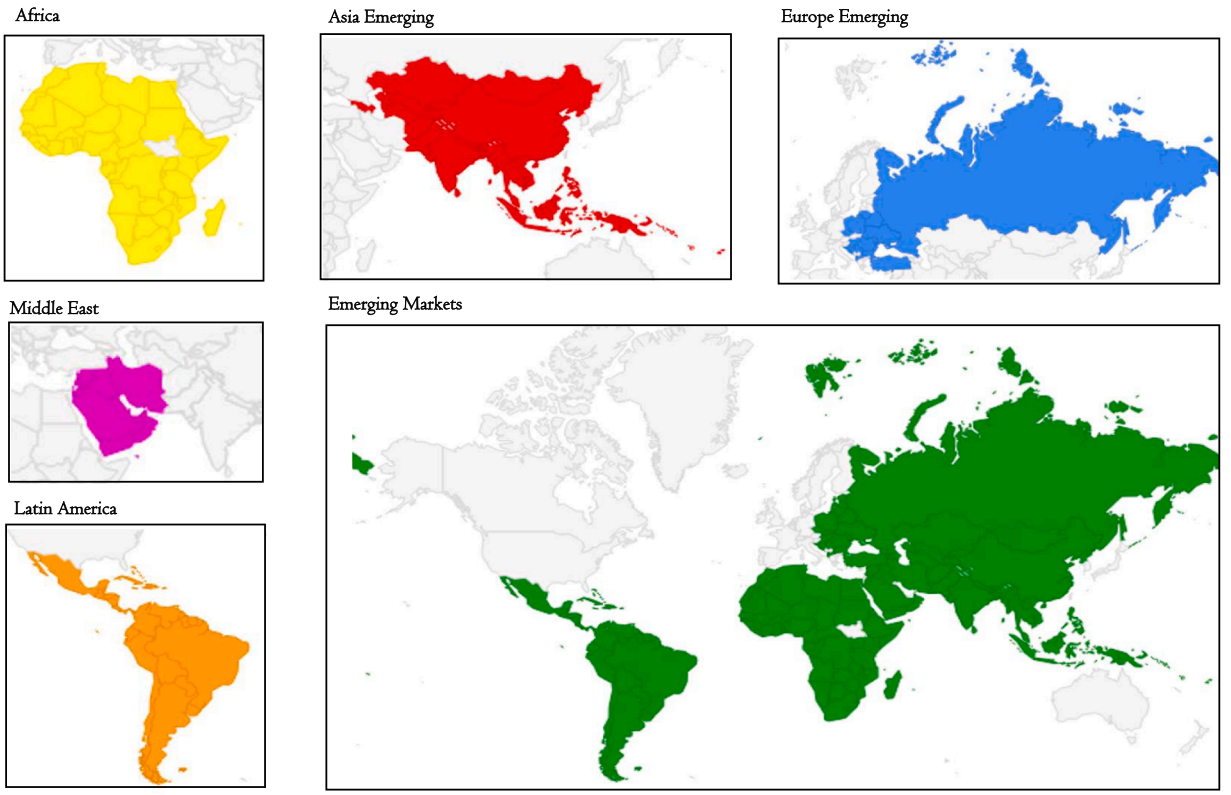
Appendix. : Countries within each region according to Morningstar regions



An exhaustive list of the countries considered within each region can be found at Glossary of Morningstar: https://www.morningstar.co.uk/uk/glossary/98216/morningstar-regions.aspx

Data availability

Data will be made available on request.

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